

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN **MANUAL**

Edition 2 – Updated February 2019

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MAJOR Project Template Guide		
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Acronyms Used in this Manual

CEMP	Construction Environmental Management Plan
LPC	Lyttelton Port Company
ECAN	Environment Canterbury (Canterbury Regional Council)
CCC	Christchurch City Council
RMA	Resource Management Act 1991
NES (Soil)	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NIWA	National Institute of Water and Atmospheric Research
HSNO	Hazardous Substances and New Organisms Act 1996



1.0 INTRODUCTION GUIDELINES FOR PRODUCING A CEMP





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FROM THE CE

Lyttelton Harbour/Whakaraupō is a unique environment and its important to me that we ensure the Harbour can be enjoyed for its environmental, recreational and cultural values now and into the future.

The Port has been a feature of the Harbour since 1849 and since that time we have continued to grow, develop and meet the needs of a thriving Canterbury economy – we are committed to doing that in a way that protects the ecological health of the harbour.

The Lyttelton Port earthquake recovery and development programme involves repair, rebuild and enhancement of almost all our infrastructure. We have developed this comprehensive plan for managing construction effects to ensure we achieve a consistently high standard of environmental performance across all our projects.

This Plan has been developed by technical experts in each of the discipline areas and in close consultation with Te Hapū o Ngāti Wheke (Rāpaki) who hold mana whenua and mana moana over Whakaraupō.

Inevitably we will work with a wide range of Contractors, large and small in the course of our development programme and my expectation is that we will value most those organisations which actively work to this high standard and share our commitment to environmental performance.

Peter Davie
CHIEF EXECUTIVE
LPC

WORKING TOGETHER

Whakaraupō is of immense cultural significance to Ngāi Tahu. Tangata Whenua associations with Whakaraupō extend over many centuries, and include three major streams of Māori – Waitaha, Ngāti Mamoe and in later generations, Ngāi Tahu. The rich resources of the Harbour brought Māori to settle in this area, and today the Harbour remains highly valued for mahinga kai. The mana moana (traditional authority) of Rāpaki Ngāi Tahu over this special place is inherited from the ancestors.

Just as the Harbour drew Ngāi Tahu to settle in this place, its attractiveness as a Port was recognised by 1849, with the first four ships of immigrants to the Canterbury settlement following shortly thereafter. Whakaraupō is now the largest deep water Port in the South Island, providing significant economic benefit for the community and the region.

Lyttelton Port Company (LPC) and Te Hapū o Ngāti Wheke share a long term interest in the future of Whakaraupō. We place a high level of importance on working together to fulfil our common responsibility as custodians and kaitiaki of the harbour.

We are committed to strengthening the partnership that already exists between us, and to enable future generations to realise the benefits of this partnership through the protection of Whakaraupō and its ability to provide for cultural, social and economic well-being.

LPC is entering a critical phase of Port recovery and development. The Port Lyttelton Plan sets out the long term plans for the rebuild and expansion of the Port. Our ability to work together to promote and protect the unique value of Whakaraupō as both a mahinga kai and a working Port is critical to the success of these endeavours.

June Swindells
CHAIR
TE HAPŪ O NGĀTI WHEKE

Peter Davie
CHIEF EXECUTIVE
LPC





1.1 INTRODUCTION

The Construction Environmental Management Plan is an LPC guideline document. Its purpose is to provide a tool for Contractors and Project Managers to identify and manage construction related environmental risk, identify performance standards and apply appropriate mitigation measures.

1.1.1 PURPOSE

Prior to construction-related activities being undertaken on LPC land, a Construction Environmental Management Plan (CEMP) must be produced by the Contractor that outlines the types of work being undertaken, the environmental effects of the works and the ways that these effects will be controlled or mitigated.

Lyttelton Port Company (LPC) has written this Guideline for Producing a Construction Environmental Management Plan (the Guideline) to provide a tool for Project Managers and Contractors to ensure environmental management during construction projects meets LPC's expectations.

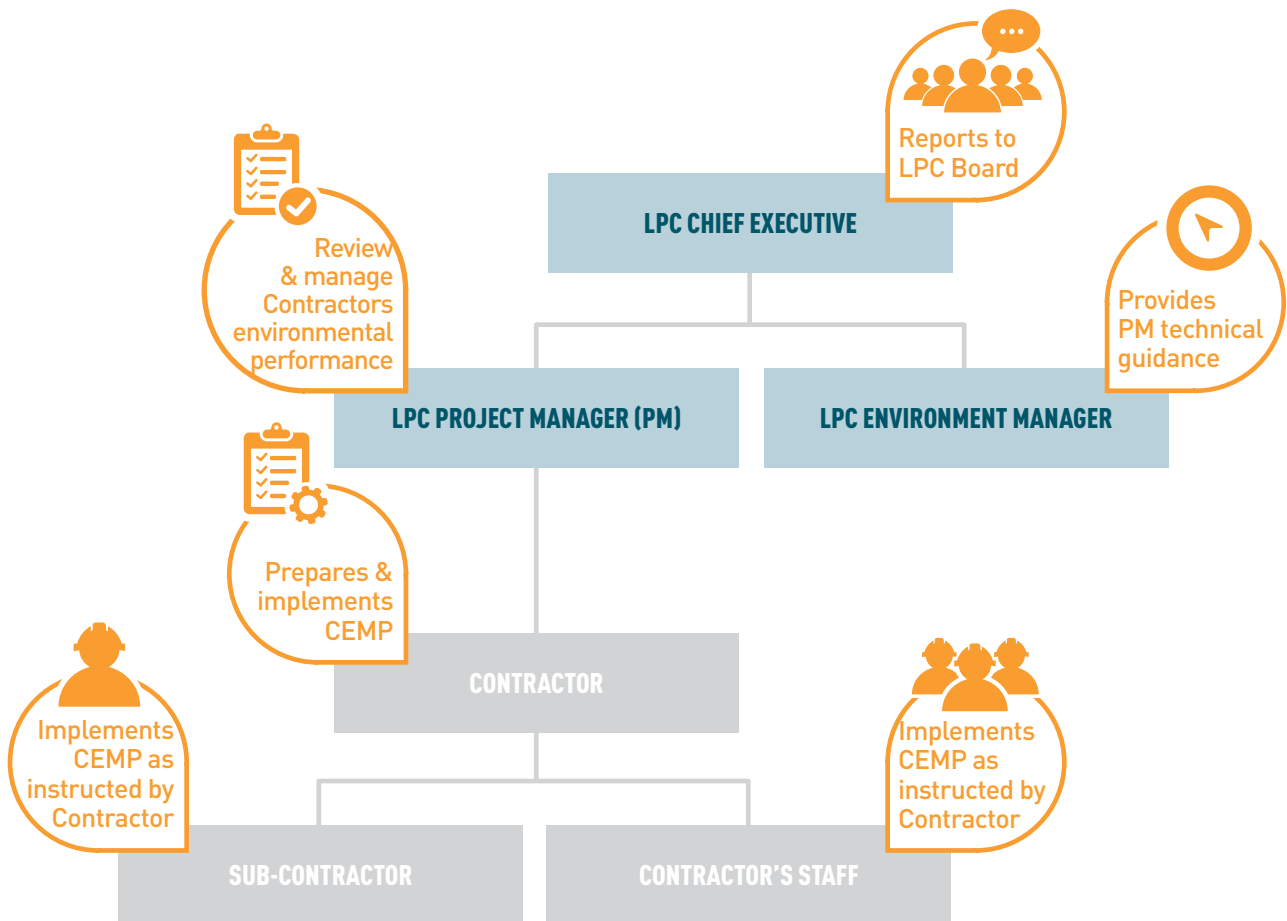
LPC expects effective environmental management at the Port, particularly among Project Managers, which drives positive behaviours and processes. The purpose of the Guideline is to ensure that environmental management of construction projects is prioritised in a consistent and effective way to a level that meets LPC's environmental policy.

From a regulatory perspective, this Guideline will aid resource consent compliance by requiring Contractors to include consent requirements in the project-specific CEMPs. The Guideline also provides a baseline understanding of the environment for future consenting. By formalising this understanding and practices in the Guideline, LPC will demonstrate a track record as a corporate citizen committed to effective and rigorous environmental management. The Guideline also aims to assist communication with iwi and the community, by providing an insight into the Port's environmental management practices, requirements and expectations.



1.1.2 RESPONSIBILITIES

Prior to construction-related activities being undertaken on LPC land, a Construction Environmental Management Plan (CEMP) must be produced by the Contractor. It outlines the types of work being undertaken, the environmental effects of the works and the ways that these effects will be controlled or mitigated. LPC's role is to provide guidance to Contractors preparing CEMPs, sign off CEMPs, and oversee their implementation.





1.1.3 COMMUNICATION

Effective communication is crucial to the success of this guideline. It is the role of the Contractor and the LPC Project Manager to maintain open lines of communication throughout the life of the project. LPC values its relationships with external stakeholders including community, iwi, and regulatory authorities and expects Contractors to respect and enhance those relationships. While LPC is the primary communicator, the Contractor must facilitate site meetings.

COMPLAINTS

LPC is the primary point of communication with external stakeholders. However, in many instances complaints are best remedied on site by the Contractor. The follow complaints procedure outlined below is to be used unless otherwise agreed with the LPC Project Manager.

The following process shall be followed for all complaints:

- All complaints should be immediately directed to the designated onsite person listed in the CEMP and the LPC Project Manager. Their contact details will be listed in the CEMP.
- It is important that any interaction with the complainant is polite and does not belittle their concern.
- As soon as the complaint is received it will be recorded on the project complaints register.
- An initial evaluation will be made to determine if it is appropriate to take any corrective actions and the outcome of this will be recorded. Depending on the nature of the complaint the initial response could be to immediately adjust or cease the activity pending investigation, replace an item of equipment, apply additional control (e.g., water sprayer for dust), or reinstate a damaged control device. However, in some cases it might not be practicable to provide immediate relief. The LPC Project Manager and the complainant will be informed of actions taken.

- Where the initial response does not address the complaint, the LPC Project Manager will be informed and will undertake (either themselves or delegated to the Contractor) further investigation, corrective action and follow-up monitoring as appropriate. The complainant will be advised of the outcome of this process.
- All actions will be recorded on the project complaints register and the complaint will then be closed.

NOTIFYING NGĀI TAHU

If any of the following incidents occur the LPC Project Manager must contact Te Hapū o Ngāti Wheke and inform them. The LPC Environmental Manager will be able to offer assistance.

Accidental Discoveries

If archaeological material of significance to Māori is discovered accidentally and there is a cultural monitor on site (i.e., areas of high risk), the cultural monitor will ensure the appropriate care and protection of accidental discoveries, including retrieval and handling of the material consistent with the correct tikanga.

In areas where there is no cultural monitor on site (i.e., low risk areas), the Accidental Discovery Protocol (ADP) in the Construction Environmental Management Plan will set out the steps to take in the event of an accidental discovery of Māori archaeological material. This includes the requirement for work to cease at the site, and immediate contact with Te Hapū o Ngāti Wheke.

Spills

Te Hapū o Ngāti Wheke is to be notified in the event of a spill or leak of oil, fuel or other hazardous substance that is more than minor, to water or to land where contaminants may enter water. The Harbour is important as a mahinga kai and any spills must be reported so that whānau can be notified.



1.1.4 TRAINING

LPC will ensure its Project Managers are trained and competent in implementing the CEMP. Contractors working for LPC will be offered training opportunities and they in turn are responsible for providing training to their own staff.

Contractors are responsible for ensuring their staff understand their responsibilities under the CEMP, and what to do if something goes wrong. This must be incorporated into the staff induction onto site, and staff will be required to sign that they have this understanding on completion of the induction to the site. Contractor's are also responsible for ensuring the relevant technical site briefings are undertaken prior to works commencing on site.



1.2

HOW TO USE THE GUIDELINE

This section directs Contractors and Project Managers to the information they need to fulfil their responsibilities under the Guideline. It also provides a reference for other users of the guideline so they can find the information they are looking for.

1.2.1 CONTRACTORS

The Contractor's role is to prepare and implement a CEMP for the works.

Tender documents will include a template to use when preparing the CEMP. The templates are also provided in the folder.

Section 1.0 outlines the overarching goals LPC is trying to achieve through the use of this Guideline.

Section 1.6 steps Contractors through the process preparing and implementing the CEMP, including identifying the environmental effects of the works, approval by LPC and making adjustments to the CEMP during the works.

Section 2.0 onwards are the Technical Sections. When preparing the CEMP, Contractors will need to refer to these sections for guidance. Section 1.6 tells Contractors when to refer to them.

Any questions should be directed to the LPC Project Manager in the first instance – their contact details are on the tender documents.

NOTE:
throughout
this document,
prompts to
contact LPC
are in green

1.2.2 LPC PROJECT MANAGERS

The LPC Project Manager's role, with support from LPC Environmental Manager, is to provide Contractors with one of the two CEMP templates with the request for tender and identify any resource consent requirements, review the CEMP prepared by the contractor, and provide oversight to the implementation of the CEMP and any consent conditions.

Section 1.0 outlines the overarching goals LPC is trying to achieve through the use of this Guideline.

The two templates are provided in the folder. There is a template for major projects and one for minor projects. The LPC Project Manager must discuss whether the project is major or minor with an LPC Environmental Manager and provide the corresponding template to Contractors with the tender documents.

The sign off checklist for review the CEMP is at the front of the CEMP template and the Contractors section should be filled out by the contractor before it is submitted.

Section 1.6 steps Contractors through the process of preparing and implementing a CEMP. This may be useful for reference.

Section 2.0 onwards are the Technical Sections. Provide technical information for Contractors when preparing the CEMPs. Section 1.6 tells Contractors when to refer to them.



1.2.3 OTHER USERS

This Guideline may also be used by others including: local iwi, council staff and the wider community. It provides insight into LPC's environmental management processes.

Section 1.0 outlines the overarching goals LPC is trying to achieve through the use of this Guideline.

At the tender stage LPC will provide the contractor with one of two templates to use when preparing their CEMP, a major template and a minor template, depending on the scale of the works and the potential environmental effects. These templates are included in the folder.

Section 1.6 steps Contractors through the process preparing and implementing a CEMP.

Section 2.0 onwards are the Technical Sections. These provide technical information for Contractors when preparing a CEMP. They also provide useful baseline information about the Port environment and mitigation measures that will be applicable to other Port activities.

Two CEMP templates are provided in the folder. There is a template for major projects and one for minor projects. The decision about whether a project is major or minor is made by LPC. The LPC Project Manager provides the appropriate template to Contractors with the tender documents.



1.3 LPC ENVIRONMENTAL PRINCIPLES

1.3.1 ENVIRONMENTAL POLICY

Lyttelton Port Company (LPC) is committed to minimising any adverse effects of its activities and facilities on the environment.

In particular, LPC will:

- comply with relevant environmental legislation, particularly the Resource Management Act;
- advocate environmentally sustainable principles in Port operations;
- avoid, remedy or mitigate adverse effects of its operations on the environment;
- where appropriate, pro-actively consult with the community on environmental issues;
- identify priorities for environmental improvement;
- implement and maintain systems and procedures for continually improving environmental performance; and
- monitor, document and report on environmental performance to the Board, senior management and staff.

LPC has designated an Environmental Manager whose role is to develop and implement environmental systems and programmes to support environmental excellence and contribute to LPC's social licence to operate.

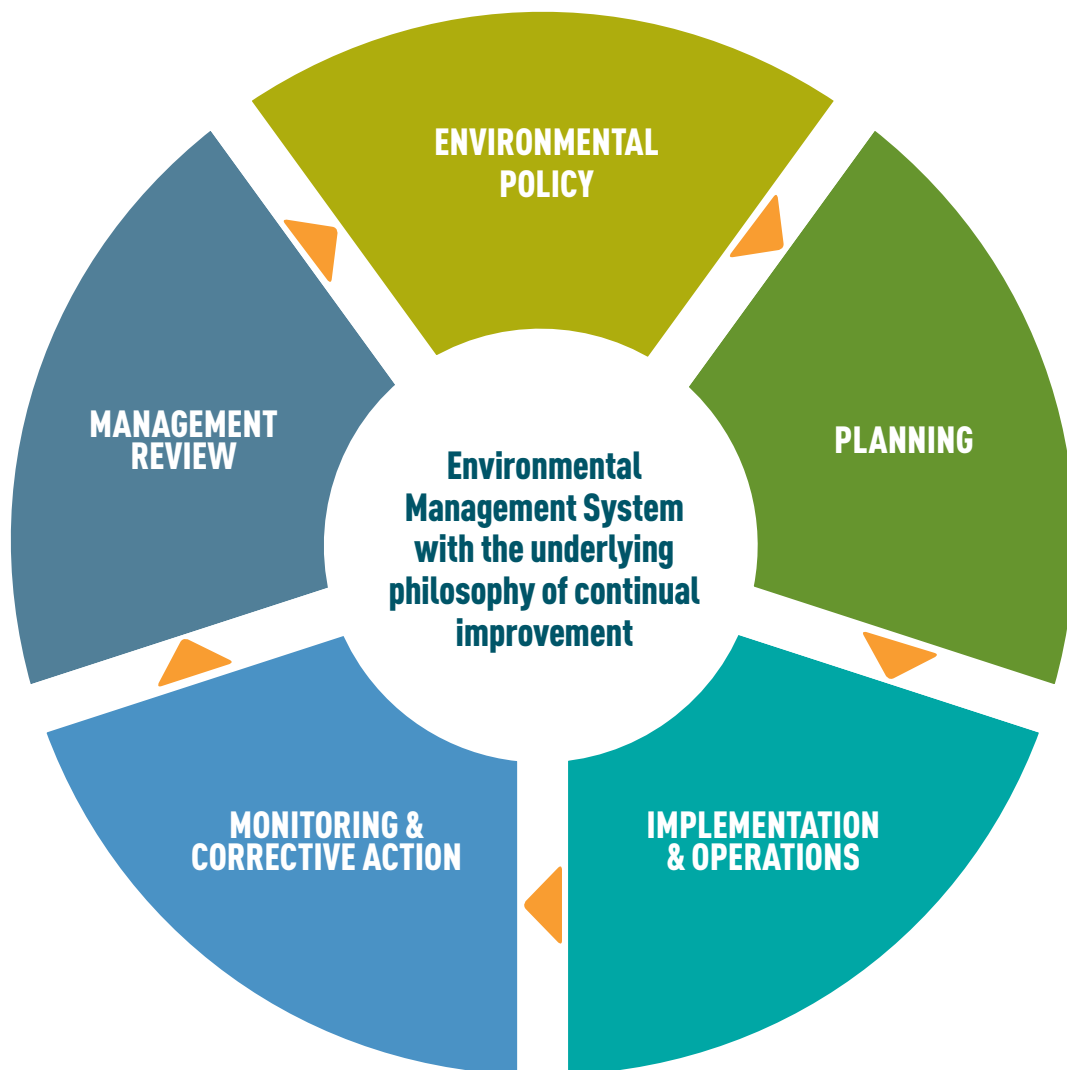
Environment matters have a high profile in the company and are actively reported to senior management and the Board.



1.3.2

LPC'S ENVIRONMENTAL MANAGEMENT SYSTEM

LPC's broader Environmental Management System, in which these guidelines sit, is described by the following cycle with the underlying philosophy of continual improvement.





1.4 NGĀI TAHU VALUES & ASSOCIATIONS WITH THE PORT & SURROUNDS

Te Hapū o Ngāti Wheke (Rāpaki) is the Ngāi Tahu Papatipu Runanga representing the tangata whenua who hold mana whenua and mana moana over Whakaraupō. The takiwa of Te Hapū o Ngāti Wheke is defined in the Te Runanga o Ngāi Tahu (Declaration of Membership Order) 2001 and the Port Cooper Deed as centering on Rāpaki and including the catchment of Whakaraupō and Te Kaituna.

Ngāti Wheke are based at Rāpaki. The name Rāpaki recalls the actions of the Ngāi Tahu chief Te Rakiwhakaputa who threw down his rāpaki (waist mat) on shores of Whakaraupō, thus claiming the land for Ngāi Tahu. Te Rakiwhakaputa's son, Wheke, settled at Rāpaki and the hapū became known as Ngāti Wheke.

Whakaraupō is of immense cultural significance to Ngāi Tahu. Associations with Whakaraupō extend over many centuries, and include three major streams of Māori – Waitaha, Ngāti Mamoe and in later generations, Ngāi Tahu. The name of the ridge above Lyttelton – Ō Kete-Upoko – marks a battle that occurred at the beginning of the 18th century, whereby a Ngāi Tahu war party defeated the resident Ngāti Māmoe. The rich resources of the Harbour brought Māori to settle in this area, and today the Harbour remains highly valued for mahinga kai. These traditions define the relationship between Rāpaki Ngāi Tahu and the harbour.

A fishing kāinga (settlement) known as Ōhinehou was located at the site of present day Lyttelton. The main settlement area centred on the foreshore near the site of the present day Sutton Reserve, extending inland and up towards the tunnel entrance. There was also a small trading market located on the foreshore to the east of the kāinga, at the site of the present day Oxford Street Bridge. Rāpaki Ngāi Tahu traded pioke/rig with other hapū and provided produce to early whalers, settlers and workmen. Trade occurred by sea, and by land-based trails such as the Bridle Path and foreshore track.

The Ngāi Tahu Claims Settlement Act (NTCSA) 1998 recognises the cultural, spiritual, historical and traditional association of Ngāi Tahu to the Whakaraupō coastal marine area as part of the larger Te Tai o Mahaanui/Selwyn – Banks Peninsula Statutory Acknowledgement area. Statutory Acknowledgements are designed to recognise the mana of Ngāi Tahu in relation to a specific areas or sites, and to improve the effectiveness of Ngāi Tahu participation in resource management processes.

Today, Te Hapū o Ngāti Wheke is committed to ensuring that a tangata whenua perspective is brought to wider community issues and projects within the catchment. The *Mahaanui Iwi Management Plan 2013* sets out the Rūnanga's aspirations and policies for Whakaraupō. The restoration of the customary fisheries values of the Harbour and the protection of sites of significance are key issues in the Plan.

The outcomes that tangata whenua seek through the preparation of a CEMP are:

- Recognition of historical Māori use and occupancy of Port land and surrounds, and therefore the potential for accidental finds of cultural/archaeological material.
- Recognition of the importance of Whakaraupō as a mahinga kai (food resource), and the need to manage activities to avoid effects on coastal marine water quality and mahinga kai habitat.



- Containment of the effects of construction activity to Port land and the inner harbour (i.e., the industrial area), and specific provisions to manage the increased risk to water quality as a result of construction activities to the east of the inner harbour.
- Recognition of Ngāti Wheke, as manawhenua, and the role of Te Hapū o Ngāti Wheke in incident management.

For Te Hapū o Ngāti Wheke, the CEMP Guideline is an opportunity for LPC to send a clear message to Contractors and the community that the company has a long term and custodial interest in the harbour, by ensuring that performance standards, mitigation measures and management actions are consistent with protecting the Harbour and the multiple values that are associated with it.



1.5 ENVIRONMENTAL SETTING

Understanding the environment is essential to decide what environmental control measures are required. The Environmental Considerations for every Port project diagram over the page summarises the environmental context of the Port, and the following section links the environmental context to the potential effects which must be well considered when preparing a CEMP. Further detail is provided in each of the Technical Sections.

The Harbour

- With its striking aquamarine tones, the water of Lyttelton Harbour/Whakaraupō is a place for recreation, fishing, a kaimoana storehouse and a hub for industry and transport.
- Water quality in the Harbour is an important environmental value and is influenced by many factors – both land and marine based, as well as weather. The Harbour has a high natural variance of turbidity (suspended solids), mostly driven by the wind and wave events stirring up fine sediment on the sea floor.
- The habitats and ecosystems of the Harbour are defined by wide spread, muddy, soft-sediment covering the Harbour floor, and rocky shores and reefs e.g., east of Te Awaparahi Bay.
- The prominent marine mammal species found in and around Lyttelton Harbour/Whakaraupō is Hector's dolphin (*Cephalorhynchus hectorii*). It is listed as Endangered and a marine mammal sanctuary exists to protect them. Banks Peninsula has a resident population and they are found in Lyttelton Harbour year round.
- The endangered white-flipped penguin (korora), a sub-species of the little blue penguin is also found in the Harbour and breeds on Quail Island every year.

Commercial & Residential Neighbours

- The Port boundary is very close to residential and commercial areas of Lyttelton township and other Harbour communities e.g., Diamond Harbour interact with the Port.
- Because of the proximity to the Lyttelton township noise, dust and construction traffic are among the key effects that must be effectively managed.
- Properties within 100 m of significant dust sources are considered as being potentially sensitive to dust.

Landscape & Soils

- Most of the operational land area of the Port is flat land, largely reclaimed in incremental developments over the past 100 years.
- The steep natural areas around the Port have significantly greater potential to be eroded and produce sediment, particularly given the prominence of the loess (windblown silt) soils. Loess is easily mobilised when disturbed or exposed, and there is potential for large-scale erosion, including slope failure, or generation of dust.
- Much of the flat part of the Port is paved in concrete and asphalt. Left intact, these surfaces have little potential to generate sediment.



Contamination Potential

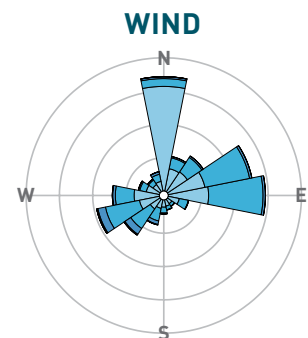
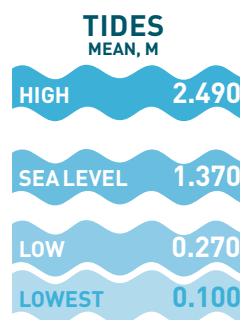
- Lyttelton Port has been the site of industrial activity since the mid-to-late 1800's. Activities undertaken on site include: coal storage, workshops, bulk fuel storage, maintenance, cargo handling etc.
- The Port site has also housed a historic gasworks site and military activities and currently contains a bulk fuel storage facility an active bitumen plant, a dry dock and several engineering services.
- Like most industrial areas there is potential to encounter contaminated land.

Archaeology

- Lyttelton Harbour has been the site of human activity for over 800 years. 1850 saw the arrival of the European immigrants coming ashore at Lyttelton Port. An archaeological assessment commissioned by LPC has found 60 pre-1900 archaeological sites within the Port boundaries so the Port is rich in European and Māori features.
- There are two main areas of high Māori archaeological value on LPC land. The area parallel to Norwich Quay, which is the original waterfront, is of particular relevance and an important site was recently found on the Port boundary.

Climate

- The prevailing wind directions at Lyttelton Port are northeasterlies and southwesterlies, so these are the main directions to consider for dust management.
- Above wind speeds of 10 m/s (36 km/hr or 19 kts) dust pick up increases substantially. Close to the Port boundary wind speeds below that level could be a problem. Local meteorological data show winds speeds at the Port are often greater than 10 m/s during drier months of spring and summer.
- For the Port, May–August are the wettest months of the year, where the potential for erosion and sediment generation is greatest, but the potential for dust generation is minimised.



RAINFALL
MM, ANNUAL AVERAGE



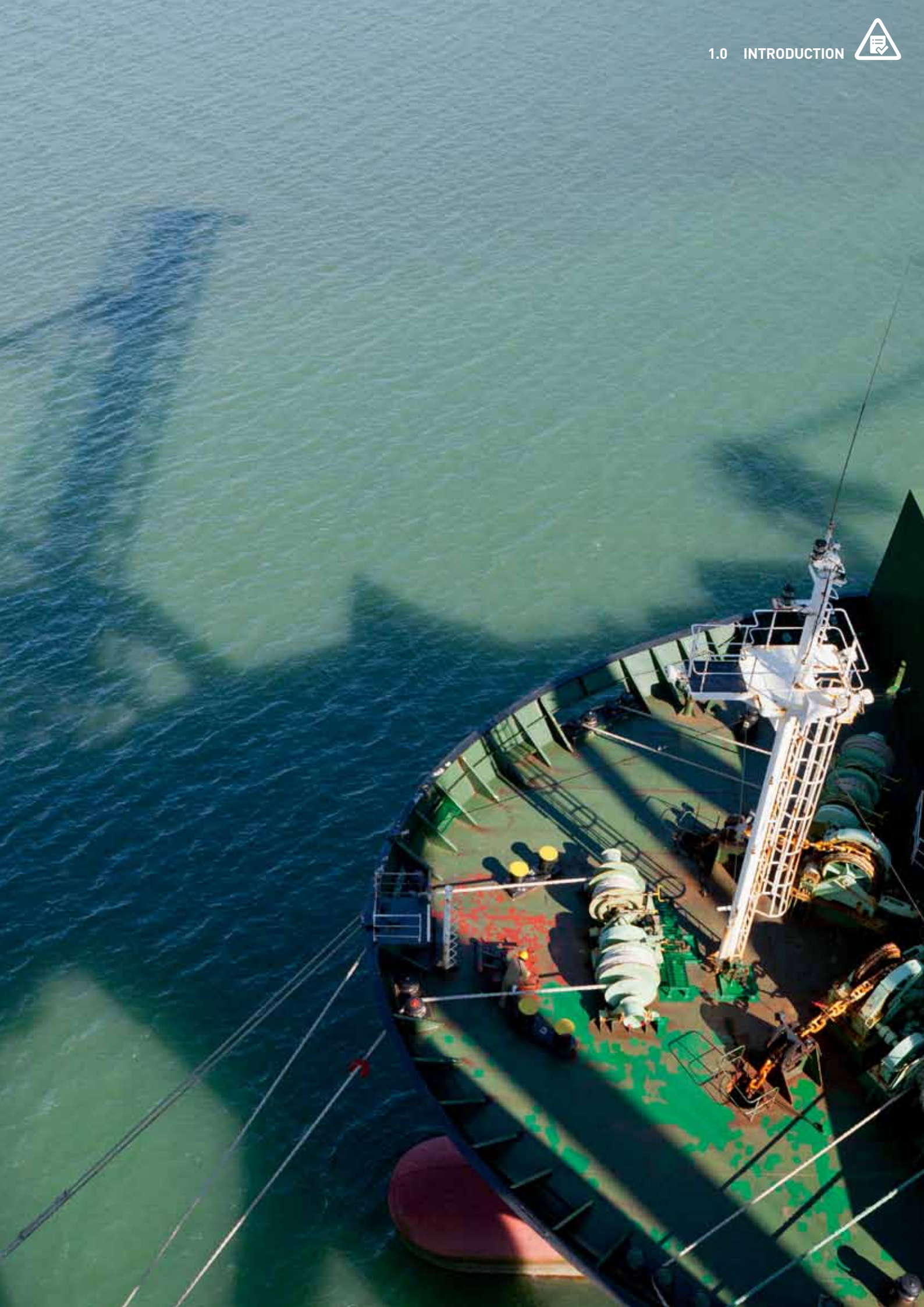
SUNSHINE
HOURS, ANNUAL AVERAGE



TEMPERATURE
MEAN °C

ANNUAL MAX: **32.0**
January DAILY MAX: **22.5**
January DAILY MIN: **12.2**
ANNUAL MEAN: **12.1**
July DAILY MAX: **11.3**
July DAILY MIN: **1.9**
ANNUAL MIN: **-4.0**







Lyttelton Harbour/Whakaraupō & the Surrounding Environment

Local Communities

▶ The operational area of the Port is very close to Lyttelton township and is a feature of the landscape for the wider Harbour communities – especially Diamond Harbour. Locals and visitors use the Lyttelton Harbour/Whakaraupō environment for many recreational purposes, including: swimming, boating, fishing, tramping, and sightseeing.



Natural Values

▶ Lyttelton Harbour/Whakaraupō is a well defined landscape appreciated for its scenic, lifestyle, cultural, historical, and ecological values. Of particular note is New Zealand's Hector's dolphin/tupoupou – an endangered marine mammal resident in Whakaraupō whose Banks Peninsula population is the largest on the east coast of the South Island. The white-flipped penguin/korora is another species of conservation significance and is native to Canterbury. It nests in the Harbour coastal zone, laying eggs from July to December. The white-flipped penguin is considered to be the only indigenous creature unique to Canterbury.





Cultural Value

▶ Whakaraupō is of immense cultural significance to Ngāi Tahu. Tangata Whenua associations with Whakaraupō extend over many centuries and include three major streams of Māori – Waitaha, Ngāti Mahoe and in later generations, Ngāi Tahu.

The mana moana (traditional authority) of Rāpaki Ngāi Tahu over this special place is inherited from the ancestors. Ngāi Tahu has enduring mahinga kai/ customary food gathering traditions at Whakaraupō, and the ecological health of the Harbour is of critical importance.



Water Quality

▶ Water quality is an important issue for Lyttelton Harbour/ Whakaraupō because of the many values the Harbour holds.

Controls that prevent pollution, minimise sedimentation effects and ensure that Lyttelton Harbour/ Whakaraupō is a healthy, functioning ecosystem enjoyed by all, are essential to every project.



Historical & Archaeological

▶ There are approximately 60 known pre-1900 archaeological sites on LPC's Lyttelton Port land. These sites are evidence of a rich Māori and European history in the area.





1.6

PREPARING & IMPLEMENTING A CEMP

This section is intended for Contractors who have to prepare a CEMP. It is intended to allow Contractors to use their own internal processes and systems, tailored to provide the consistency in CEMPs that LPC require. For the avoidance of doubt, wherever “you”, “your”, or “their” is used in this section, it refers to the Contractor.

The process for preparing and implementing a CEMP is outlined in the diagram to the right. This applies regardless of the size of the project. The rest of this section covers each of these steps in more detail.





1.6.1 DEFINE YOUR WORKS

A clear outline of the type of works that will require to be undertaken is needed before assessing the environmental effects and selecting mitigation measures. You will need to know:

- the activities you will be undertaking;
- location of the works;
- timing of works (seasons, day/night);
- scale of works;
- duration of works; and
- any Resource Management Act (RMA) requirements, such resource consent conditions (LPC Project Manager will include these in the tender documents) and any other regulatory approvals i.e., archaeological authorities.

You may find that your approach to the works changes as a result of your assessment of environmental effects (i.e., you may identify a better way of doing the works that achieves the same outcome but results in a lesser environmental effect.

If no resource consent requirements are specified in the tender documents, or you suspect there are additional requirements due to your chosen methodology, contact your LPC Project Manager.



1.6.2

IDENTIFY THE ENVIRONMENTAL EFFECTS

The following environmental effects must be considered for all types of work:

- dust;
- contaminated soil;
- archaeology;
- erosion & sediment;
- noise & vibration; and
- hazardous substances.

There is a Technical Section for each of these environmental effects to step you through assessing the environmental risk and putting in place actions to control these effects. For more information see Section 1.6.3.

You must also consider whether there are any other environmental effects that may be caused by the project in addition to the common ones listed above.

EXAMPLE: Glare from lighting for night works near residential of commercial properties.

If a project involves several types of work, each of the types of work must be assessed individually. However, there will be a single CEMP for the project.

EXAMPLE: The removal and replacement of a number of piles on a wharf may include several types of work – piling, operation of a crane and excavation – and all the control measures for these types of work will be detailed in one CEMP, in a different section for each type of work.

Even if you consider one of the environmental effects listed above is not relevant to your project you must still address it in your CEMP. The Major Project Template provides guidance on when only a brief consideration of each effect is needed. The Minor Project Template only requires brief consideration of each effect, in accordance with the level of risk posed by the project.

If you consider there are other potential environmental effects of your activity, contact your LPC Project Manager.



1.6.3 ASSESSING THE ENVIRONMENTAL RISK

Once you have compiled a list of the effects associated with the types of work you are going to do for LPC, the next step is to consult the Technical Sections. There is a Technical Section for each of the environmental effects listed in Section 1.6.2. These Technical Sections will help you determine the risk of the effect.

RISK = Likelihood × Consequence

To make the risk assessment consistent across all CEMPs, the technical experts have distilled common risks down to a list of contributing characteristics. For example, 3000 m² of the site being disturbed is more likely to result in sediment generation, and more sediment being generated (consequence) than if only 100 m² is disturbed. This enables Contractors to easily identify the level of risk of their project using the characteristics of their project (such as the area that will be disturbed) rather than making a subjective assessment of the likelihood and consequence of an effect (such as sediment generation) themselves.

LPC uses a simple traffic light system to provide a snapshot of environmental risk associated with a project. In your CEMP each of the environmental effects needs to be ranked, high, medium or low, and coloured red, orange or green in the CEMP. The Technical Sections will help you do this.

EXAMPLE: This is an example for a project where contaminated land is a **HIGH RISK** environmental effect, dust and archaeology are **LOW RISK**, and sediment generation is **MEDIUM RISK**.

Dust Management	LOW RISK
Contaminated Soil	HIGH RISK
Archaeology	LOW RISK
Sediment & Erosion Control	MEDIUM RISK
Noise & Vibration	MEDIUM RISK
Hazardous Substances Management	LOW RISK

NOTE: Other risks associated with the project, such as health and safety, are not addressed in this risk assessment and should be addressed elsewhere.

NOTE: the orange boxes throughout the document are useful information, but not specifically guidance on preparing a CEMP



What's in the Technical Sections?

The Port setting as it applies to that environmental effect.

EXAMPLE: The erosion and sediment control section outlines the physical characteristics such as topography, rainfall patterns and materials that could be encountered, and how these relate to sediment generation.

Performance standards every Contractor has to meet for the particular environmental effect.

EXAMPLE: Stormwater discharges must not cause conspicuous greases or films in the Harbour after reasonable mixing.

What types of work might cause the effect and where within the Port the effect might occur.

EXAMPLE: Piling at the north end of Cashin Quay is likely to cause less of a noise impact for Lyttelton residents than piling by the Ferry Passenger Terminal.

Control measures, these may be specific to a type of work or to a location within the Port.

EXAMPLE: An archaeologist may need to be onsite for excavations in a sensitive heritage area, but not in the reclamation.

Maintenance, inspection and monitoring requirements. These may be specific to the type of work, the location or the control measures in place.

EXAMPLE: A silt fence requires regular checking for silt build up or damage and cleared periodically. Noise should be monitored while work is being undertaken, any complaints should be treated through the standard complaints procedure.

Reporting requirements to LPC. This is generally the results of the monitoring and inspections.

Contingency measures if something goes wrong.



IDENTIFY CONTROLS & MONITORING MEASURES

D

1.6.4

CONTROL & MONITORING MEASURES

Controls

Control measures are the most important aspect of the CEMP because they are the physical actions to manage environmental effects.

Control measures that are acceptable to LPC for each potential environmental effect are listed in each of the Technical Sections. Each Technical Section provides guidance on which measures are appropriate in a given situation, and notes when further design advice is required.

EXAMPLE: Silt fences, sediment retention ponds and cut-off drains are erosion and sediment controls.

If you have any concerns about whether the control measures listed in the Technical Sections are suitable for your project, contact your LPC Project Manager.

Monitoring & Reporting

The inspection of control measures and monitoring of environmental effects are required on a regular basis to ensure they continue to work and that performance standards are not breached. Suggested frequency of inspections and monitoring are outlined in Technical Sections, as are check sheets covering what to look for during inspections, maintenance actions and monitoring of environmental effects. The minimum inspection requirements are outlined in the Table below.

If inspections identify areas of non-compliance or improvement you will be advised either verbally or in writing by either the LPC Project Manager, or if applicable, via a Notice to Contractor prepared by the Project Engineer.

If the schedule of monitoring and reporting is not appropriate for your project, discuss this with your LPC Project Manager. An alternative schedule can be suggested in your Draft CEMP.

Minimum Monitoring Requirements

ACTION	FREQUENCY	PURPOSE
Inspection sheets must be completed and provided to the LPC Project Manager.	At least once a week.	Keep LPC up to date with environmental management onsite.
The LPC Project Manager should accompany the Contractor during a site inspection.	At least once a month.	Ensure compliance with the CEMP and identify areas where improvements can be made or repairs and maintenance are needed. To follow up on previous actions/improvements.
Meetings on site to discuss the results of the weekly inspection and monthly audit with staff and sub-contractors.	At least once a week.	Keep staff and sub-contractors up to date with environmental management onsite and provide opportunity for them to raise issues/ areas for improvement.



1.6.5 POPULATING THE CEMP TEMPLATE

Now you are ready to produce your CEMP. LPC will have specified which template to use with the tender documents. It will be one of the following:

- **The Major Project Template** – an MS Word template with separate management plans for each environmental effect.
- **The Minor Project Template** – a single A3 page MS Word template.

The information needed to populate the template is a combination of the information provided in the previous sections, the Technical Sections, in the tender documents and a summary of your methodology.

The CEMP templates have grey highlighted text in each section which provides guidance on how to fill out the CEMP. A summary of what content is required in each of the templates is outlined in the Table on page 1-22. Note that while much of the content required is the same, it is expected that a Major Project CEMP will provide significantly more detail than a Minor Project CEMP.

Please contact your LPC Project Manager if you are having trouble populating the CEMP template.



Components of the CEMP Required for Major & Minor Projects

CEMP COMPONENT	MINOR PROJECT	MAJOR PROJECT
Purpose of the CEMP		✓
Contractual obligation the CEMP fulfils are listed		✓
Responsibilities are outlined and assigned to specific people	✓	✓
Site description:		
Location map showing the location of the site within the Port and the extent of the area where works will be undertaken	✓	✓
A description of the site condition and current use		✓
A description of the surrounding land use		✓
Project description:		
Description of what works are being done and why	✓	✓
Method and equipment to do the works	✓	✓
Project duration	✓	✓
Regulatory requirements:		
Outlines RMA requirements, such as resource consents	✓	✓
Outlines any standards or conditions which must be met and how they will be met	✓	✓
Environmental effects and controls:		
Environmental risk assessment	✓	✓
Control measures	✓	✓
Monitoring requirements; including monitoring method, frequency, template and performance criteria	✓	✓
Reporting requirements; including frequency, format and who the report must be submitted to	✓	✓
Contingency; describes actions to be taken in the event of non-compliance	✓	✓
Approval:		
CEMP must be signed by the Contractor and LPC	✓	✓



APPROVAL BY LPC

F



IMPLEMENT CEMP

G

1.6.6 FINALISING YOUR CEMP & SIGN-OFF BY LPC

You must submit a draft of the CEMP with your tender. The draft is expected to be a complete document, and will be evaluated in the tender process. However, it is envisaged that the CEMP will be finalised, in consultation with LPC, after the tender has been awarded, and will be amended as necessary throughout the life of the project.

The CEMP must be signed off by LPC prior to starting your works onsite.

1.6.7 IMPLEMENTING YOUR CEMP

To achieve its purpose, the CEMP must be implemented throughout your works. This means:

- ensuring you actually do what you said you would in CEMP (unless this has been modified in consultation with LPC;
- maintaining awareness of environmental issues during the works;
- assessing the success of mitigation measures in line with reporting monitoring requirements;
- asking – is the reality different to expectations reported in the CEMP, how do your works need to change/respond?; and
- reporting problems to your LPC Project Manager – they are there the help.

If you receive complaints from the public during your works, refer them to your LPC Project Manager. The LPC Project Manager will work with you and the complainant to resolve the issue.



1.6.8 AMENDING YOUR CEMP

To maintain relevance, the CEMP must be reviewed when any changes to the methodology are made and updated accordingly.

You may need to amend your CEMP if:

- the scope of your works or methodology is going to change;
- the mitigation measures are not working sufficiently;
- responsible parties change;
- the season or time of day in which the works need to take place changes;
- the area of works increases or changes;
- you have identified improvements to the process or mitigation measures;
- the duration of your works changes; and
- anything else changes that alters the effectiveness of your CEMP to manage the environmental effects of your works.

Any amendment to your CEMP should be done in consultation with your LPC Project Manager and signed off prior to implementation.

EXAMPLE: Repair of a damaged underground service is underway near the Ferry Terminal. As the works progresses it is realised that the damaged pipe extends further west than first anticipated. Excavation works are now required west of the original area of works, into an area of potentially contaminated land and sensitive heritage area. The CEMP must be amended to consider the effects of the works in new area of excavation works. The CEMP must be revised and signed off by LPC before works start in this area.





2.0

TECHNICAL SECTION

DUST MANAGEMENT





CONTENTS

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2.1 INTRODUCTION

This Technical Section provides guidance to Contractors on dust management, to help them prepare the Dust Management Section of the CEMP. All construction activities should be operated, maintained, supervised, monitored and controlled at all times, so that all dust emissions are maintained at the minimum practicable level.

Please note, throughout this Section, any references to 'you' or 'your' are directed at the Contractor.

Given the proximity of residential and commercial neighbours to the Port, the Lyttelton community is sensitive to dust. Dust from the Port has been a source of frustration for residents and businesses in the past, so it is important for the Port's relationships with its neighbours that dust is managed effectively. Dust can cause:

- nuisance due to soiling of surfaces with dust;
- potential effects on human health for workers and the local residents of Lyttelton;
- potential effects on terrestrial ecology and aquatic ecology.

This Technical Section sets out:

- the relevant rules and permitted activity criteria in relation to construction dust;
- performance criteria for dust management;
- a risk assessment of typical construction activities in the context of the sensitivity of the receiving environment at the Port;
- mitigation measures for managing dust, and advice on how to incorporate them into the CEMP.

Dust management controls specified in this Section are prescriptive and do not require additional specialist input. Contact your LPC Project Manager in the first instance if you need assistance putting in place dust management.

The requirements set out in this Section are accurate as of October 2014. 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 is designed to be worked through from start to finish. A flow chart summarising the content of each Section is provided over the page.



ASSESSMENT

i

2.2 ROLES & RESPONSIBILITIES

Outlines the responsibility of the contractor.

2.3 SETTING

Provides a description of the dust context at the Port.

2.4 RISK ASSESSMENT

Steps you through deciding if dust risk is high/medium/low for your project.



DESIGN

ii

2.5 PERFORMANCE STANDARDS

What dust criteria your project has to achieve.

2.6 CONTROL MEASURES

What to do for low/medium/high risk projects.



OPERATION

iii

2.7 MONITORING & REPORTING REQUIREMENTS

Requires monitoring and reporting throughout the project.

2.8 CONTINGENCY MEASURES

What to do during adverse weather conditions which increase the likelihood of dust.



2.2 ROLES & RESPONSIBILITIES

Port development activities are generally undertaken by third party Contractors, which are managed directly by LPC or a consultant on behalf of LPC. The contractor is responsible for producing and implementing the CEMP, including the Dust Management Technical Section.



2.3 SETTING

The effects of dust generation will depend on the sensitivity of the receiving environment. This is described below, with locations of sensitive neighbours in relation to Port redevelopment identified (particularly in the vicinity of the Dampier Bay and Inner Harbour areas of the Port).

The township of Lyttelton is situated in the valley around the Port (to the south) with most of the residential properties elevated on hill slopes. A ridge of 240 m above sea level separates the township from Port activities to the east in Te Awaparahi Bay.

Properties within 100 m of significant dust sources are considered as being potentially sensitive to dust. The table below indicates the sensitivity of the receiving environment to dust in relation to the main Port development areas of the Port Lyttelton Plan.

List of Sensitive Neighbours/Properties by Port Development Area

LOCATION (PORT AREA)	SENSITIVITY OF RECEIVING ENVIRONMENT	SENSITIVE NEIGHBOURS/PROPERTIES
1. Dampier Bay	Medium-High	Sensitive properties on Godley Quay and Simeon Quay within 50 m, particularly when prevailing north-easterlies.
2. Inner Harbour	Medium-High	Commercial properties on Norwich Quay within 50 m, residential properties within 50 m on Sumner Road elevated above the quay. Particularly when prevailing south-westerlies.
3. Naval Point	Low-Medium	Small number of sensitive properties on Godley Quay and Brittan Terrace 50–100 m when works are closest to the north-west boundary, particularly when prevailing north-easterlies.
4. General Cargo, Cashin Quay	Low	Small number of sensitive properties on elevated terrain above the Quay on a ridge that rises to 240 m above sea level.
5. Container terminal	Low	No sensitive properties identified.

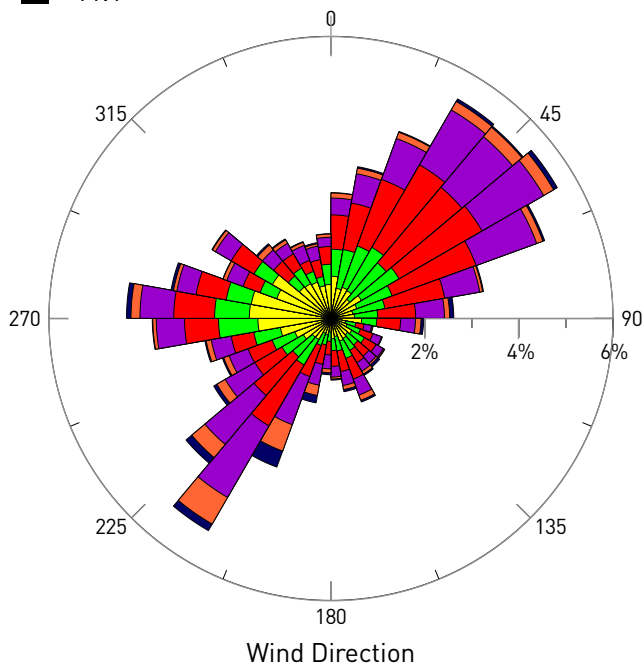
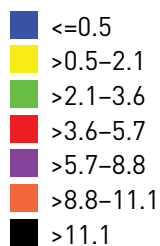


Dust emissions from exposed surfaces generally increase with increasing wind speed. However dust pick up by winds may become significant at wind speeds above 5 m/s (10 knots). Above wind speeds of 10 m/s (20 knots) dust pick up increases substantially. Local meteorological data shows winds speeds at the Port are often greater than 10 m/s during drier months of spring and summer.

The prevailing wind directions at Lyttelton Port are northeasterlies and southwesterlies and therefore these will be the main directions to consider in terms of implementing dust controls and determining potential effects of dusty activities (see below).

LYTTELTON PORT Wind Rose 2010–12

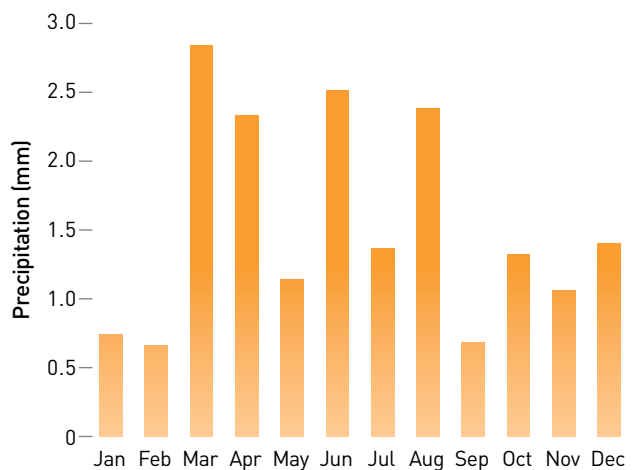
Wind Speed (m/s)



In general soils with a dominant particle size corresponding to gravel size or larger have less potential of becoming airborne than finer particles such as fine sand, silt and clay. For example, the loess soils on the hills around the Port are fine particles with a high potential to generate dust. However, moisture content of soil is generally a more important indicator of dust potential than particle size. Moisture binds particles together preventing them from being disturbed by winds or vehicle movements. Similarly, vegetated surfaces are less prone to wind erosion than bare surfaces.

Rainfall increases surface moisture content and reduces the potential for dust generation. Particular attention to surface watering requirements needs to be paid over the driest months of the year, from September to February. The average daily precipitation (for years 2010–14) are shown below.

LYTTELTON PORT Average Daily Precipitation 2010–14





2.4 RISK ASSESSMENT

The first step in working out what dust controls are going to be needed is to assess the risk of dust effects from your activities. The higher the risk the more controls will be required. To determine the dust risk you need to understand the nature and scale of activity; and the sensitivity of the receiving environment.

The table on page 2-9 sets out how you can assign risk to particular activities within the proposed construction footprint¹. The table sets out examples of the type and scale of activity and the sensitivity of the receiving environment that can lead to low, medium or high dust magnitude; to provide an overall risk category which can be used to define the site specific dust controls. The sensitivity of the receiving environment is determined from the closest part of the working area. For example, if the project area is within both the low and medium sensitivity areas, then the entire project should be treated as medium sensitivity. The risk categories are used to define the minimum mitigation measures required as outlined in Section 2.6.

¹ The methodology adopts the approach outlined in the UK IAQM [2014] Guidance on the assessment of dust from demolition and construction



Risk of Dust Generation Based on Nature/Scale of Activity & Sensitivity of the Receiving Environment

DUST GENERATING ACTIVITIES		RECEIVING ENVIRONMENT SENSITIVITY (see map on page 2-10)		
		HIGH ^{1,4}	MEDIUM ^{2,4}	LOW ^{3,4}
Demolition	Significant demolition proposed of potentially dusty construction materials (e.g., concrete), on site crushing and screening operations.	HIGH RISK	MEDIUM RISK	LOW RISK
	Small scale demolition or construction activities involving construction materials with low potential for dust release (e.g., metal/timber).	LOW RISK	LOW RISK	LOW RISK
Earthworks	Earthworks involve large areas of soil being exposed at any one time, significant material movement (e.g., 100,000 m ³ total) and material storage and stockpile areas, potentially dusty soil types (e.g., high silt content), large numbers of heavy earthmoving equipment active at any one time (e.g., >10).	HIGH RISK	MEDIUM RISK	LOW RISK
	Earthworks involve moderate areas of soil being exposed at one time and material movement (e.g., 20,000 m ³ total), moderately dusty soil types with 5–10 heavy earthmoving equipment active at any one time.	MEDIUM RISK	MEDIUM RISK	LOW RISK
	Earthworks only involve small areas of soil being exposed at one time and low dust generating soil types, <5 heavy earthmoving equipment active in area at any one time. Earthworks undertaken in wetter months.	LOW RISK	LOW RISK	LOW RISK
Construction	Large scale construction using potentially dusty construction materials, lime use for soil stabilisation, on site concrete batching plant.	HIGH RISK	MEDIUM RISK	LOW RISK
	Construction of between ten to 150 units ⁵ .	MEDIUM RISK	MEDIUM RISK	LOW RISK
	Construction of one unit ⁵ and up to a maximum of ten.	LOW RISK	LOW RISK	LOW RISK
Truck movements	Large number of daily truck movements (e.g., >50), potentially dusty surface material and unpaved roads of >100 m length.	HIGH RISK	MEDIUM RISK	LOW RISK
	10–50 daily truck movements, moderately dusty surface material and unpaved roads of 50–100 m length.	MEDIUM RISK	MEDIUM RISK	LOW RISK
	<10 daily truck movements, surface material with low potential for dust release and unpaved roads of <50 m length.	LOW RISK	LOW RISK	LOW RISK

Notes: ¹ High sensitivity receiving environments are residential neighbours closer than 50 m from the works site.

² Medium sensitivity receiving environments are residential neighbours between 50–100 m from the works site and/or commercial properties closer than 50 m from the work site.

³ Low sensitivity receiving environments are residential neighbours greater than 100 m from the works site and/or commercial properties between 50–100 m from the work site.

⁴ Other dust-sensitive neighbours such as schools, hospitals and care homes can be considered as equally sensitive to residential, in addition to commercial premises that are more sensitive to dust deposition for example food premises, car showrooms and museums.

⁵ A unit can be a flat or house or office space. A large building could have multiple units. Most relevant to Dampier Bay mixed use development



Technical Section 2.0 Dust Management

MAP 1: Sensitivity of the Receiving Environment in Relation to Dust Generation

Source: Tonkin and Taylor 2015
LPC Air Quality Management Plan
Lyttelton, Christchurch







2.5 PERFORMANCE STANDARDS

The management of dust at the Port is subject to the provisions of the Resource Management Act 1991, regional and district plans and resource consents (where required). There are no national air quality standards or guidelines for nuisance dust. However, the Ministry for the Environment (MfE) guidance¹ provides recommended trigger levels for dust (measured as total suspended particulate matter – TSP) depending on the sensitivity of the receiving environment.

Performance Standards Based on Sensitivity of the Receiving Environment

RECEIVING ENVIRONMENT	TOTAL SUSPENDED PARTICLES TRIGGER LEVEL (DUST CONCENTRATION)
Insensitive area	120 µg/m ³ (fixed 24-hour average)
Moderate sensitivity	100 µg/m ³ (fixed 24-hour average)
Sensitive area (e.g., significant residential development)	80 µg/m ³ (fixed 24-hour average)

A sensitive area is considered to be an area with significant residential development, so this trigger level is relevant to the redevelopment of Lyttelton Port. More detail on these trigger levels is provided in Appendix 2A.

The requirements of legislation and good practice guidance in relation to dust management have a common aim which is to avoid, remedy or mitigate adverse effects on the environment, including effects on the health of people and ecosystems and amenity effects. In order for the construction of the Project to comply with regulatory requirements, the discharge

of dust from the site must comply with the following which is commonly known as the “no nuisance policy”²:

“The discharge to air of dust shall not be corrosive, noxious, dangerous, objectionable, or offensive to the extent that it has or is likely to cause an adverse effect on the environment beyond the boundary of the site where the discharge originates.”

Further information on legislative requirements in relation to dust emissions is attached as Appendix 2A.

¹ Ministry for the Environment “Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions”, 2001.

² This is taken from Policy AQL6 of the Section 3 of Canterbury Natural Resource Regional Plan.



2.6 CONTROL MEASURES

There are five principles to limit dust generation and nuisance:

- Limit wind speed across exposed surfaces.
- Limit disturbance of soil or dusty materials – particularly fine particles.
- Limit the area of soil exposure.
- Stabilise completed earthworks areas.
- Maintain surface moisture content.

Control measures for dust depend on the risk rating. Having determined the risk rating (high, medium, or low) for the construction area in Section 2.4, you need to work out what measures are suitable for each type of work on your project.

The table on page 2-14 sets out the dust control measures that should be considered depending on your risk category. All these control measures should be considered for each type of work. For example, if you are undertaking demolition, there may also be loading/unloading, material storage, and construction traffic associated with the demolition that need to be considered.

It is important that all dust sources be minimised as far as practicable, including those well separated from sensitive locations, as all dust generated will add up to have an effect on the overall air quality in the area.

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



Dust Control Measures for Low, Medium & High Risk Areas

CONTROL MEASURES		RISK CATEGORY WHERE CONTROL MEASURES APPLY		
		HIGH	MEDIUM	LOW
Site Planning	Trained and responsible manager on site during working times to maintain logbook and carry out required site inspections.	✓	✓	
	Site personnel trained in dust management controls.	✓	✓	
	Erect effective barriers around dusty activities or at the site boundary.	✓	✓	✓
	Erect solid barriers at site boundary.	✓	✓	
	Plan site layout—machinery and dust causing activities should be located away from sensitive neighbours.	✓	✓	✓
Construction traffic	Large scale construction using potentially dusty construction materials, lime use for soil stabilisation, on site concrete batching plant.	✓	✓	✓
	Minimise movement of construction traffic around site and travel distances through appropriate site layout and design.	✓	✓	✓
	Set agreed speed restriction (10-20 km/h) for the site, particularly for unsealed haul routes.	✓	✓	✓
	Hard surface and compact all unsealed road surfaces where practical, especially near to residential areas.	✓	✓	
	If winds are forecast above 5.5 m/s (20 km/hr), keep busy unsealed road surfaces damp (e.g., with water carts or fixed irrigation), or use dust suppressants to stabilise the surface.	✓		
	Keep unsealed road surfaces in regular use within your operational areas damp through surface watering in all wind conditions, unless dust suppressants used as an alternative can effectively stabilise the surface.	✓	✓	✓
	Regularly maintain unsealed roads by grading and the laying of fresh gravel.	✓	✓	
	Hard surface area between the wheel wash area and the public road.	✓	✓	✓
	Clean vehicles effectively before they leave a site.	✓	✓	
	Install and operate wheel wash equipment to remove mud and soil from vehicles exiting the site from unsealed surfaces.	✓		
	Put in place fixed wheel washing at all exits as well as procedures for effective cleaning and inspection of vehicles.	✓	✓	✓
	All loads entering and leaving site with dusty materials to be covered.	✓	✓	✓
	No site runoff of water or mud.	✓	✓	✓
	Clear all spillages on sealed roading surfaces as soon as is practicable and regularly clean sealed surfaces using wet techniques, particularly during periods of dry weather and where close to sensitive receptors.	✓	✓	
	Use agreed wet cleaning methods or mechanical road sweepers, or fixed or mobile sprinkler systems, on sealed roads at least once a day to keep clean.	✓	✓	
	Clean road edges and pavements at site entrance using agreed wet cleaning methods.	✓	✓	
	Provide hardstanding areas for vehicles and regularly inspect and clean these areas.			



CONTROL MEASURES		RISK CATEGORY WHERE CONTROL MEASURES APPLY		
		HIGH	MEDIUM	LOW
Demolition works	Ensure availability of water as dust suppressant should visible emissions arise.	✓	✓	✓
	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	✓	✓	
	Securely cover debris and minimise drop heights.	✓	✓	✓
	Where possible strip inside buildings before demolition begins (outer structure provides a screen against dust).	✓	✓	✓
	Sheet or screen structures with suitable material.	✓		
Construction activities and earthworks	Limit the area of soil exposed.	✓	✓	✓
	During dry, windy conditions, limit the extent of earthworks, particularly adjacent to sensitive neighbours.	✓	✓	✓
	Retain as much vegetation as is practicable.	✓	✓	✓
	Temporarily cover earthworks if possible (e.g., mulch).	✓	✓	✓
	Stabilise exposed areas as soon as practicable. This includes site access, parking and completed fill and spoil areas. Stabilisation methods may include metalling, grassing, mulching.	✓	✓	✓
	Ensure water available as dust suppressant for all dusty activities to dampen down, especially during dry weather.	✓	✓	✓
	Maintain surfaces of active earthworks areas in damp condition. This should include pre-watering of earthworks surfaces, prior to excavation allowing enough time for moisture to penetrate the soil.	✓		
Loading/unloading	Install windbreak fences around earthworks areas where practicable.	✓		
	Limit loading or unloading of trucks during windy conditions.	✓	✓	✓
Stockpiles and material storage	Minimise drop heights to control the fall of materials when loading or stockpiling materials.	✓	✓	✓
	Make sure that stockpiles exist for the shortest possible time.	✓	✓	✓
	Locate stockpiles in sheltered areas of site and away from sensitive site boundaries as far as practical.	✓	✓	✓
	Take into account the predominant wind direction when siting stockpiles to reduce the likelihood of affecting sensitive receptors.	✓	✓	
	Limit the height and slope of stockpiles to reduce wind lifting up materials. Stockpiles over 3 m in height have a higher risk of causing dust emissions.	✓	✓	✓
	Cover, seed or fence inactive stockpiles of soil materials to be left more than 3 months or consider use of surface binding agents.	✓	✓	✓
	Enclose or cover stockpiles of fine, dry materials.	✓	✓	
	Maintain active stockpiles in damp condition with regular watering. Dampen inactive stockpiles if producing visible dust.	✓		
	Erect windbreak fences or use windbreaks such as vegetation, topographic features or earth bunds of at least the height and size to the stockpile to act as wind barriers.	✓		
	Store fine material (under 3 mm in size) inside buildings or enclosures.	✓		



2.7 MONITORING & REPORTING

Monitoring and reporting measures for dust depend on the risk rating. Based on the risk rating (high, medium, or low) for the project from Section 2.4, you need to work out what measures are suitable for each of type of work on your project.

The table below sets out the monitoring that should be considered depending on the risk category. Further detail on how to undertake the monitoring is provided in the sections to follow.

Monitoring & Reporting Requirements for High, Medium & Low Projects

MONITORING AND REPORTING MEASURES	RISK CATEGORY WHERE CONTROL MEASURES APPLY		
	HIGH	MEDIUM	LOW
Check and log weather forecast daily. Assess wind speed and rainfall – action may be required (see Section 2.7.1).	✓	✓	✓
Carry out a visual inspection of site activities, dust controls and site conditions (see Section 2.7.2) and record in a daily dust log (see Appendix 2B).	✓	✓	✓
Keep an accurate log of all dust complaints from the public and LPC. Record the nature/location/time of complaint, the cause identified, and measures taken to reduce emissions.	✓	✓	✓
Record any exceptional incidents that cause dust, either on- or off- site, and the action taken to resolve the situation.	✓	✓	✓
Use real-time dust monitoring (e.g., hand held monitor) to supplement visual assessments for investigation of complaints (See Section 2.7.3). Assessment will be against dust trigger levels (Appendix 2A).	✓	✓	
Use real-time dust monitoring (e.g., hand held monitor) at the site boundary during dry months to assess compliance with dust trigger levels (Appendix 2A). Where the trigger level is being significantly breached, stop work whilst best practice mitigation measures are put in place before restarting.	✓		



2.7.1 METEOROLOGICAL FORECASTS

Check weather forecasts daily (wind speed and direction, and rainfall) to assist in managing site activities and implementing the appropriate dust controls. LPC has a Port specific forecasting serviced called "Metconnect". Ensure you get access to this system via the LPC Project Manager for the most up-to-date and detailed forecasting information. The prevailing wind directions at Lyttelton Port are northeasterlies and southwesterlies and therefore these will be the main directions to consider in terms of implementing dust controls and determining potential effects of dusty activities.

Contact your LPC Project Manager for access to Metconnect to see if there is specific weather data available for your work site.

2.7.2 VISUAL MONITORING CHECKLIST

General visual monitoring of all construction areas should be undertaken on a daily basis or more frequently, if conditions change and during dry periods. The table below outlines the dust monitoring programme that should be implemented during construction works. The frequency of the monitoring has been defined in the table below but in the instance of strong winds, discharges of dust that cross the site boundary or a complaint, the monitoring programmes will need to be undertaken more regularly. The results of the dust monitoring programme will need to be logged using the dust monitoring checklist in Appendix 2B, or an equivalent checklist agreed with the LPC Project Manager.

Dust Monitoring Programme

MONITORING ACTIVITIES	FREQUENCY
Check weather forecasts for strong winds and rainfall to plan appropriate activities and dust management response in advance.	Daily
Observe weather conditions, wind via observations and data outputs from weather stations, and presence of rain.	Daily & as conditions change
Visual inspections shall be made of all active construction areas, whenever there are construction activities.	Daily and increase to three times daily during dry months
Inspect land adjacent to the site (including vegetation, residential properties and cars), construction exits and adjoining roads for the presence of dust deposition.	Daily & as conditions change
Inspect all exposed soils and unsealed surfaces for dampness and to ensure that surface exposure is minimised.	Daily & as conditions change
Inspect stockpiles to ensure enclosure, covering, stabilisation or dampness. Ensure stockpile height is less than 3 m or appropriately stabilised.	Daily & as conditions change
Inspect dusty activities to ensure dust emissions are effectively controlled.	Daily & as new activities are commenced
Monitor dust generating activities and controls, including water application rates.	In winds over 5.5 m/s (20 km/h or 11 knots)
Ensure site windbreak fences are intact.	Daily
Inspect wheel wash equipment to ensure effective operation.	Weekly
Inspect watering systems (sprays and water carts) to ensure equipment is maintained and functioning to effectively dampen exposed areas.	Weekly



2.7.3 INSTRUMENTAL MONITORING

Real-time monitoring of dust (measured as TSP or PM₁₀ concentrations) is recommended in areas assessed as high risk of dust generation (according to Section 2.4 criteria) and will provide a further tool to manage dust emissions during dry weather conditions. Assessment of the TSP or PM₁₀ measured levels would be against the recommended trigger levels (in Appendix 2A).

In addition, real-time dust monitoring can be used as a tool to investigate complaints and determine where additional controls may be needed. This is recommended in medium and high risk areas.

Examples of real-time particulate monitors that could be used include:

- Continuous particulate monitoring in accordance with US Code of Federal Regulations Title 40, Part 50 Appendix O – Reference Method for the Determination of Coarse Particulate Matter as PM₁₀-2.5 in the Atmosphere (e.g., E-BAM for TSP/PM₁₀)
- Portable light-scattering laser photometers for PM₁₀ measurement (e.g., E-Sampler, TSI OPS, Dusttrak).

Location of fixed monitors should generally be in accordance with AS/NZ 3580.1.1:2007 Method for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment; and AS2923:1987 Ambient Air – Guide for the Measurement of Horizontal Wind for Air Quality Applications, as far as practicable.

2.7.4 REPORTING

Maintain a record of completed dust management inspection logs (Appendix 2B) and any incident or complaints investigations. Inspection sheets must be completed and provided to the LPC Project Manager at least once a week in accordance with CEMP reporting requirements.

The complaints procedure of the CEMP guidance document should be followed. Any complaints should be referred to LPC.

Specifically for dust complaints, note:

- the time, date, location of complaint;
- description of the dust complaint;
- wind direction and strength and weather conditions at the time; and
- details of your site inspection, what you noted in terms of dusty activities and controls being used and what additional action was taken to reduce dust, if required.

If necessary update any relevant management procedures to prevent any recurrence of dust emissions that may lead to complaints.



2.8 CONTINGENCY MEASURES

The following contingency actions may be required during adverse weather conditions:

Contingency Actions

WEATHER FORECAST	ACTION TO CONSIDER
Winds of 5.5 m/s (20 km/h or 11 knots) or more	<ul style="list-style-type: none"> Limiting the activities that may cause dust (particularly adjacent sensitive neighbours). Additional visual inspections of exposed areas and activities. Assessing the need for additional controls, such as increased water application rates.
Strong winds over 10 m/s (36 km/h or 20 knots)	A site 'shut down and cover up' policy, whereby all site operations that can lead to dust should cease and all exposed areas covered or treated to minimise dust emissions. All dusty activities should stop until wind eases.
Dry weather (particularly between September and February)	Dry weather (particularly between September and February). Additional water suppression may be required to minimise dust generation.





2.9 APPENDICES



APPENDIX 2A

LEGISLATIVE REQUIREMENTS & ENVIRONMENTAL PERFORMANCE STANDARDS

LEGISLATIVE REQUIREMENTS

The Resource Management Act 1991 (RMA)

The RMA is the overarching legislation relevant to the management of dust emissions. To assist them in achieving the purpose and principles of the RMA, regional councils and unitary authorities prepare regional air quality management plans.

Canterbury Natural Resources Regional Plan

The permitted criteria for fugitive dust is set out under Rule AQL38 of the Canterbury Natural Resources Regional Plan, prepared under the Resource Management Act 1991.

Coastal Plan

At 12.2(3), the Coastal Plan notes that applications for resource consent should include mitigation methods to deal with nuisance dust.

District Plan

District Councils do not have specific functions under the RMA to manage discharges to air, unless delegated to do so by the regional council. However, under Section 31 they are responsible for controlling some activities that can cause impacts on air quality, in particular, the use and development of land. The Banks Peninsula District Plan sets out specific criteria for assessing land use consent applications. This includes consideration to the effects on amenity values from dust nuisance.

Rule AQL38 Fugitive dust emissions from unconsolidated surfaces – permitted activity:

Discharges from unsealed or unconsolidated surfaces on industrial or trade premises and construction sites are common, but mitigation measures can be employed to prevent windblown dust emissions from these sites causing nuisance effects. Condition 1

1. The dispersal or deposition of particles shall not cause an objectionable or offensive effect beyond the boundary of the property where the discharge originates.

has been adopted to control potential adverse effects on neighbouring properties. Consideration will be given to the assessment guidelines for dust in assessing the offensive or objectionable nature of any dust discharged beyond the property boundary.



ENVIRONMENTAL PERFORMANCE STANDARDS

Trigger levels are provided below which are relevant when instrumental monitoring is undertaken. Instrumental monitoring will only be required on high risk sites, and on medium–high risk sites where complaints have been received to determine if additional controls are required.

Dust (TSP) Trigger Levels

The Ministry for the Environment (MfE)¹ provide recommended trigger levels which can be used to manage dust from construction sites. The recommended trigger levels for TSP are shown in the Table below. Installation of real time monitoring to monitor TSP (e.g., using an E-BAM) and assessment against these trigger levels may be appropriate for high risk construction sites. For low risk sites, visual assessments of dust are considered adequate.

MfE TSP trigger levels:

AREA	TOTAL SUSPENDED PARTICLES TRIGGER LEVEL (DUST CONCENTRATION)
Insensitive area	120 µg/m ³ (fixed 24-hour average)
Moderate sensitivity	100 µg/m ³ (fixed 24-hour average)
Sensitive area (significant residential development)	80 µg/m ³ (fixed 24-hour average)

Sensitive areas are defined by the MfE to be typically areas in which there is significant residential development, so this is trigger level relevant to the redevelopment of Lyttelton Port.

The MfE trigger levels for TSP are designed to avoid dust discharges causing a dust nuisance (i.e. to avoid offensive or objectionable discharges of dust). However, because they are measured as a fixed 24-hour average, they cannot readily be used as management tools to prevent dust nuisance – the typical response to exceedances of MfE trigger levels is to investigate the cause of the exceedance with a view to preventing a recurrence.

The MfE does not give any recommendations for short-term TSP concentrations. Short term TSP concentrations downwind of construction activities are likely to be highly variable. Short-term trigger levels to manage dust emissions as shown in Table below are used for large construction projects in New Zealand. These can be used to assess nuisance dust levels and compliance with the MfE daily TSP trigger level.

Short-term dust and meteorological action trigger levels:

TRIGGER	VALUE
Short term TSP threshold	200 µg/m ³ (1-hour average)
Wind warning level 1 – Monitor and implement additional dust controls measures	5 m/s (Wind speed)
Wind warning level 2 – Dusty activities to stop until wind eases	10 m/s (Wind speed)

PM₁₀ Trigger Levels

An alternative to continuous monitoring of TSP to assess against action trigger levels, is monitoring of the PM₁₀ fraction of dust (a mass fraction of airborne particles with an aerodynamic diameter of 10 microns or less).

The advantage of PM₁₀ monitoring over TSP monitoring for construction activities is in the greater portability of real time analysers that are available for measuring this fraction. Portable handheld real time PM₁₀ devices are available which can be used for identifying potential dust issues from different activities across the site before they extend beyond the boundary and cause complaint. These are also useful for investigating complaints with the help of wind speed and direction data. These monitors can be used to assess dust levels on high risk sites for comparison against trigger levels for corrective action and work stoppage.

¹ MfE Good practice guide for assessing and managing the environmental effects of dust emissions 2001.



Short term trigger levels have been developed in the US and UK² for PM₁₀ which can be used with meteorological data as a management tool, as shown in the Table below. Project specific triggers for corrective action must be determined on a case-by-case basis as there are a number of variables that can affect the relationship between the dust levels measured within the site and the resulting dust levels occurring off-site.

Short-term PM₁₀ and meteorological action trigger levels:

TRIGGER	VALUE
Short term PM ₁₀ threshold (1 hour average)	150 µg/m ³
Short term PM ₁₀ threshold (15 minute average)	200 µg/m ³
Wind warning level 1 – Monitor and implement additional dust controls measures	5 m/s (Wind speed)
Wind warning level 2 – Dusty activities to stop until wind eases	10 m/s (Wind speed)

² GLA and London Councils (2006) The control of dust and emissions from construction and demolition Best Practice Guidance.



APPENDIX 2B

DAILY DUST INSPECTION LOG



DAILY DUST INSPECTION LOG

Project: [type Project]

Date: [type date]

Inspection By: [Click here and type]

Time: [type time]

Current Weather Condition (eg sunny, cloudy, rain)

Wind Direction/Strength (eg strong, moderate, light, still):

Areas(s) inspected:

SCOPE OF INSPECTION	Circle the relevant item			COMMENTS
	Y	N	N/A	
Is there visible dust from site work activities, stockpiles, earthworks areas or haul roads?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Are haul roads visibly dry and need spraying with water truck?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Are any exposed earthworks or stockpile areas visibly dry and need water spray?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Stockpile heights less than 3M?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Stockpiles covered/stabilised where needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Are there any signs of dust going off site as a result of site activities? [Inspect land adjacent to the site (including vegetation, residential properties and cars), construction exists and adjoining roads for the presence of dust deposits].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Are site windbreak fences intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
If wind speeds are strong (over 5.5m/s) are additional inspection and mitigation measures being put in place? (eg increase water application, restrictions on dusty activities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Are watering systems (eg water carts, wheel wash) operating effectively to minimise dust?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Is plant and equipment producing visible emissions for longer than 10 seconds?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Are trucks carrying loose (uncovered) material entering or leaving the site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
If real time dust monitoring being undertaken, is this showing compliance with dust trigger limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
Overall assessment: Is dust generation likely to impact on nearby residents?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Click here to enter text.
RECOMMENDATIONS				
Priority (H/M/L)	ACTIONS	By Whom	By When	Completed Y/N
Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.





3.0

TECHNICAL SECTION

CONTAMINATED SOIL



3.0 CONTAMINATED SOIL



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3.1

INTRODUCTION

This Technical Section sets out procedures and mitigation measures to ensure that potentially contaminated soil associated with ground disturbance works at Lyttelton Port Company's facilities at both the Lyttelton Port and the City Depot is excavated, handled and disposed of appropriately.

This Section is not intended to cover the management of non-soil waste materials, such as removed pipe work or other infrastructure materials. It does however cover the handling and disposal procedures for asbestos containing materials (ACM) such as asbestos cement pipes.

Much of the ground disturbance work at the Port (including routine maintenance works) may fall under the NES Soil¹ regulations because of the presence of potentially contaminated land. Contamination may be present due to current and historical activities such as fuel storage, gasworks and landfilling.

Disturbance of contaminated soils can result in adverse effects on both the environment and the health of workers and surrounding residents. The presence of potentially contaminated soil also has implications for disposal of surplus soil.

LPC has obtained a resource consent to disturb contaminated soils for the entire Port site (consent number RMA92025316). The consent requires Contractors to adopt and implement the relevant Contaminated Soil Management Plan (CSMP) for their works. This Technical Section steps Contractors through determining which CSMP must be used.

The CSMPs have been prepared so that they can be appended to the Construction Environmental Management Plan (CEMP) and include procedures for:

- undertaking excavations in areas potentially containing contaminated soils;
- identifying the presence of contaminants;
- managing and containing contaminated soils encountered/excavated during the infrastructure rebuild works;
- making disposal decisions;
- managing the potential effects during the works such as odour, dust, contaminated stormwater discharge, and tracked soil;
- additional health and safety requirements due to contamination;
- monitoring the works to ensure appropriate disposal;
- validating the works on completion.

The City Depot was included in the resource consent, and so is included in this Section and covered by the relevant CSMP. However, it is not explicitly covered by the other technical sections.

¹ National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011



ASSESSMENT

i

2.2 ROLES & RESPONSIBILITIES

Outlines the responsibility of the contractor.

2.3 SETTING

Provides a description of the contaminated soil context at the Port.

2.4 RISK ASSESSMENT

Steps you through deciding if contaminated soil risk is high/medium/low for your project.



DESIGN

ii

2.5 PERFORMANCE STANDARDS

Project requirements regarding contaminated soil.

2.6 CONTROL MEASURES

What to do for low/medium/high risk projects, and non-HAIL sites.



OPERATION

iii

2.7 VERIFICATION & REPORTING REQUIREMENTS

Details verification and reporting requirements and sampling requirements if contamination is encountered.

2.8 CONTINGENCY MEASURES

What to do if you encounter contaminated soil unexpectedly.



3.2 ROLES & RESPONSIBILITIES

It is the Contractor's responsibility to implement the appropriate CSMP in order to minimise the impact of contaminated soil on human health and the environment. Sections 3.4 and 3.6 will help Contractor's determine the appropriate CSMP for the works (if one is required at all).

More detail on the specific roles and responsibilities for implementing the CSMPs are provided within the roles and responsibilities section of each CSMP.

LPC will provide Christchurch City Council (CCC) with any updates to this Technical Section of the CSMPs. Updates must be provided to CCC at least two weeks prior to works commencing under the revised documentation.



3.3 SETTING

A desk based assessment has been undertaken by contaminated land specialists to determine the potential for contamination to be present throughout the Port, and the potential nature of that contamination. The findings of the desk assessment form the basis for the CSMPs. The potential for contamination is summarised below. Further information is available on request from the LPC Project Manager for the works.

3.3.1 LYTTTELTON PORT

The Lyttelton Port site has been used for general Port activities since the mid-to-late 1800's. As part of Port operations, the site has hosted coal storage and handling areas, fuel storage and filling points and bulk handling areas. These activities have the potential to have caused contamination of shallow soils and groundwater.

There was a historic gasworks across Gladstone Quay from the site. It is possible gasworks waste was used in the reclamation. Contamination from the gasworks site may also have migrated onto the Port site.

The western end of the Port area has historically hosted bulk fuel storage facilities, many of which remain today, along with an active bitumen plant,

a dry dock and several engineering services. This area is subject to significant groundwater and soil contamination.

The military used the eastern end of the main Port area for barracks, gun emplacements and ammunitions storage around the time of World War II (mid 1930s–mid 1940s). A quarry and landfill operated at the eastern extreme of the site from the early 1900's till recently.



3.4 RISK ASSESSMENT

Refer to the maps on the following pages to determine the contaminated soil risk category. Each project will either have low, medium or high potential for contamination or be classified as non-HAIL land (land where contamination is not expected), depending on the location of the works. Please note it is possible to encounter contaminated soil across all categories.

Any land not shaded in the maps is classed as non-HAIL land. If the project spans two risk categories, the overall risk rating for the project is the highest risk rating. Each of the risk categories is described here:

- **CATEGORY 1 (high potential for contamination):**
Sites within or directly adjacent to the Tank Farm at Naval Point, where hydrocarbon contamination is known to occur.
- **CATEGORY 2 (medium potential for contamination):**
Port land that has a specific contaminating activity on it (in addition to general Port usage) and all of City Depot.
- **CATEGORY 3 (low potential for contamination):**
All other Port operational Port land where possible contamination could still be encountered.
- **CATEGORY 4 (non-HAIL land):**
Land owned by LPC that is not being used for any Port operations and has not been used for any other contaminating activities¹. There is no evidence to suggest these areas are contaminated, no additional contamination-related procedures are required for works in these areas.

The railway land is not covered by this Technical Section. If you are undertaking work within the railway areas at the Port, contact your LPC Project Manager.

¹ Contaminating activities referred to are activities which appear on the Hazardous Activities and Industries List (HAIL). The NES Soil regulations do not apply to non-HAIL land.

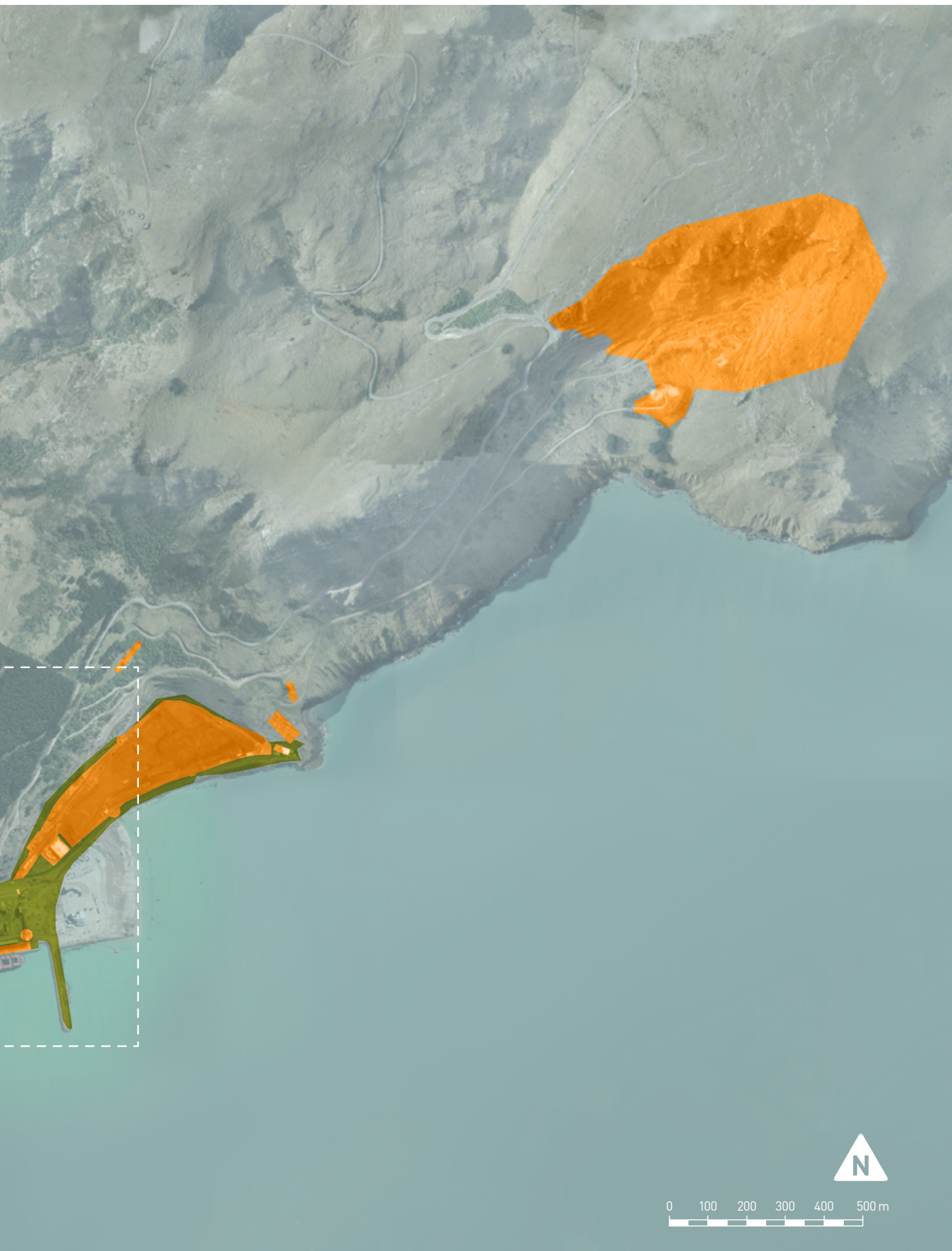


Technical Section 3.0 Contaminated Soil

MAP 1: Contaminated Land Risk Category

Source: Tonkin and Taylor 2014







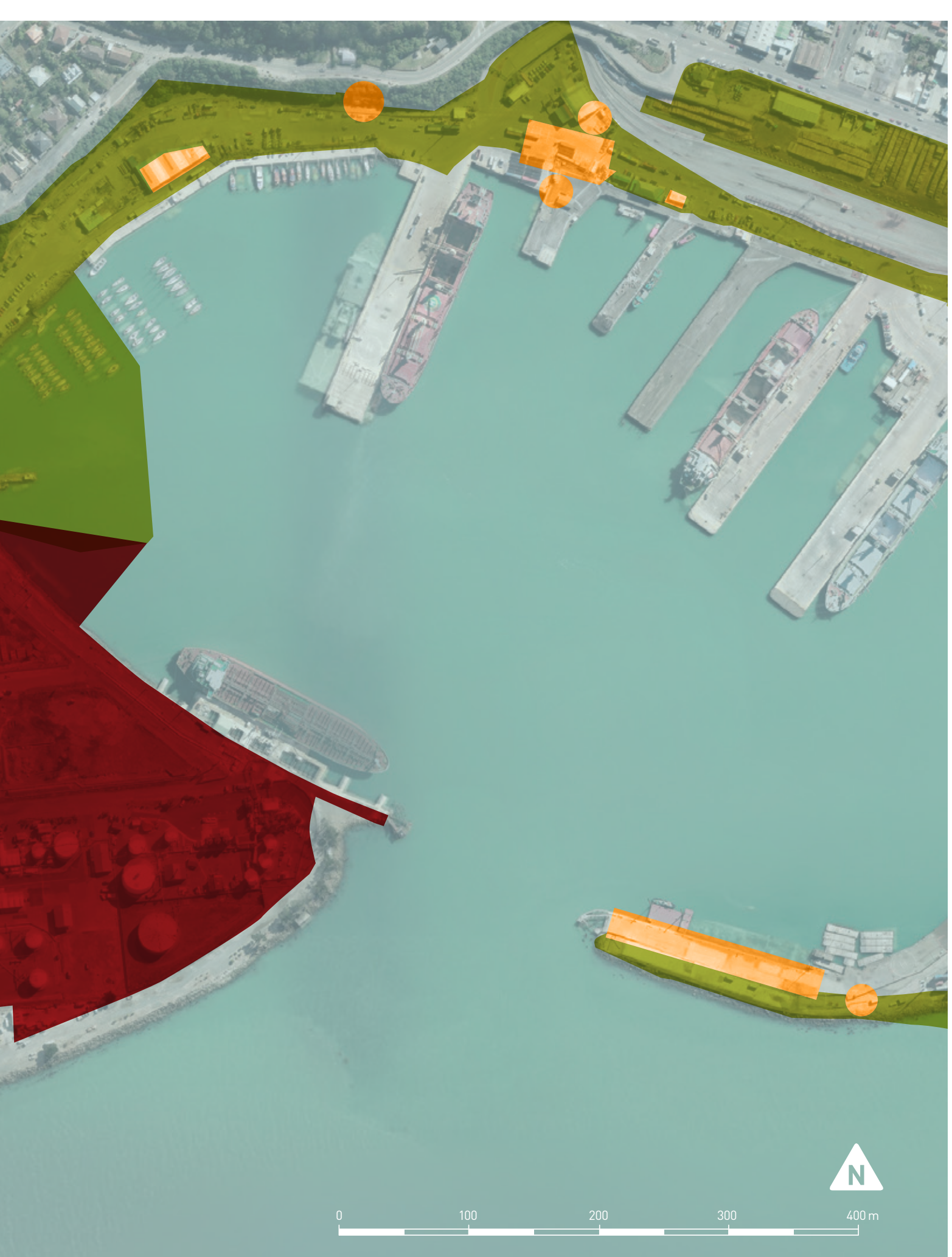
Technical Section 3.0 Contaminated Soil
MAP 2: Contaminated Land Risk Category

Source: Tonkin and Taylor 2014

**CATEGORY
3**
Low
potential for
contamination

**CATEGORY
2**
Medium
potential for
contamination

**CATEGORY
1**
High
potential for
contamination





Technical Section 3.0 Contaminated Soil

MAP 3: Contaminated Land Risk Category

Source: Tonkin and Taylor 2014







Technical Section 3.0 Contaminated Soil

MAP 4: Contaminated Land Risk Category

Source: Tonkin and Taylor 2014







3.5 PERFORMANCE STANDARDS

LPC requires Contractors to minimise the impact of contaminated land on human health and the environment.

The controls in this Technical Section are designed to manage the effects of contaminated land at the Port on human health and the environment. The controls are designed to meet the requirements of the NES Soil regulations, and for the disturbance of low levels of asbestos in soil, the requirements of the Health and Safety at Work (Asbestos) Regulations 2016.



3.6 CONTROL MEASURES

For each Category (i.e., low, medium and high potential for contamination) there is a different CSMP that must be implemented.

If the project location spans two different Category areas, Contractors can either adopt both the relevant plans, using each plan in the area it covers, or adopt the plan for the lowest Category.

Refer to Sections 3.6.1–3.6.3 for further detail on the contents of each plan and how to implement it.

Land that falls under Category 4 does not require contaminated land-specific controls. This land is

owned or leased by the Port and has not been subject to operational Port activities or other contaminating activities. Therefore, this land does not require additional earthworks controls above what would be undertaken for standard earthworks. However, Contractors should be aware of the potential for unforeseen contamination to exist and be prepared to implement additional procedures if required by a Contaminated Land Specialist.

3.6.1 CATEGORY 1 HIGH POTENTIAL FOR CONTAMINATION

Land that has been identified to fall within Category 1 includes the tank farm where fuel spills and leaks are known to have occurred, as shown on Map 2. It is almost certain that contamination will be encountered during earthworks in these areas. Contamination may include hydrocarbons, metals, and volatile organic compounds (VOCs).

The procedures that apply to this category recognise and allow for this high likelihood of encountering significant contamination during excavations and address the risks associated with this contamination such as odours, free hydrocarbon product and VOCs. Procedures include removal/management

of subsurface structures (such as underground tanks, pipe work and sumps). A key aspect of this CSMP is the early identification and containment of any contaminants encountered. Contractors are expected to work closely with the Contaminated Land Specialist throughout the works.

All staff working on these sites must be made aware that contamination is likely to be present, and understand the procedures to identify and manage any contamination.



3.6.2 CATEGORY 2 MEDIUM POTENTIAL FOR CONTAMINATION

Category 2 sites are located where there is a specific identified contaminating activity (in addition to general Port operations) but contamination has not been confirmed to the degree of high risk sites. Examples of contaminating activities are storage of small volumes of fuel, asbestos pipes or proximity to historic gasworks. A buffer around each specific contaminating activity has also been included, its size determined by the nature of the activity and ability for contamination to migrate.

Procedures in the CSMP for medium risk sites are based on the nature of the contaminating activity that has taken place. Therefore, some procedures will be relevant to the works and not others. The Contractor must take care to read and understand the procedures that apply to the type of contamination most likely to be encountered in the proposed works.

Please contact the LPC Project Manager for the specific Medium Risk Category 2 Map. This map identifies specific contaminating activities which have occurred in the past. This information needs to be incorporated in the Category 2 CSMP.

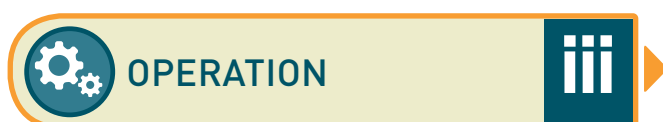
Some areas within Category 2 (e.g., military ammunitions dumps) require a site specific CSMP to be prepared. The site specific CSMP would be targeted to the contaminating activity which has occurred at the work site, and the work being proposed.

The Contractor must ensure that all staff working on within the Category 2 area are aware that contamination may be present, and understand the procedures to identify and manage any unforeseen contamination.

3.6.3 CATEGORY 3 LOW POTENTIAL FOR CONTAMINATION

Land within this category is general Port operations areas (a contaminating activity in itself) that have not been subject to additional contaminating activities such as fuel storage. Although potential for contamination is low, the Contractor must brief all staff working on these sites that contamination may be present, and the procedures to identify and manage any unforeseen contamination. Potential contamination that may be identified includes hydrocarbons, metals and asbestos.

This category also has provision for work areas to be elevated to Category 2 or 1 if contamination is identified during works. If this is the case, the Contractor must implement Category 2 or 1 procedures and advise LPC so that Maps 1–4 can be updated.



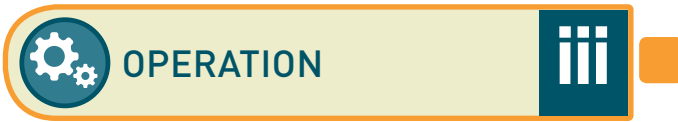
3.7 VERIFICATION & REPORTING

The checklist in Appendix A of each CSMP provides a summary of the above actions and the contaminated land requirements during works. The LPC Environmental Manager will be able to assist if Contractors have any questions regarding the selection or implementation of the CSMPs. Within each CSMP is a Contractor Checklist which must be completed by Contractors. It outlines the key areas of the CSMP that require consideration by the Contractor before, during and following works.

Verification is the process of confirming the objectives of the works have been achieved, confirming works were undertaken according to agreed procedures and reporting on any incidents. Verification is relevant to all works within Category 1, 2 or 3 land.

Validation sampling is required for Category 1 sites and any Category 2 or Category 3 sites where evidence of contamination has been identified. If sampling is required, this will be undertaken by the contaminated land specialist in accordance with the procedures outlined in the relevant section of each CSMP.

A Works Verification Form is the basis of the Contractor's reporting to LPC (Appendix B of each CSMP). The form includes information about contamination encountered, soil disposal locations and volumes, environmental or health and safety incidents during work, and the results of any testing undertaken. Further details regarding verification are included in each CSMP. The Contractor must consult with the Contaminated Land Specialist to complete the Works Verification Forms.



3.8 CONTINGENCY MEASURES

If the Contractor encounters soil which may be contaminated, the Contractor must contact a contaminated land specialist immediately for advice on how to proceed and what additional controls are required.







3.0

**CONTAMINATED SOIL
MANAGEMENT PLAN**

CATEGORY 1

HIGH POTENTIAL FOR CONTAMINATION



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 1



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1 INTRODUCTION

This report has been prepared in general accordance with national guidance and standards for conducting ground contamination-related desk study investigations in New Zealand. This includes compliance with the general format described in the Ministry for the Environment (MfE) Contaminated Land Management Guideline No. 1 *Reporting on Contaminated Sites in New Zealand*.

1.1 BASIS FOR THESE PROCEDURES

Category 1 sites are those in which excavations are likely to encounter significant contamination such as hydrocarbon spills. Category 1 covers the tank farm at Lyttelton Port. Hydrocarbon and contaminated groundwater plumes have been identified in this area, and there are records of burial of contaminated sludge. The procedures in this plan recognise the significance of the contamination expected to be encountered during any excavation in a Category 1 area.

The area of the Port included in Category 1 area is presented in the Risk Category Zoning plan in Maps 1–4 in the Contaminated Soil Technical Section (Section 3 of the CEMP guidelines). Further detail about the basis for the procedures is provided in the main section of the Contaminated Soil Technical Section.

1.2 SITE MANAGEMENT

The following are key aspects of site management during all earthworks on Category 1 areas:

- The Contractor shall advise LPC's Environmental Manager at least one day prior to commencement.
- The site Hazard Board shall include information pertaining to the contamination likely to be identified. The Contractor's details shall be provided on the Hazard Board.

- Personal protective equipment (PPE) relevant to the expected contamination shall be available on site (Section 5).
- The site shall remain secured during non-working hours to prevent access by the public or unauthorised personnel.
- Appropriate earthworks controls (Section 3) shall be established prior to works commencing.
- Additional controls and procedures for disturbing low levels of asbestos in soil (Appendix B) shall be established prior to works commencing.

1.3 IDENTIFICATION OF CONTAMINATION

The most significant contaminants likely to be identified in Category 1 areas are hydrocarbons and metals such as lead. Indicators that contamination may be present include:

- a hydrocarbon odour (typically smells like petrol, diesel, kerosene etc.);
- other abnormal odours not normally associated with soil;
- discoloured soil (i.e., areas of soil with dark staining, abnormal or unnatural colouring);
- an oily substance or sheen on the surface of soil, or on the surface of water in the excavation;
- soil with waste material or building debris (i.e., plastics, metal, bricks, timber etc.) indicating the ground has been filled.



2 PLAN MANAGEMENT & CONTROL

2.1 ROLES & RESPONSIBILITIES

LPC is Responsible for:

- Ensuring that the site works are undertaken in accordance with this CSMP.
- Ensuring that all site staff and sub-contractors understand and comply with the procedures and the health and safety requirements.
- Making this CSMP available to site Contractors carrying out works and ensure the most recent updated copy is kept on site.
- Compiling an annual report to be provided to Christchurch City Council.

The Contractor is Responsible for:

- Identifying the appropriate category-specific CSMP and implementing the required management procedures and health and safety controls.
- Notifying the Contaminated Land Specialist prior to commencing works which require observation.

- Communicating contaminated-land related incidents to LPC in a timely manner.

A Contractor's Checklist is included in Appendix A and outlines the key management and reporting requirements for works in Category 1 sites.

Contaminated Land Specialist:

This document refers to a Contaminated Land Specialist as a role which provides technical expertise to oversee the identification and disposal of contaminated soil. For the purposes of this CSMP the Contaminated Land Specialist shall meet the following criteria:

The Contaminated Land Specialist shall be a person who is qualified to undertake a detailed site investigation (supervised) and who should have at least tertiary education in environmental science or engineering or a related field and 2 or more years of professional experience in environmental investigations and risk assessment.

Personnel with decision making roles in relation to contamination management procedures and their training requirements are set out below:

	SITE CREW (e.g., excavator operators, site construction staff)	TRAINED STAFF (e.g., Project Manager, Site Engineer, Environmental Managers)	CONTAMINATED LAND SPECIALIST
Training Requirement	15 min tool box	2 hour training from Contaminated Land Specialist	Degree qualified + 2 or more years professional experience
Decision Authority	Day to day site inspections during works	Regular inspections on Category 2 sites, daily inspections on Category 1 sites	Disposal of soil from works, additional mitigation measures



2.2 DISTRIBUTION

The following parties have been provided with this CSMP and the three category-specific CSMPs:

- LPC;
- CCC;
- Environment Canterbury (ECan).

A copy of the CSMP shall be kept onsite at all times.

2.3 REVIEW & UPDATE OF THE CSMP

Any variations to this CSMP must be approved by LPC and Christchurch City Council (CCC).

To change any aspect of the CSMP, the Contractor must contact LPC in the first instance. Any changes made to the CSMP shall not reduce the level of control of the works without good evidence that this is acceptable. The Contaminated Land Specialist should be consulted in the event of any CSMP changes.

It is the responsibility of Contractor to distribute updated versions of the CSMP and to ensure the correct copy of the report is onsite at all times.

2.4 IMPLEMENTATION

Contractors undertaking the works must implement the CSMP.

2.5 INFORMATION REQUIRED FROM CONTRACTORS

LPC is obliged to submit an annual report to CCC. In order to prepare the report, LPC requires the following information from all Contractors:

- Records of all contaminated land inspections completed in the preceding annual period (LPC will advise the dates).
- Any contaminated land reports or testing undertaken to comply with this CSMP.
- Details of any incidents related to contamination, such as fuel spills, encountering asbestos, health and safety incidents as a result of contamination, etc.
- Details of any variations to the procedures in the CSMP, including why variations occurred and who approved them.

A full list of all requirements is included in Section 6. Templates for reporting of incidents and monitoring can be found in Appendix D.

2.6 ANNUAL REPORT REQUIREMENTS

Annually, a report shall be compiled by LPC and provided to the CCC¹. The report shall set out:

- the records of all contaminated land inspections completed in the preceding annual period where contaminated material has been positively identified;
- any contaminated land reports or testing results undertaken to comply with this CSMP.

Contractors undertaking the works will provide LPC² copies of all reports produced by the Contaminated Land Specialist produced in relation to the sampling, analysis and assessment of all contaminated materials encountered. These reports will include information relating to the location, type and depths of contamination observed (if any), photographs, surrounding land uses and any monitoring/validation (if any).

¹ Marked for the attention of Team Leader Environmental Compliance Team (I&EEEnvComplianceINBOX@ccc.govt.nz)

² Attn Kim Kelleher, Environmental Manager, LPC



3

SOIL MANAGEMENT PROCEDURES

These procedures focus on the identification, management and disposal of soils and water with hydrocarbon and metal contamination. Additional procedures for the disturbance of soil with low level asbestos are in Appendix B.

Where possible, excavation shall also be undertaken in a manner which allows soils of a different type/composition/contaminant levels to be kept separate.

A key underlying principle is that where possible, excavated material containing hydrocarbons shall be kept separate from material which does not. The cleaner material may be able to be disposed at a lower landfill cost (following sampling and testing), thereby reducing the overall project costs.

3.1 SITE ESTABLISHMENT

The following site establishment procedures are required for all earthworks on Category 1 sites:

- The Contractor shall advise LPC's Environmental Manager at least one day prior to works starting.
- The site Hazard Board shall include information pertaining to the contamination likely to be identified. The Contractor's details shall be provided on the Hazard Board.
- Personal protective equipment (PPE) relevant to the expected contamination shall be available on site (Section 5).
- The site shall remain secured during non-working hours to prevent access by the public or unauthorised personnel.
- Appropriate earthworks controls (Section 3) shall be established prior to works commencing.

3.2 INSPECTION PROCEDURES

The Contaminated Land Specialist must attend a tool box meeting prior to excavations commencing to discuss potential soil and groundwater contamination issues that may arise during excavations. The Contaminated Land Specialist will then be on call as required and may inspect the excavations at any time during earthworks.

All excavations in Category 1 areas shall be inspected regularly by the Trained Staff member, with a minimum of one inspection per day.

If unforeseen contamination is encountered, the Contaminated Land Specialist is to be contacted to inspect the excavation and advise on the appropriate soil handling and health and safety procedures.

3.3 GENERAL SOIL HANDLING PROCEDURES

The following general handling procedures should be followed where contamination is identified/suspected in any Category 1 area, except where testing of soils has proven soils to be clean (see Section 3.11):

- Material excavated shall be loaded directly onto trucks for offsite disposal, or temporarily stockpiled to prevent contamination of other area.



- Trucks shall be loaded within the site where runoff and possible spills during loading will be controlled and contained.
- Measures shall be put in place to ensure contaminated soil is not tracked offsite on wheels of trucks (e.g., wheel wash).
- Each truck shall have a tracking document signed onsite and collected at the receiving facility to track each load of material.
- Trucks shall have their loads covered during transport of material to licensed landfill. These shall be affixed before leaving site.
- Stockpiling shall be in accordance with Section 3.4.
- A permit/manifest shall be obtained from the disposal destination prior to transportation. This is the responsibility of the Contractor.
- All contaminated material removed from site shall be disposed as per the procedures set out in Section 4.1.
- All weighbridge dockets shall be retained by the Contractor and provided to the Engineer to the Contract.
- If the stockpile is to remain for more than 1–2 days and/or if rain is forecast during the time the stockpile is present, the stockpile shall be covered with clean soil, geotextile or a polythene cover to prevent rainfall induced erosion.
- Fenced or otherwise secured so that there is minimal access to the stockpile.
- If the material is odorous, odour control measures shall be put in place. This could include covering the material with clean soil, a polythene cover or instituting a deodoriser system.

3.4 STOCKPILING OF CONTAMINATED SOILS

Stockpiling of contaminated soil on site is not desirable but may be required due to phasing of work, or other construction constraints. Where possible stockpiling should be avoided and, if required, the time material is stockpiled shall be minimised as much as practical.

Any material from Category 1 areas that requires stockpiling shall be managed as below:

- Sediment control measures shall encircle the stockpile, this may include:
 - earth bunds with a minimum height of 0.3 m;
 - hay bales;
 - silt fences;
 - proprietary products such as filter socks etc.

3.5 DUST GENERATION

From an environmental and human health perspective, dust generated from contaminated soils has the potential to contain contaminants and, during windy conditions, may migrate offsite to affect surrounding Port workers and residents.

In all Category 1 areas the Contractor shall:

- limit the amount of material to be excavated as much as practicable;
- limit vehicle access onto contaminated areas;
- use a water truck or portable water sprays in trafficked areas to dampen dust during dry and windy conditions;
- if required, cover stockpiled material awaiting laboratory testing/removal to prevent dust generation;
- visually monitor dust in the vicinity of the excavation at all times when there is exposed ground; and
- avoid work during windy conditions.

When utilising water to control dust, the Contractor shall ensure that the volume of water used for dust suppression does not cause surface ponding or runoff, does not cause surface run off that would discharge into natural water bodies, and does not induce soil erosion and soil pugging.



3.6

STORMWATER & SEDIMENT CONTROL MEASURES

Rainwater has the potential to come into contact with contaminated material and become contaminated itself. Contaminated sediment may also be entrained in the stormwater.

As well as standard erosion and sediment control procedures (see CEMP) in all Category 1 areas, the Contractor shall ensure that the following contamination-related stormwater and sediment control procedures are put in place prior to any ground breaking works commencing:

- Limiting the duration of exposure of contaminated ground as much as possible.
- Divert clean stormwater away from excavations/ exposed soil in contaminated areas.
- If stormwater does enter contaminated areas, contain runoff during rainfall events within the excavation.
- Bund stockpiles as set out in Section 3.4.
- Controlled site exit points and methods to prevent contaminated soils being tracking offsite by vehicles.

The purpose of the above stormwater and sediment control measures is to prevent contaminated water from entering surface water (the Harbour, rivers and streams) via the stormwater network.

3.7

CROSS CONTAMINATION

To avoid transferring contaminated soils from one location to another, all machinery and equipment shall be decontaminated prior to moving from any Category 1 site to a different location.

3.8

PREVENTION OF PREFERENTIAL PATHWAYS ALONG PIPELINES

Installation of pipelines through contaminated soils can provide a preferential flow path, through which contaminants can migrate. When laying pipe work through areas of contaminated soil with high groundwater where the contaminants may be mobile, measures (such as pipe dams) shall be put in place to prevent these contaminants from travelling along the permeable bedding of the pipeline. Advice on the design of the mitigation measures (pipe dam etc.) shall be sought from the Contaminated Land Specialist.

3.9

PROCEDURE FOR REMOVING & REPORTING ON UNFORESEEN STRUCTURES

It is possible that subsurface structures with potential to cause ground contamination may be encountered during the works, particularly in Category 1 sites. Structures of concern are those associated with the storage, transfer or disposal of fuels, chemicals or wastes. These may include USTs, pipelines, waste tanks or sumps, but do not include structures associated with stormwater or municipal wastewater. If unforeseen structures of this type are encountered, the Contaminated Land Specialist shall inspect the structures and advise on handling, disposal, and site validation procedures. Any abandoned drainage lines shall be capped off with concrete and inspected by the Contaminated Land Specialist prior to reinstatement.

Underground fuel storage tanks (USTs) are a special case, and a procedure for their removal is set out in Section 3.15.



3.10 IMPORTED MATERIAL PROCEDURES

Material imported to site is generally virgin quarry material or certified cleanfill, including demolition cleanfill from the Christchurch rebuild. Any other soil imported to site that is not certified cleanfill shall be sampled by the Contaminated Land Specialist at a rate of one sample for every 500 m³ and tested for metals and hydrocarbons as well as any other contaminants as determined by the Contaminated Land Specialist. Results must be consistent with expected background, unless otherwise authorised by resource consent conditions at the receiving location (i.e., the reclamation). It is preferable that fill is tested at its source prior to its use at the site. Otherwise, the Contractor shall stockpile the fill on site until test results are available.

Hardfill sourced directly from a quarry does not require testing.

3.11 SOIL SAMPLING REQUIREMENTS & PROCEDURES

Soil sampling shall be undertaken by the Contaminated Land Specialist according to the requirements of the NES Regulations 2012 and the MfE Contaminated Land Management Guidelines No.5. Soil samples shall be collected according to the following procedure:

- The materials encountered shall be described in accordance with the NZ Geotechnical Society “Guidelines for the classification and field description of soils and rocks for engineering purposes”.
- Freshly gloved hands shall be used to collect soil samples and shall be placed immediately into 300 ml glass jars.
- Any equipment used to collect the samples shall be decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent) or similar.
- Samples shall be shipped in a chilled container to an IANZ accredited laboratory under chain of custody documentation.

The Contaminated Land Specialist shall identify potential contaminants on the basis of visual and olfactory observations. However, at a minimum they shall include metals (arsenic, chromium, copper, nickel, lead and zinc), TPH, BTEX and PAH. Other contaminants may be tested for at the discretion of the Contaminated Land Specialist.

Any evidence of the presence of asbestos shall trigger testing for asbestos content in soil.

The Contaminated Land Specialist shall report the results of any testing to Lyttelton Port Company, and the Contractor. It is appropriate to evaluate the results with respect to:

- NES Regulations (2012) soil contaminant standards for an industrial/commercial land use with respect to protection of human health; and
- background concentrations for the local area.

3.12 ODOUR CONTROL

If odorous material is uncovered during excavation works the following odour control measures shall be implemented to prevent a nuisance to neighbouring businesses and to ensure the health of workers:

- All work in the immediate vicinity of odorous material shall cease and the exposed material shall be covered, for example with tarpaulin, polyethylene sheeting or a layer of clean soil to prevent further discharge of odour. The Contractor shall then seek advice from the Contaminated Land Specialist.
- The Contaminated Land Specialist shall assess the potential for volatile compounds and advise on health and safety requirements. Assessment of volatility may include use of a Photoionisation Detector (PID) and soil sampling and testing.
- Wind conditions shall be assessed and if necessary work shall cease until conditions are more favourable for minimising discharge of odour.
- A ventilation or other mitigation system, for example odour suppression sprays, shall be established if natural dispersion is not adequate.
- Health & safety procedures as set out in Section 4 shall be employed.



3.13 PRODUCT CONTROL

Free flowing petroleum-based products are likely to occur in soil on Category 1 sites. Petroleum-based products could include petroleum fuels (e.g., petrol, diesel), solvents, tar and creosote. Petroleum-based products can discharge from soil if not managed appropriately and may affect the safety of workers, visitors and the general public as well as the environment. Preventing and managing vapour discharges is discussed in Section 3.14.

The following procedures shall be implemented at every Category 1 site where there is a potential for or it is known that petroleum-based product occurs. The following procedures shall be modified as necessary by the Contaminated Land Specialist in conjunction with the Contractor's Health and Safety Officer (HSO) to ensure a safe working environment for workers is maintained:

- Soil that contains liquid hydrocarbons shall be handled in a manner which prevents hydrocarbons running out of the soil and contaminating the surrounding area.
- Stockpile soils containing contaminants away from water where possible, and ensure the controls set out in Section 3.4 are installed.

Free hydrocarbon product may be encountered on soils in areas that have been subject to petroleum industry activities or storage tanks. If free product is encountered, work shall cease and the Contaminated Land Specialist advised immediately. The Contaminated Land Specialist will advise on containment and disposal procedures, which may include use of a spill kit or removal by sucker truck and disposal at an approved facility.

3.14 CONTROL OF VAPOURS

The vapour component of petroleum fuels, solvents, heavy end hydrocarbons such as tar and creosote and can occur as vapour in soil even where a source of the vapours is not present (i.e., liquid petroleum product) on the actual site of works. If vapours are present, hazardous atmospheres may occur and the safety of workers, visitors and the general public compromised.

The following procedures shall be implemented at every project site where there is potential for or it is known that vapours occur. The following procedures shall be modified as necessary by the Contaminated Land Specialist in conjunction with the Contractor's HSO to ensure a safe working environment for workers is maintained:

- Before starting an excavation in a low or high potential for contamination area, the potential for vapour exposure is assessed. If vapours have been identified as potentially present, vapour levels at the excavation site shall be tested.
- Vapour levels (the volatile organic compounds, or VOCs) shall be measured using a photoionisation detector (PID), or an alternative vapour monitor. The results shall be compared with Work Place Exposure Standards in the Table below and appropriate PPE selected.
- Wind and temperature conditions affect levels of vapours in the working area. If these conditions change, vapours levels shall be reassessed. If necessary work shall cease until conditions are more favourable for minimising volatile inhalation risk and odour dispersion.
- Ventilation shall be established if natural dispersion is not adequate.
- Health & safety procedures as set out in Section 4 shall be employed.

EXPOSURE SCENARIO	EXPOSURE LIMIT	TRAINED STAFF
VOCs total (adopted n-hexane limit)	20	60
Benzene	1	2.5



3.15 USTS (FUEL & OTHER CHEMICALS)

There is high potential to encounter USTs within Category 1 areas. Any USTs and associated pipe work identified within the excavation shall be removed¹. The removal procedure, as follows, is appropriate for the removal of USTs formerly containing solvents or petroleum products:

- Notify the Contaminated Land Specialist as soon as the UST is encountered.
- Notify Environment Canterbury and the Christchurch City Council before any works begin.
- Engage a Contractor certified in removal of fuel/chemical tanks.
- Breakout overlying concrete (if present).
- Expose the top and sides of the tanks by pulling back the overburden soil.
- Seal all upper tank openings.
- Remove concrete anchors.
- Lift the tank from the excavation.
- Seal all lower tank openings, and prepare tanks for transport (e.g., label according to dangerous goods class).
- Remove any obviously contaminated bedding material under direction from the Contaminated Land Specialist.
- Transport the tank offsite to a licensed tank disposal location under the appropriate dangerous goods certification, where they will be purged, cleaned and broken down into scrap metal.
- Contaminated Land Specialist to undertake validation sampling and reporting as per the MfE guidelines, this may require the excavation to be left open for a period of 5-7 days.
- Backfill the excavation with suitable material.

3.16 GROUNDWATER/SURFACE WATER DISPOSAL

It is possible that groundwater will be encountered in excavations within Category 1 areas. Groundwater and ponded surface water within Category 1 areas shall not be discharged to stormwater unless testing confirms that contaminants are within acceptable levels.

The Contractor shall in the first instance contact the Contaminated Land Specialist to advise if contamination is present. Disposal shall be to sewer at the discretion of CCC. Treatment of the water may be required prior to disposal. Alternatively, disposal by sucker truck and transport to a Treatment Plant may also be possible.

3.17 ASBESTOS HANDLING PROCEDURES

There is potential for pipe work or buildings to contain asbestos, or for asbestos (either as fragments or free fibres) to be identified within soils on site (particularly in fill or in areas where historic buildings have been demolished). Specific procedures for disturbance of soil with low level asbestos are provided in Appendix B. If ACM including pipes or building cladding is encountered on site, the Contractor will notify the Project Manager and the Contaminated Land Specialist and follow the procedures below:

- Demolition of asbestos-containing buildings must be done under the supervision of an approved asbestos Contractor. A sub-contractor with the necessary certification is to be engaged and the works notified to WorkSafe New Zealand if necessary.
- Any cutting or excavation of AC pipe is to be undertaken in wet conditions with Contractors wearing full face and body protection and in accordance with the methods prescribed in the ACoP². Depending upon the quantity of AC pipe being cut or excavated, the works may be notifiable and need to be undertaken by a licensed asbestos removalist: check the ACoP for the thresholds.

¹ The removal shall be in accordance with the Regional Plan rules and the NES (soil).

² WorkSafe New Zealand – Approved Code of Practice – Management and Removal of Asbestos (November 2016).



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 1

- All workers on site must wear P₂ masks as a minimum.
- Work shall not proceed if conditions are windy.
- All asbestos contaminated material, or potentially contaminated material, will be loaded directly onto trucks to be transported to a licensed facility approved to accept asbestos materials. Material on the trucks will be covered prior to transport.
- Stockpiling of asbestos contaminated material will be avoided if possible. If it must be stockpiled, the stockpile will be covered with a suitable geotextile to prevent generation of dust and transport of asbestos off-site.
- Asbestos products, and all personal protective equipment used to handle it, shall be double-bagged and disposed of at an approved disposal facility.
- Disposal receipts shall be provided to the contaminated land specialist and LPC Project Manager.



4 SOIL DISPOSAL

4.1 DISPOSAL OF CONTAMINATED SOIL

All soils excavated from Category 1 areas shall be assumed to be contaminated unless testing (as per Section 3.11) has indicated that soils are uncontaminated. Contaminated soils shall be kept separate from other excavated material where possible in order to minimise disposal costs.

If sampling is required, it can be undertaken in situ (pre testing prior to excavation) or following excavation, from stockpiles. All sampling must be undertaken by a Contaminated Land Specialist¹. Contractors should be aware that laboratory testing takes 5–7 working days and methodology should account for this potential delay.

The results of the testing will dictate the disposal locations, broad guidelines are as follows:

- If the levels of contaminants are consistent with background concentrations then these materials may be disposed of to cleanfill (subject to approval from the cleanfill operator; see Section 3.3). This may also include disposal at the reclamation works at Lyttelton Port.
- If the levels of contaminants are greater than background but less than the Burwood Landfill acceptance criteria then these materials can be disposed of within the Burwood Landfill in the locations directed by the site operator.
- If the levels of contaminants exceed the Burwood Landfill acceptance criteria, options for pre-treatment, disposal to the facility at Texco Remediation or disposal to Kate Valley should be sought.

- Excavated materials containing asbestos require disposal to a licensed facility approved to accept asbestos materials with the prior approval of the operator.

Records of the material disposed (weighbridge dockets etc.), and the location of disposal shall be kept for all loads.

4.2 DISPOSAL OF HYDRO EXCAVATION MATERIALS

Materials from all hydro excavation (slurry etc.) works undertaken at Category 1 sites must only be disposed of at the designated location at the Burwood Landfill as directed by the site operator.

4.3 DISPOSAL OF UN-CONTAMINATED SOIL

Soils from Category 1 that have been pretested (see Section 3.11) and proven to be uncontaminated² may be transported to cleanfill for disposal, subject to approval from the cleanfill operator, or retained on site.

The loading of trucks and transport to the cleanfill shall be as per standard soil handling procedures.

Records of the material disposed, and the location of disposal should be kept.

¹ Where pre-testing is required for disposal or health and safety purposes then testing shall be undertaken in accordance with Ministry for the Environment Contaminated Land Management Guidelines. All testing shall be undertaken by a Contaminated Land Specialist. Analysis results will be compared to the receiving facility acceptance criteria and most recent and relevant human health assessment criteria.

² Soils are uncontaminated for the purposes of disposal to cleanfill if they meet the relevant resource consent conditions of the receiving cleanfill.



5

HEALTH & SAFETY PROCEDURES

These health and safety procedures relate to the risk to workers as a result of high potential for significant ground contamination. These are additional to standard health and safety requirements of the Contractor during excavation works and should be incorporated into the Contractor's overall health and safety plan.

Health and Safety requirements shall be managed through site specific and job specific safety authorisations (JSA's). The following procedures are to be used as a guide for the preparation of these JSA's. **The following procedures deal with health and safety matters relating to contaminated ground only and do not cover other hazards on site.**

These general procedures are designed as a base level for all sites, and are designed to cover the generic health and safety set up and controls related to contaminated ground. Specific hazard management procedures for Category 1 areas are provided in latter parts of this section, as well as Appendix B for the disturbance of low levels of asbestos in soil.

5.1 SITE ESTABLISHMENT

The following shall be put in place by the Contractor prior to ground works commencing:

- The site is to be fenced with 1.8 m secured fencing to restrict entry to authorised workers and prevent access by the general public. Appropriate warning signs (e.g., "Restricted entry", "Danger open excavations") shall be erected around the fenced site.
- Health and safety inductions and daily prestart meetings shall be completed.
- Health and safety facilities as required by the hazard management procedures, such as wash facilities, personal protection equipment stores

and first aid points shall be provided.

5.2 GENERAL SAFETY REQUIREMENTS

Contractor's staff, sub-contractors and visitors shall be required to undergo a site specific safety induction before entering and/or commencing work. The purpose of the safety induction is to make sure staff, sub-contractors and visitors are aware of the hazards related to contaminated soil relevant to the site, safe working procedures, safety equipment and requirements and the action plan in case of an emergency.

The Contractor shall appoint an environmental safety officer (ESO) for the duration of the works. The ESO shall be responsible for ensuring health and safety procedures are adhered to and that the risks associated with the potential hazards are controlled.

The following general safety procedures shall be followed by all staff entering and/or working in the immediate area of the project activities:

- All incidents shall be reported to the ESO.
- Workers shall be made aware of potential hazards on site so they can be identified and appropriate control measures can be taken to ensure the safety of workers, and passers-by.
- Site workers shall avoid unnecessary contact with site soils.
- Site workers shall avoid exposure to asbestos containing material.



- Site workers shall wear personnel protective clothing and equipment as outlined in Section 5.4.
- A first aid kit and fire extinguisher must remain and be available on site at all times.
- Hand washing facilities must be provided onsite.

5.3 HAZARD IDENTIFICATION

Works within Category 1 sites can be expected to encounter a range of contaminated ground, and the measures in this section are designed to protect workers from general exposure to the following contaminants:

- heavy metals;
- hydrocarbons (fuels, oils and greases);
- solvents;
- asbestos;
- volatile contaminants.

Exposure to the above can result in acute and long term adverse health effects, some of which manifest themselves long after the exposure occurs. It is important that the ESO makes the workers aware of these risks and the importance of complying with the procedures set out in this document.

Workers on contaminated sites can also be subject to unusual stresses, for example, manual work while wearing dust masks or respirators, or exposure to elevated concentrations of contaminants. It would be recommended that the Contractor undertakes continual monitoring and checks that any site workers in Category 1 areas do not have any pre-existing condition which might place them at risk as a result of such stresses.

The ESO shall ensure that all personnel are familiar with the application and use of the equipment and procedures specified in this plan, in addition to the Contractor's standard Site Safe procedures before commencement of site work. No personnel are to commence work without prior knowledge and understanding of this plan and with the Contractors safety requirements.

5.4 GENERAL HAZARD MINIMISATION PROCEDURES

Works undertaken in Category 1 areas are highly likely to encounter contaminated soil and groundwater. Therefore it is appropriate for all workers, sub-contractors and visitors adopt the Contractor's health and safety measures to prevent exposure to potentially contaminated soils. The procedures set out below aim to prevent workers, sub-contractors and visitors being exposed to the soils by use of appropriate PPE as well as behavioural practices.

Workers may be exposed to contaminants via the ingestion of soil, skin contact with contaminated soil or inhalation of vapours. To prevent this exposure, the following procedures must be followed by workers who are likely to come into contact with soil or contaminants. Extra procedures apply for the disturbance of low levels asbestos in soil – refer Appendix B:

- Wear cloth coveralls.
- The cloth coveralls shall be removed at the end of each day and shall be stored at the work site. **The coveralls shall not be left in vehicles or taken home** (this is to prevent tracking contaminated material to the workers' homes).
- The coveralls shall be laundered weekly by a commercial laundry, unless heavily soiled in which case they shall be washed daily. The coveralls shall under no circumstances be taken home and washed.
- Wear P2 dust masks during dusty conditions.
- All staff physically involved in excavations, handling soil or working in excavations shall wear chemical resistant disposal gloves which shall be regularly changed.
- Minimise hand to mouth contact.
- Wash hands and face prior to eating, drinking using the toilet or smoking.
- Do not eat or drink within the excavation area.

The Contractor must review any new work element and continually monitor and assess whether there are any new associated hazards, and whether these



can be eliminated, isolated or minimised. If these hazards are related to ground contamination, the Contractor shall seek advice from the Contaminated Land Specialist. The Contractor shall then instruct all staff, sub-contractors and visitors on the health and safety procedures associated with the new hazard.

5.5 EXPLOSION RISK CONTROL

Vapours from hydrocarbons have the potential to produce an explosion risk if present in air at levels above the lower explosion limit (LEL). The following sets out the procedures that the Contractor shall follow for monitoring the presence of volatile organic compounds and mitigating potential explosive risk.

To manage the potential explosion risk, the Contractor shall:

- only use machinery fitted with spark arrestors to excavate and handle contaminated materials;
- treat any excavation greater than 1 m depth and narrower than 3 m, using confined space procedures. This will require persons entering excavations to be trained and competent in confined space entry, and will require the appropriate emergency response plan, permits safety and rescue equipment to be present. It is the responsibility of the Contractor to ensure their staff are trained, have practiced the ERP and comply with all the relevant regulations relating to confined space entry;
- ensure an LEL meter shall be onsite at all times, monitor the atmosphere continuously and placed as near as practical to the excavation face of all excavated areas;
- ensure no work shall be undertaken while explosive gases are present above the lower explosive limit;
- ensure a ventilation system shall be established where required to dissipate explosive gases to below the LEL; and
- ensure a fire extinguisher must be kept on site at all times.

5.6 INHALATION OF TOXIC GASES

If strong odours are noticed during works a Contaminated Land Specialist shall be notified to assess if the risk of toxic gases being present. The following measures (or similar) may be required to minimise the risks associated with toxic gases:

- Before the start of work each day, and following any break longer than 15 minutes the atmosphere in the area of works shall be tested and recorded.
- All staff working in an excavation shall wear personal gas meters.
- If the results show concentrations of H_2S greater than 2 ppm, half face respiratory masks (with appropriate cartridges) must be worn. If results of H_2S are above 10 parts per million (ppm), all work must cease until the levels reduce below that level.
- If the levels of O_2 are greater than 21.5% or less than 19.5% all work must cease and staff must leave the excavation.
- If levels of CO_2 are greater than 5,000 ppm all work must cease and staff must leave the excavation.
- If concentrations of CO are greater than 25 ppm all work must cease until levels reduce.
- Appropriate respiratory protection shall be made available to workers, including half or full face mask with the appropriate cartridges to reduce the inhalation of organic compounds.
- The Contractor is responsible for providing workers with this equipment, are trained in the correct wearing of, and ensuring it is used where appropriate.
- During all works within landfill materials the appropriate rescue systems shall be in place and tested as required by the confined space regulations.



5.7 EMERGENCY PROCEDURES

It is the responsibility of the ESO to develop an emergency response plan (ERP) and ensure everyone working on the site is familiar procedures to be carried out in an Emergency. This plan must be tested onsite to ensure that the availability of appropriate emergency services and equipment prior to the start of works. These will include:

- the Assembly Point;
- the location of the nearest telephone;
- location of the nearest first aid kit, fire extinguisher; and
- appropriate local medical emergency numbers.

The ESO must be notified immediately of any injury or accident occurring at the site. If serious harm occurs WorkSafe NZ (or the Ministry of Business Innovation and Employment prior to WorkSafe NZ being established) must be notified immediately.

The following is a list of emergency numbers:

Emergency:	111
Christchurch Hospital:	03 364 0640
Christchurch Fire Department:	03 372 3600
Christchurch Police:	03 363 7400
WorkSafe New Zealand:	0800 030 040
Contaminated Land Specialist:	To be determined
Contractor:	To be determined



6 WORKS VERIFICATION

6.1 INFORMATION REQUIRED BY LPC

In conjunction with the Contaminated Land Specialist, the Contractor is required to complete a Works Verification Form (Appendix C) for each earthworks project. The Works Verification Form is to be submitted to LPC's Project Manager and Environmental Manager. The Works Verification Form includes items such as:

- confirmation that the soil disturbance works are complete;
- whether or not contaminated material was encountered during the works;
- confirmation that soil disturbance works were completed according to the CSMP and details of any variations during the works;
- information regarding any environmental incidents during the works;
- results of any contamination tests undertaken; and
- confirmation of the disposal destination of clean and contaminated soils and the verification test results undertaken for disposal permitting.

The following information also needs to be appended to the Works Verification Form:

- Copies of weigh bridge summaries for the disposal destination for contaminated soil.
- Disposal volumes for uncontaminated soil removed and disposed.
- Records of visits by council representatives.
- Details of any complaints (by the public or Council).
- Details of any health and safety incidents related to the contamination and how they were resolved.

The Contractor is required to provide the above information within 1 month of completion of works to which the information relates.

6.2 VALIDATION SAMPLING

The requirements for validation sampling will be determined on a case-by-case basis by LPC and the Contaminated Land Specialist. It is anticipated that validation sampling will only be required on sites that will remain unsealed on completion of works or where unexpected contamination is identified that may present a risk to future site users or the environment.

Any validation sampling results will be appended to the Works Verification Form (Appendix C).



7 APPENDICES



APPENDIX A

CONTRACTOR CHECKLIST

Task	Talk to/ liaise with	Completed?
<i>Tendering stage</i>		
Read through contaminated land technical chapter		
Locate area of works on Contamination Risk Area Map	Confirm interpretation with LPC	
Choose Category 1/2/3 SMP (Appendix A-D) based on location. <i>Read and understand Category SMP</i>	Discuss any questions with LPC	
<i>Job awarded/ Pre-earthworks stage</i>		
Appoint Contaminated Land Specialist (CLS)	Consultants/CLS, LPC may be able to assist	
Discuss proposed works with CLS and provide them with copy of the Category SMP for works.	CLS	
Arrange disposal permits for any excavated material that has to be disposed off-site.	Christchurch City Council and fill operators, CLS if sampling required	
Arrange permits for water discharge if necessary	Christchurch City Council, CLS if sampling required	
Set up hazard boards, site fencing, PPE, wheel washes, etc. as required by Category SMP.		
Undertake staff training as per Category SMP and have start-of-works briefing with CLS	All staff, CLS	
<i>During earthworks</i>		
Ongoing monitoring by staff, with CLS as required by Category SMP	CLS	
Any unexpected contamination or contamination-related incidents – immediately talk to LPC and CLS	LPC, CLS, Council if required	
Record all material being disposed off-site and imported to site		
Maintain earthworks controls and erosion and sediment and erosion controls as per Category SMP		
Undertake testing as required for soil disposal and validation	CLS	
<i>Earthworks completion</i>		
Complete Works Verification Form	CLS, LPC	
Ensure all other resource consent requirements are met		



APPENDIX B

LOW LEVEL ASBESTOS IN SOIL – CONTROLS & PROCEDURES

1 Introduction

This appendix provides additional controls and procedures to Sections 3 and 5 of the CSMP for use by LPC and their contractors for earthworks disturbing **low levels of asbestos** in soils and where there is a low likelihood that such works will produce above trace levels of asbestos in air (<0.01 fibres/mL) as required by the Asbestos Regulations¹.

Procedures and controls for managing the disturbance of asbestos in soil are provided in WorkSafe New Zealand's ACoP² and the BRANZ Asbestos in Soil Guidelines³. The level of control for disturbing low levels of asbestos in soil materials depends on the quantity of asbestos present in soil, as measured in the laboratory:

- ≤0.001% w/w asbestos fines (AF) and/or fibrous asbestos (FA) – *unlicensed asbestos works*;
- >0.001% to ≤0.01% w/w AF/FA – *asbestos related works*.

For bonded asbestos containing material (ACM), these are:

- ≤0.01% w/w ACM – *unlicensed asbestos works*;
- >0.01% to ≤1% w/w ACM – *asbestos related works*.

The controls and procedures are **mandatory** for all persons (employees, contractor and sub-contractors) disturbing soils containing low levels of asbestos.

NOTE: If the asbestos content in soils is more than the upper limits above, the works are either Class A or Class B asbestos removal works, and require a **task specific asbestos removal control plan** (Asbestos Regulations – Regulation 32 and ACoP Section 26).

The procedures and controls presented in this Appendix are not sufficient for Class A or Class B works. Therefore LPC and/or its contractor will need to engage the services of licensed asbestos removalist to prepare the asbestos removal control plan and undertake such works.

2 Roles & Responsibilities

LPC is responsible for engaging a Contaminated Land Specialist to investigate and assess asbestos in soil conditions. The Contaminated Land Specialist shall confirm whether the works should be classified as **asbestos related** or **unlicensed asbestos works**. If offsite disposal of low level asbestos in soil materials is required, the Contaminated Land Specialist shall identify potential disposal locations.

The Contractor is responsible for implementing the controls and procedures detailed in this appendix and the CSMP including, when offsite disposal is required, arranging this before commencing disposal.

¹ Health and Safety at Work (Asbestos) Regulations 2016

² Approved Code of Practice – Management and Removal of Asbestos – WorkSafe New Zealand (November 2016)

³ New Zealand Guidelines for Assessing and Managing Asbestos in Soil – BRANZ (November 2017)



For works disturbing low level asbestos in soil on LPC land, the following roles and responsibilities apply.

ORGANISATION	ROLES & RESPONSIBILITIES
Lyttelton Port Company	<ul style="list-style-type: none">• Principal (i.e., PCBU) and client, site owner and operator, global consent holder and project manager.
Contractor	<ul style="list-style-type: none">• Responsible for implementation of the CSMP and the asbestos-specific procedures detailed in this appendix.• Responsible for distribution of the CSMP including this appendix to subcontractors undertaking the unlicensed asbestos work and/or asbestos related works.• Appointing a Site Controller – responsible for compliance with the controls and procedures of the above documentation, including subcontractors. Role required to fulfil requirements of the Asbestos Regulations (i.e., a competent person).
Contaminated Land Specialist	<ul style="list-style-type: none">• Contaminated Land Specialist as defined described in the CSMP.• Competent person (per Asbestos Regulations, Regulation 3 (1)).• Delivery of pre-works site induction(s) for asbestos in soil controls.• Undertake asbestos in air monitoring (if required) and report to LPC and Contractor air monitoring results per Section 5 below.• Clearance inspection of decontaminated equipment leaving works area after completion of all soil disturbance (if this task is not completed by the Contractor's competent person).• Conduct soil validation sampling and reporting as required.

NOTE: With adequate training/proof of experience and documentation, some functions of the competent person can be undertaken by designated personnel employed by the Contractor instead of the Contaminated Land Specialist (e.g., clearance inspection of decontaminated equipment).

3 Site Access, Set Up, Demarcation & Signage

Any area in which asbestos-contaminated soils could be disturbed or encountered (e.g., soil stockpiles) are considered to be 'Asbestos Works Areas' and the controls and procedures in this appendix shall apply.

The asbestos work areas must be defined/separated from other LPC activities; if the asbestos works area is within an existing development area, it requires its own demarcation (e.g., fencing, delineation with glow netting within the working area).

Access to the asbestos work areas shall be controlled by the Contractor and limited to pertinent personnel only (e.g., excavator operator, labourers, contaminated land specialist). All personnel must be inducted before working in this area.

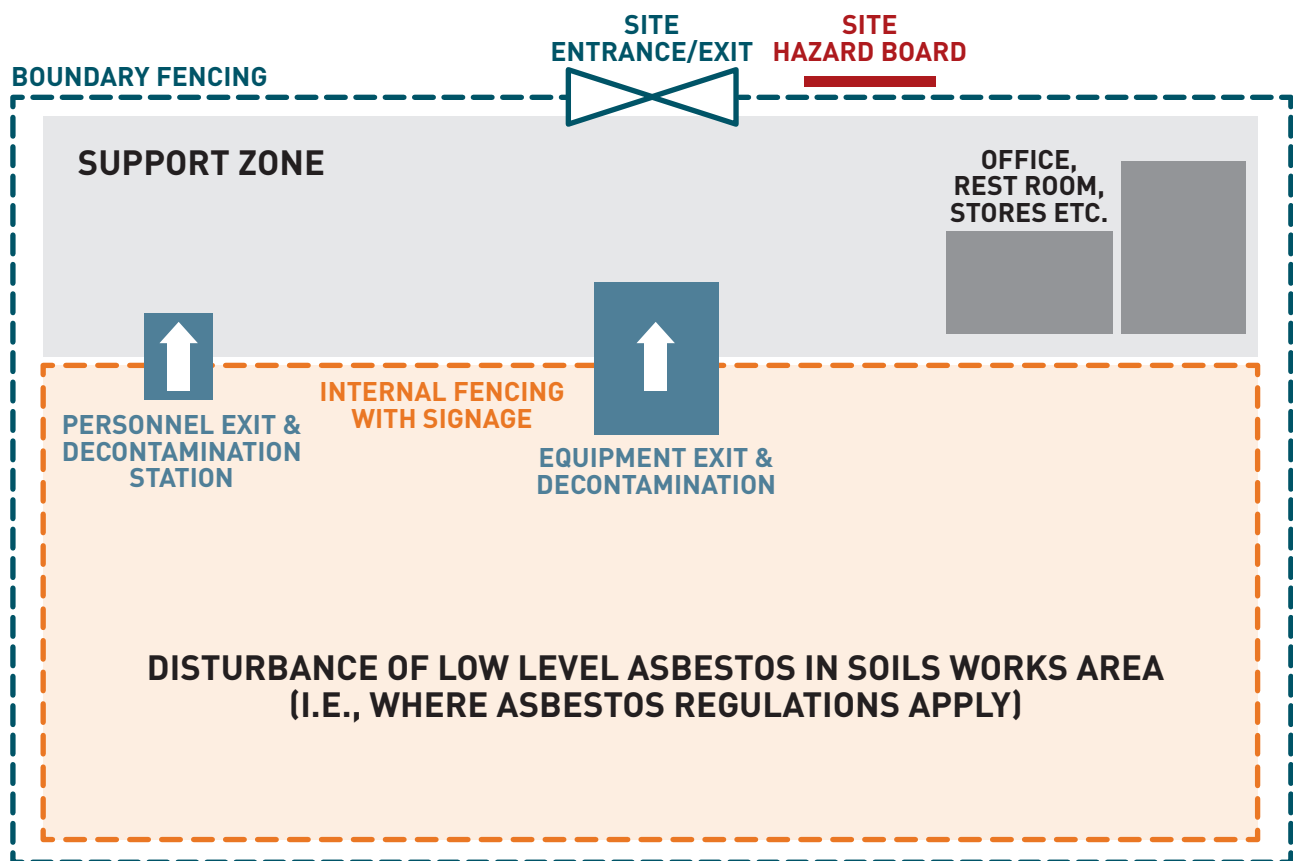
Prior to starting earthworks involving soils containing asbestos, the Contractor shall:

- Erect fencing to separate the asbestos works area and support zone from other LPC activities and internal fencing to demarcate the asbestos works area from the support zone(s). The figure on page 23 illustrates a typical asbestos works area set up. Internal delineation demarcating the asbestos related works area from the support zone can be constructed with ropes and waratahs or other temporary fencing.
- Establish designated exit point(s) for equipment and personnel leaving the asbestos works area to the support zone. The exit point(s) shall allow for



the completion of decontamination procedures before entering the support zone (see below).

- Erect signage on the internal fence (i.e., orange dashed line, figure below) to inform that access is restricted to inducted personnel only and works are subject to Asbestos Regulation 2016 controls. This signage is additional to the Contractor's hazard identification board at the site entrance(s).



4 Personnel Training

The asbestos induction shall be delivered by the Site Controller and Contaminated Land Specialist and include:

- nature and extent of asbestos-in-soil materials;
- site layout/setup including internal separation of asbestos works areas (where the asbestos controls apply) from support zone, as well as and entry/egress points between these;
- personnel decontamination procedures;
- equipment decontamination procedures;
- use of personal protective equipment;

- accidental discovery protocols and emergency procedures for managing unexpected ground contamination.

Drivers **who do not exit their vehicles** while in the asbestos works area do not need to complete the specific asbestos induction, but do need to be aware that they may not leave their vehicle.



5 Air Monitoring

Daily air monitoring shall be undertaken during the first three working days of asbestos works. The purpose of the air monitoring is to confirm the earthworks controls (see Section 7 below) are working effectively. If the works extend to more than three days, additional daily monitoring may be undertaken based on:

- changes in site conditions (e.g., change in nature of materials being handled, weather conditions observed by the Contractor and/or Contaminated Land Specialist);
- changes in works method;
- at the request of LPC.

Undertaking air monitoring during rainfall is not required so long as this is documented, with reasoning, by the Contaminated Land Specialist/competent person.

Air monitoring shall be undertaken by the Contaminated Land Specialist or competent person as detailed in the Asbestos Regulations and the samples analysed at an IANZ accredited laboratory (per Asbestos Regulations, Regulation 3 (1)). Monitoring shall be undertaken in accordance with the procedures of the ACoP (Section 30).

At a minimum, air monitoring shall be undertaken at three stations around the work area at locations determined by the Contaminated Land Specialist/competent person, based on the spatial extent of disturbance works and prevailing wind directions at the time of monitoring. As a minimum the set up shall comprise one upwind station and two stations downwind of the asbestos work area.

Each day's results shall be reviewed against the trace level in air threshold (<0.01 fibres/mL) (Asbestos Regulations (Regulation 3 (1))). If monitoring results are below trace level, the works shall continue following the procedures established. If monitoring results exceed trace level, works shall cease while the Contractor and Contaminated Land Specialist/competent person review the previous day's activities and site conditions to determine if additional procedures are required. Works shall only recommence on LPC's instruction, which will be informed by written advice from the Contaminated

Land Specialist/competent person to LPC on any required changes in earthworks controls.

Further air monitoring shall be undertaken if site conditions or earthworks method change. The Contractor's Site Controller shall inform LPC and the Contaminated Land Specialist/competent person immediately if there is a change in conditions (e.g., implement contingency measures).

6 Personal Protective Equipment

The following asbestos related personal protective equipment (PPE) (based on the Asbestos in Soil Guidelines) is required for all personnel working in the asbestos works area:

For unlicensed asbestos work (based on air monitoring demonstrating less than trace level in air)

- No specific personal protective equipment or respiratory protective equipment.

For asbestos related work

- Disposable coveralls (rated type 5, category 3), or dedicated cloth overalls ¹ for sole use in this works area.
- Overshoes or designated safety boots.
- Disposable gloves (nitrile).
- Disposable P2 dust mask. Note all personnel shall be cleanly shaven if working in the asbestos related works area to ensure the mask provides effective protection (ACoP Section 14.6).

These requirements are in addition to the Contractor's own PPE requirements for its works on site (e.g., hi-visibility clothing, safety boots etc.).

7 Earthworks Controls

The following sub-sections are supplementary to the controls and procedures set out in the CSMP and related solely to the disturbance of low level asbestos in soil materials.

7.1 Dust Suppression

The dust controls section of the CSMP shall apply to the works, with the primary difference being when low level asbestos soils are being disturbed they will

¹ On completion of the works, these shall be either laundered in accordance with Asbestos Regulations – Regulation 53 (3), or disposed offsite as asbestos waste.



be subject to active dust control at all times, not just an ad hoc manner (i.e., the direct and continuous application of mist and/or water). The following additional considerations are applicable based on the level of asbestos in soil and condition of the materials being disturbed (e.g., moisture content):

- The Contaminated Land Specialist shall advise the Contractor if the use of proprietary dust suppressants is necessary to manage the potential for the generation and discharge of dust from the earthworks and stockpiles.
- The Contractor's Site Controller shall continually observe for dust generation and implement further wetting (i.e., addition of more water) as necessary during the works, but avoid the generation of run-off from the site. The required visual monitoring of dust applies to activities such as, but not limited to, loading of asbestos contaminated materials into trucks, tipping from trucks and blading/grading. Works shall cease if the Contractor's Site Controller and/or LPC (or their delegated party) acting on advice from the Contaminated Land Specialist deem wind conditions are too strong to manage potential discharge of dust from the asbestos related works.

7.2 Excavation, Loading & Unloading

Disturbance of low level asbestos in soil materials, including excavation and loading into trucks for transport shall be conducted in accordance with the CSMP general soil handling procedures (Section 3). Loading shall be undertaken with continuous application of mist/water to prevent dust generation. All trucks moving low level asbestos soils shall be covered before setting off (e.g., with tarpaulin). Before trucks that have been used for moving low level asbestos in soil materials can be used for moving other (non-contaminated) materials they will be decontaminated following the procedures detailed in Section 8.2 below.

7.3 Offsite disposal of asbestos waste materials

The following asbestos waste materials generated from the works shall be disposed offsite to a licensed facility approved to accept asbestos materials. Materials generated by the disturbance of low level asbestos in soils include:

- disposable coveralls, gloves, P2 masks;
- wet wipes used for decontamination, wiping down equipment;
- non-woven geotextile, AP60 (if used) used in decontamination stations;
- sediment from boot wash station.

Waste materials (e.g., spent PPE, decontamination materials) shall be stored in proprietary asbestos waste bags or dedicated lined skips prior to offsite disposal (per ACoP Section 18.2).

Disposal of asbestos waste materials shall be to a licensed facility approved to accept this waste type.

8 Decontamination Procedures

Personnel, plant and equipment leaving the asbestos works area shall pass through a designated decontamination area and complete the following procedures.

8.1 Personnel Decontamination

Personnel decontamination procedures for exiting the asbestos works areas shall comprise:

For unlicensed asbestos work

- Cleaning of footwear or removal and storage for re-use.

For asbestos related work

- Cleaning of footwear or removal and storage (subsequently donning suitable footwear for working in support area as prescribed by the Contractor) at the designated exit point. Cleaning shall be by low pressure hose or two stage bootwash.
- Wash or wet wipe hands before leaving area. Any waste materials shall be stored in suitable bag/container for offsite disposal as asbestos waste.



8.2 Equipment Decontamination

All equipment and plant (e.g., excavator, hand tools) used in the works areas (either unlicensed asbestos work or asbestos related work) shall be decontaminated before exiting the area. A designated decontamination area shall be established as follows:

- Place non-woven geotextile (e.g., Biddim™) approximately 5 m x 5 m in plan on flat ground and secure at edges (e.g., peg or sand bag).
- Depending on quantity of traffic using the pad, Contractor could consider placing either steel plates, or approximately 150 mm thick layer of AP60 onto the geotextile with approximately 1 m of geotextile extending beyond plates/gravel.
- Equipment drives onto prepared pad and is hosed down (i.e., low pressure water supply only) to systematically remove all soil materials from the equipment's exterior (e.g., wheels, tracks, buckets). The washing shall be undertaken with care to prevent water and washed off materials overshooting geotextile cloth area. The geotextile and if used, AP60, shall be disposed as asbestos waste.
- The interior of cab shall be wet wiped down. Used wet wipes shall be disposed as asbestos waste.
- Cleaned equipment shall be inspected by the Contaminated Land Specialist or competent person to confirm decontamination completed to required level. The equipment can then drive into the support zone and is ready to undertake other tasks on or offsite.

9 End of Asbestos Works Controls

Controls and procedures described above in Sections 3 to 8 inclusive shall cease to apply when:

Soil Disturbance

- asbestos contaminated soils have been capped with a minimum of 200 mm of non-asbestos containing materials; or
- complete removal of the low level asbestos in soil materials, i.e., change in strata; or
- validation sampling and laboratory analysis undertaken/scheduled by the Contaminated Land Specialist records non-detects for asbestos in soil.

Contractor Demobilisation

Asbestos related controls shall cease to apply for the Contractor when:

- all soil disturbance work is complete (as above); and
- equipment has been decontaminated and inspected by the Contaminated Land Specialist/competent person; and
- waste materials from the decontamination pad and/or personnel decontamination process have been removed from the works area.

Works Verification Reporting

The existing controls from Section 6 of the CSMP shall apply.



APPENDIX C

WORKS VERIFICATION FORM



SECTION 3 CONTAMINATED SOIL WORKS VERIFICATION FORM CATEGORY 1 SITES

Job name:		
Location:		
Dates and duration:		
Summary of works:		
Contaminated soil/water identified? (If yes, detail actions undertaken):		
Material disposed (fill name and volume disposed):	Cleanfill: Landfill:	
Imported material	Source: Volume:	
Test results (including validation sampling):		
Form completed by:		Date:
Contractor's Project Manager:		Signed:
Contaminated Land Specialist:		Signed:



APPENDIX D

INCIDENT & MONITORING REPORTING FORM




INCIDENT REPORTING FORM

In the event of an incident, the following steps are to be taken:

- stop work in the immediate vicinity of the contamination incident and isolate the area by taping, coning or fencing off
- advise the Site Manager who is then to advise LPC and the Contaminated Land Specialist
- implement contaminated soil Health & Safety procedures as per the SMP
- implement surface water, sediment, dust and other controls as required as per the SMP
- update the Hazard Board as required
- implement specific controls as advised by the Site Manager and Contaminated Land Specialist
- ensure monitoring and disposal records are kept, including the form below:

Task	Details	Date/Time & Person
Isolate area of contaminated incident	Materials used, areas:	
Arrange disposal of contaminated material offsite as required	Disposal location and volumes:	
Implement additional controls as per the SMP and as advised by the Site Manager and Contaminated Land Specialist	Additional control details:	
Monitoring of water/air/soil (to be done by Contaminated Land Specialist)	Monitoring results:	
Notify Christchurch City Council and ECan as required	Person/team notified from CCC: ECan:	
Incident resolved and site returns to normal	How did resolution occur, what additional actions were taken:	



<div>MONITORING FORM</div>						
This form can be used for soil testing, water testing or air monitoring:						
Date / Time	Parameter / location monitored	Who by	Site results / observations	Lab results (if applicable)	Comments	





3.0

**CONTAMINATED SOIL
MANAGEMENT PLAN**

CATEGORY 2

MEDIUM POTENTIAL FOR CONTAMINATION



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 2



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1 INTRODUCTION

This report has been prepared in general accordance with national guidance and standards for conducting ground contamination-related desk study investigations in New Zealand. This includes compliance with the general format described in the Ministry for the Environment (MfE) Contaminated Land Management Guideline No. 1 *Reporting on Contaminated Sites in New Zealand*.

1.1 BASIS FOR THESE PROCEDURES

Category 2 areas are those within general Port operational or transport depot areas, with one or more additional HAIL activities such as minor fuel storage or substations. Category 2 covers many individual areas around the Port sites, including a buffer around some sites depending on the nature of potential contamination. Some of these areas have recorded contamination, but records do not exist for many of them.

Further detail about the basis for the procedures is provided in the main section of the Contaminated Land Technical Section.

Excavation shall proceed in accordance with the procedures in Section 3 to ensure the early identification and management of any contaminated soil present. Where possible, the excavation shall also be undertaken in a manner which allows soils of different type/composition/contaminant levels to be kept separate. For instance, excavated material containing hydrocarbons shall, where possible, be kept separate from soils which do not. If this is carried out the cleaner material may be able to be disposed at a lower landfill cost, following sampling and testing, reducing the overall project costs.

The excavation method should allow for regular inspections and monitoring of the subsurface conditions to allow identification of any areas of

unforeseen contamination. Inspection requirements are covered in Section 3.1.1, with soil sampling procedures in Section 3.1.9.

1.2 SITE MANAGEMENT

The following are key aspects of site management during all earthworks on Category 2 areas:

- Advise LPC's Environmental Manager at least one day prior to works commencing.
- The site Hazard Board shall include information pertaining to the contamination likely to be identified (as identified in the Table on page 5). The Contractor's details shall be provided on the Hazard Board.
- Personal protective equipment (PPE) relevant to the expected contamination shall be available on site (Section 5).
- The site shall remain secured during non-working hours to prevent access by the public or unauthorised personnel.
- Appropriate earthworks controls (Section 3) shall be emplaced prior to works commencing.
- Additional controls and procedures for disturbing low levels of asbestos in soil (Appendix B) shall be established prior to works commencing.

A Contractor's Checklist is included in Appendix A and outlines key requirements for site management and reporting for works in Category 2 areas.



1.3 IDENTIFICATION OF CONTAMINATION

A range of contaminants may be present within Category 2 areas, depending on the nature of the HAIL activity. Standard indicators of contamination for general Port and transport depot areas include:

- a hydrocarbon odour (typically smells like petrol, diesel, kerosene etc.);
- other abnormal odours not normally associated with soil;
- discoloured soil (i.e., areas of soil with dark staining, abnormal or unnatural colouring);
- soil with waste material or building debris (i.e., plastics, metal, bricks, timber etc.) indicating the ground has been filled;
- an oily substance or sheen on the surface of soil, or on the surface of water in the excavation.

In order to identify indicators that contamination may be present relating to specific HAIL activities, the following procedure should be followed:

There may be situations where specific site management procedures are required to be developed in addition to this Contaminated Soil Management Plan (CSMP), depending on the nature of the excavations and the potentially contaminating activity. For example, excavations in areas of military emplacements require specialist advice that is not within the scope of this CSMP. These situations are commented on in the Table on page 5 and earthworks may not proceed without specialist advice.

Look up position of works on Maps 1 to 4 in Technical Section 3 to establish contaminating activity.

Assess likely contaminants and identifiers of them on the Table on page 5.

Refer to relevant section for additional soil management procedures as indicated in the Table on page 5, in addition to mandatory sections.



Specific Contaminating Activities & their Key Contaminants

TYPE OF CONTAMINATING ACTIVITY	POTENTIAL CONTAMINANTS	IDENTIFICATION OF CONTAMINATION	ADDITIONAL MANAGEMENT SECTIONS
Gasworks or gasworks waste	PAH, BTEX, metals, cyanide	Fine black gravels, ash, hydrocarbon odours	3.2.1, 5.2.2
Fuel storage (above or below ground), petroleum depots and fuelling stations	Hydrocarbons including BTEX, PAHs, solvents, metals including lead	Hydrocarbon odours, oily sheen on the surface of soil or water, black stained soil.	3.2.1 to 3.2.4, 5.2.1, 5.2.2
Transformers and substations	PCBs, hydrocarbons, copper, tin, lead and mercury. Asbestos in substations	Stained ground, likely to be localised. Asbestos sheeting, insulation or cladding.	3.2.5, Appendix B
Military emplacements and dumping	PCP, nitroglycerine, metals, fuel oils and solvents	Visible shot or shells,	Specific site management procedures required – contact contaminated land specialist
Quarry blasting	Metals, chlorides, coke and fuel oils.	Coal, hydrocarbons	N/A
Asbestos pipes, buildings, fragments or free fibres in soil	Asbestos	Visual identification including super six and honeycomb texture, fibrous board. Asbestos fibres in soil may not be visible.	3.2.5, 5.2.3, Appendix B
Cement silos	Lime, calcium hydroxide, boron and arsenic		N/A
Coal yard	Hydrocarbons (PAH), boron and arsenic	Visible coal, odours	3.2.1, 3.2.3
Railway yards	Hydrocarbons including PAHs, solvents, creosote/phenols, and heavy metals	Hydrocarbon odours, black staining	3.2.1, 3.2.3
Landfill, waste ponds and recycling centres.	Dependant on waste composition; wide range of hydrocarbons, metals, organic acids and landfill gas	Strong odours (H ₂ S, 'rotten' odours), visible refuse	Specific site management procedures required – contact contaminated land specialist
Wood storage or processing	PCP, copper, arsenic, chromium, boron, PAHs, creosote, antisapstain, OCP, TBT	Stained ground (especially green staining), unusual odours	3.2.1
Foundry activities	Metals, acids, cyanide, BTEX, solvents	Ash, slag or odours	3.2.1, 3.2.3



1.4 POST WORKS VERIFICATION

Works verification procedures are outlined in Section 6 and are centred on the use of a Works Verification Form by the Contractor and contaminated land specialist. A copy of the Works Verification Form is included in Appendix B.



2 PLAN MANAGEMENT & CONTROL

2.1 ROLES & RESPONSIBILITIES

LPC is Responsible for:

- Ensuring that the site works are undertaken in accordance with the category-specific CSMPs.
- Ensuring that all site staff and sub-contractors understand and comply with the procedures and the health and safety requirements.
- Making the relevant CSMP available to site Contractors carrying out works and ensure the most recent updated copy is kept on site.
- Compile annual report.

The Contractor is Responsible for:

- Identifying the appropriate category-specific CSMP and implementing the required management procedures and health and safety controls.
- Notifying the Contaminated Land Specialist prior to commencing works which require observation.

- Communicating contaminated-land related incidents to LPC in a timely manner.

A Contractor's Checklist is included in Appendix A and includes the key management and reporting requirements for works in Category 2 sites.

Contaminated Land Specialist:

This document refers to a Contaminated Land Specialist as a role which provides technical expertise to oversee the identification and disposal of contaminated soil. For the purposes of this CSMP the Contaminated Land Specialist shall meet the following criteria:

The Contaminated Land Specialist shall be a person who is qualified to undertake a detailed site investigation (supervised) and who should have at least tertiary education in environmental science or engineering or a related field and 2 or more years of professional experience in environmental investigations and risk assessment.

Personnel with decision making roles in relation to contamination management procedures and their training requirements are set out below:

	SITE CREW (e.g., excavator operators, site construction staff)	TRAINED STAFF (e.g., Project Manager, Site Engineer, Environmental Managers)	CONTAMINATED LAND SPECIALIST
Training Requirement	15 min tool box	2 hour training from Contaminated Land Specialist	Degree qualified + 2 or more years professional experience
Decision Authority	Day to day site inspections during works	Regular inspections on Category 2 sites, daily inspections on Category 1 sites	Disposal of soil from works, additional mitigation measures



2.2 DISTRIBUTION

The following parties have been provided with this CSMP and the three category-specific CSMPs:

- LPC;
- CCC;
- Environment Canterbury (ECan).

A copy of the CSMP shall be kept onsite at all times.

2.3 REVIEW & UPDATE OF THE CSMP

Any variations to this CSMP must be approved by LPC and Christchurch City Council (CCC). If the Contractor would like to change any aspect of the CSMPs please contact LPC in the first instance. Any changes made to the CSMPs shall not reduce the level of control of the works without good evidence that this is acceptable. The Contaminated Land Specialist should be consulted in the event of any CSMP changes.

It is the responsibility of Contractor to distribute updated versions of the CSMP and to ensure the correct copy of the report is onsite at all times.

2.4 IMPLEMENTATION

Contractors undertaking the works must implement the CSMP.

2.5 REPORTING FOR CONSENT COMPLIANCE

LPC is obliged to submit an annual report to CCC. In order to prepare the report, LPC requires the following information from all Contractors:

- Records of all contaminated land inspections completed in the preceding annual period (LPC will advise the dates).
- Any contaminated land reports or testing undertaken to comply with this CSMP.
- Details of any incidents related to contamination, such as fuel spills, encountering asbestos, health and safety incidents as a result of contamination, etc.
- Details of any variations to the procedures in the CSMP, including why variations occurred and who approved them.

A full list of all requirements is included in Section 6. Templates for reporting of incidents and monitoring can be found in Appendix D.

Annual Reporting

Annually, a report shall be compiled and provided to the CCC¹. The report shall be compiled by LPC. The report shall set out:

- the records of all contaminated land inspections completed in the preceding annual period where contaminated material has been positively identified;
- any contaminated land reports or testing results undertaken to comply with this CSMP.

Contractors undertaking the works will provide LPC² copies of all reports produced by the Contaminated Land Specialist produced in relation to the sampling, analysis and assessment of all contaminated materials encountered. These reports will include information relating to the location, type and depths of contamination observed (if any), photographs, surrounding land uses and any monitoring/validation (if any).

¹ Marked for the attention of Team Leader Environmental Compliance Team (I&EEEnvCompliance\INBOX@ccc.govt.govt.nz)

² Attn Kim Kelleher, Environmental Manager, LPC



3

SOIL MANAGEMENT PROCEDURES

Due to the range of contamination that may be identified in Category 2 areas, a range of soil management procedures may be applicable. These procedures focus on the early identification of contaminants and implementation of appropriate handling and disposal procedures.

All earthworks in Category 2 areas must follow the soil handling procedures in Section 3.1, regardless of the contaminating activities identified. Additional procedures for the disturbance of soil with low level asbestos are in Appendix B.

3.1

GENERAL SITE MANAGEMENT PROCEDURES

The following site establishment procedures are required for all earthworks on Category 1 sites:

- The Contractor shall advise LPC's Environmental Manager at least one day prior to works starting.
- The site Hazard Board shall include information pertaining to the contamination likely to be identified. The Contractor's details shall be provided on the Hazard Board.
- Personal protective equipment (PPE) relevant to the expected contamination shall be available on site (Section 5).
- The site shall remain secured during non-working hours to prevent access by the public or unauthorised personnel.
- Appropriate earthworks controls (Section 3) shall be established prior to works commencing.

3.1.1 Inspection Procedures

The Contaminated Land Specialist must attend a tool box meeting prior to excavations commencing to discuss potential soil and groundwater contamination issues that may arise during excavations. The Contaminated Land Specialist will then be on call as required and may inspect the excavations at any time during earthworks.

All excavations in Category 1 areas shall be inspected regularly by the Trained Staff member, with a minimum of one inspection per day.

If unforeseen contamination is encountered, the Contaminated Land Specialist is to be contacted to inspect the excavation and advise on the appropriate soil handling and health and safety procedures.

3.1.2 General Soil Handling Procedures

The following general handling procedures should be followed where contamination is identified/suspected in any Category 1 area, except where testing of soils has proven soils to be clean (see Section 3.11):

- Material excavated shall be loaded directly onto trucks for offsite disposal, or temporarily stockpiled to prevent contamination of other area.
- Trucks shall be loaded within the site where runoff and possible spills during loading will be controlled and contained.



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 2

- Measures shall be put in place to ensure contaminated soil is not tracked offsite on wheels of trucks.
- Each truck will have a tracking document¹ signed onsite and collected at the receiving facility to track each load of material.
- Trucks shall have their loads covered by tarpaulins during transport of material to licensed landfill. These shall be affixed before leaving site.
- Stockpiling shall be in accordance with Section 3.1.3.
- A permit/manifest shall be obtained by the Contractor from the disposal destination prior to transportation and the Contractor is responsible for obtaining this approval.
- All contaminated material removed from site shall be disposed as per the procedures set out in Section 4.1.
- All weighbridge dockets shall be retained by the Contractor and provided to the Engineer to the Contract.

Health and safety precautions identified in Section 5 shall also be followed.

Additional procedures for specific situations are provided in the following sections.

3.1.3 Stockpiling of Contaminated Soils

It is possible stockpiling of contaminated soil on site may be required due to phasing of work, or other construction constraints. Where possible stockpiling should be avoided and, if required, the time material is stockpiled shall be minimised as much as practical.

Any material that is suspected to be contaminated that requires stockpiling shall be managed by the Contractor as below:

- Sediment control measures (refer Erosion and Sediment Controls in Section 5) shall encircle the stockpile, this may include:
 - earth bunds with a minimum height of 0.3 m;
 - hay bales;
 - silt fences;
 - proprietary products such as filter socks etc.

- If the stockpile is to be remain for more than 1–2 days, the stockpile shall be covered with clean soil, geotextile or a polythene cover to prevent rainfall induced erosion.
- Fenced or otherwise secured so that the general public cannot have access to the stockpile.
- If the material is odorous, odour control measures shall be put in place. This could include covering the material with clean soil, a polythene cover or instituting a deodoriser system.

3.1.4 Dust Generation

From an environmental and human health perspective, dust generated from contaminated soils has the potential to contain contaminants and, during windy conditions, may discharge offsite.

Where contamination is suspected/identified in Category 2 areas, in addition to the standard dust control practices that are incorporated in the Contractors Environmental Management Plans, the Contractor shall:

- limit the amount of material to be excavated as much as practicable;
- limit vehicle access onto contaminated areas;
- use a water truck or portable water sprays in trafficked areas to dampen dust during dry and windy conditions;
- if required, cover stockpile material awaiting laboratory testing/removal to prevent dust generation;
- visually monitor dust emissions in the vicinity of the excavation until exposed material has been covered by clean material; and
- avoid work during windy conditions.

When utilising water to control dust, the Contractor shall ensure that:

- the volume of water used for dust suppression does not cause surface ponding or runoff;
- the application does not cause surface runoff that would discharge into natural water bodies; and
- the application of water does not induce soil erosion and soil pugging.

¹ Driver's log sheets will be sufficient as tracking documents.



3.1.5 Stormwater & Sediment Control Measures

Rainwater has the potential to come into contact with contaminated material and become contaminated itself. Contaminated sediment may also be entrained in the stormwater.

Where contamination is suspected/identified in Category 2 areas, the Contractor shall ensure that stormwater and sediment control procedures are put in place prior to any ground breaking works commencing and include at a minimum:

- limiting the duration of exposure of contaminated ground as much as possible;
- containment of any runoff during rainfall events within the excavation;
- bund stockpiles as set out in Section 3.1.3;
- controlled site exit points and methods to prevent contaminated soils being tracking offsite by vehicles.

The purpose of the above stormwater and sediment control measures is to prevent contaminated water from entering rivers and streams via the stormwater network.

3.1.6 Cross Contamination

To avoid transferring contaminated soils from one site to another the site, all machinery and equipment shall be decontaminated prior to moving from a suspected/identified contaminated site (or any Category 1 site) to a different location.

3.1.7 Prevention of Preferential Pathways Along Pipelines

Installation of pipelines through contaminated soils can provide a flow path through which contaminants can migrate. When laying pipe work through areas of contaminated soil with high groundwater where the contaminants may be mobile, measures (such as pipe dams) shall be put in place to prevent these contaminants from travelling along the permeable bedding of the pipeline. Advice on the design of the mitigation measures (pipe dam etc.) shall be sought from the Contaminated Land Specialist.

3.1.8 Procedure for Removing & Reporting on Unforeseen Structures

It is possible that subsurface structures with potential to cause ground contamination may be encountered during the works. Structures of concern are those associated with the storage, transfer or disposal of fuels, chemicals or wastes. These may include underground storage tanks (USTs), pipelines, waste tanks or sumps, but does not include structures associated with stormwater or municipal wastewater. If unforeseen structures of this type are encountered, the Contaminated Land Specialist shall inspect the structures and advise on handling, disposal, and site validation procedures. Any abandoned drainage lines shall be capped off with concrete and inspected by the Contaminated Land Specialist prior to reinstatement.

USTs are a special case with specialist procedures set out in Section 3.2.4.

3.1.9 Soil Sampling Requirements & Procedures

Soil sampling shall be undertaken by the Contaminated Land Specialist according to the requirements of the NES Regulations 2012 and the MfE Contaminated Land Management Guidelines No. 5². Soil samples shall be collected according to the following procedure:

- The materials encountered shall be described in accordance with the NZ Geotechnical Society “Guidelines for the classification and field description of soils and rocks for engineering purposes”.
- Freshly gloved hands shall be used to collect soil samples and shall be placed immediately into 300 ml glass jars.
- Any equipment used to collect the samples shall be decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent) or similar.
- Samples shall be shipped in a chilled container to an IANZ accredited laboratory under chain of custody documentation.

² Ministry for the Environment, 2004: Contaminated Land Management Guideline No. 5 – *Site Investigation and Sampling*, revised 2011.



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 2

The Contaminated Land Specialist shall identify potential contaminants on the basis of visual and olfactory observations. However, at a minimum they shall include metals (arsenic, chromium, copper, nickel, lead and zinc), TPH, BTEX and PAH. Other contaminants may be tested for at the discretion of the Contaminated Land Specialist.

Any evidence of the presence of asbestos shall trigger testing for asbestos content in soil.

The Contaminated Land Specialist shall report the results of any testing to Lyttelton Port Company and the Contractor. It is appropriate to evaluate the results with respect to:

- NES Regulations (2012) soil contaminant standards for an industrial/commercial land use with respect to protection of human health; and
- Background concentrations for the local area.

3.1.10 Groundwater Disposal

It is possible that groundwater will be encountered in excavations within Category 2 areas. Groundwater and ponded surface water within Category 2 areas shall not be discharged to stormwater unless testing confirms that contaminants are within CCC's permitted stormwater concentrations.

The Contractor shall in the first instance contact the Contaminated Land Specialist to advise if contamination is present. Disposal shall be to sewer at the discretion of CCC. Treatment of the water may be required prior to disposal. Alternatively, disposal by sucker truck and transport to a Treatment Plan may also be possible.

3.1.11 Imported Material Procedures

Material imported to site is generally expected to be virgin quarry material or certified cleanfill, including demolition cleanfill from the Christchurch rebuild. Any other soil imported to site that is not certified cleanfill shall be sampled by a contaminated land specialist at a rate of one sample for every 500 m³ and tested for metals and hydrocarbons as well as any other contaminants as determined by the Contaminated Land Specialist. Results must be consistent with expected background, unless otherwise authorised by consent conditions at the receiving location (i.e., the reclamation). It is

preferable that fill is tested at its source prior to its use at the site. However, if not, then the Contractor shall stockpile the fill on site until test results are available.

Hardfill imported for backfill, if sourced directly from a quarry or supplier, does not require testing.

3.2 ADDITIONAL SITE MANAGEMENT PROCEDURES

These procedures relate to specific potential contaminating activities as outlined in Table 1. The relevant procedures for the type of contamination must be implemented along with the procedures in Section 3.1.

3.2.1 Odour Control

If odorous material is uncovered during excavation works the following odour control measures shall be implemented to prevent a nuisance to neighbouring businesses and to ensure the health of workers:

- All work in the immediate vicinity of odorous material shall cease and the exposed material shall be covered, for example with tarpaulin, polyethylene sheeting or a layer of clean soil to prevent further discharge of odour. The contractor shall then seek advice from the Contaminated Land Specialist.
- The Contaminated Land Specialist shall assess the potential for volatile compounds and advise on health and safety requirements. Assessment of volatility may include use of a Photoionisation Detector (PID) and soil sampling and testing.
- Wind conditions shall be assessed and if necessary work shall cease until conditions are more favourable for minimising discharge of odour.
- A ventilation or other mitigation system, for example odour suppression sprays, shall be established if natural dispersion is not adequate.
- Health & safety procedures as set out in Section 5 shall be employed.



3.2.2 Product Control

Petroleum-based products may occur in soil on Category 2 sites in close proximity to fuel storage facilities. Petroleum-based products could include petroleum fuels (e.g., petrol, diesel), solvents, tar and creosote. Petroleum-based products can cause discharges if not managed appropriately and may affect the safety of workers, visitors and the general public as well as the environment. Preventing and managing vapour discharges is discussed in Section 3.2.3.

The following procedures shall be implemented at Category 2 sites where it has been identified that there is a potential for petroleum-based product to occur. The following procedures shall be modified as necessary by the Contaminated Land Specialist in conjunction with the Contractors HSO to ensure a safe working environment for workers is maintained:

- No hydrocarbons are to drain to ground during excavations; all leaks are to be collected in drain trays or collection vessels.
- Store all petroleum products away from waterways. An oil tray and suitable absorbent material shall be placed on the ground under all petroleum product storage tanks, drums, etc. The oil tray and absorbent material shall be removed and disposed of by the Contractor prior to Contract completion.
- All valves, taps, pumps etc. on tanks containing petroleum products must be kept locked or secured at all times. All reasonable precautions against release of the contents due to vandalism shall be taken.
- Machinery cannot be refuelled near waterways.

Free hydrocarbon product may be encountered on soils in areas that have been subject to petroleum industry activities or storage tanks. If free product is encountered, work shall cease and the Contaminated Land Specialist advised immediately. The Contaminated Land Specialist will advise on

containment and disposal procedures, which may include use of a spill kit or removal by sucker truck and disposal at an approved facility.

3.2.3 Control of VOCs

Volatile organic compounds (VOCs) are the vapour component of petroleum fuels, solvents and heavy end hydrocarbons such as tar and creosote. They can occur as vapour in soil even where a source of the vapours (i.e., hydrocarbon product) is not present. Hazardous atmospheres may occur if VOCs are present and the safety of workers, visitors and the general public compromised.

The following procedures shall be implemented at every project site where there is potential for or it is known that VOCs occur. The following procedures shall be modified as necessary by the Contaminated Land Specialist in conjunction with the Contractor to ensure a safe working environment for workers is maintained:

- Before starting an excavation in a low or high potential for contamination area, the potential for VOC exposure must be assessed. If VOCs have been identified as potentially present, VOC levels at the excavation site shall be tested.
- VOC levels shall be measured using a photoionisation detector (PID), or an alternative VOC monitor. The results shall be compared with Work Place Exposure Standards Table below and appropriate PPE selected (see Section 5).
- Wind and temperature conditions can affect levels of VOCs in the working area. VOC levels shall be reassessed if these conditions change. If necessary work shall cease until conditions are more favourable for minimising volatile inhalation risk and odour dispersion.
- Ventilation shall be established if natural dispersion is not adequate.
- Health & safety procedures as set out in Section 5 shall be employed.

EXPOSURE SCENARIO	EXPOSURE LIMIT	
	TWA PPM	STEL PPM
VOCs total (adopted n-hexane limit)	20	60
Benzene	1	2.5

Reference: Workplace Exposure Standards and Biological Exposure Indices



3.2.4 USTs (Fuel & Other Chemicals)

There is high potential to encounter USTs within some Category 2 areas. USTs may contain fuel or chemicals, and there is often the potential for USTs to have leaked to surrounding soils. Some are contained within concrete bunds but this is not always the case. Any USTs, bunds and associated pipe work identified within the excavation shall be removed ¹:

- Notify the Contaminated Land Specialist as soon as the UST is suspected or encountered.
- Notify Environment Canterbury and the Christchurch City Council before any works begin.
- Engage a sub-contractor certified in removal of fuel/chemical tanks if the Contractor does not hold this certificate.
- Breakout overlying concrete (if present).
- Expose the top and sides of the tanks by pulling back the overburden soil.
- Seal all upper tank openings.
- Remove concrete anchors.
- Lift the tank from the excavation.
- Seal all lower tank openings, and prepare tanks for transport (e.g., label according to dangerous goods class).
- Remove any obviously contaminated bedding material under direction from the Contaminated Land Specialist.
- Transport the tank offsite to a licensed tank disposal location under the appropriate dangerous goods certification.
- Contaminated Land Specialist to undertake validation sampling and reporting as per the MfE guidelines, this may require the excavation to be left open for a period of 5–7 days.
- Backfill the excavation with suitable material once the Contaminated Land Specialist has provided written instruction to do so.

3.2.5 Asbestos Handling Procedures

There is potential for pipe work or buildings to contain asbestos, or for asbestos (either as

fragments or free fibres) to be identified within soils on site (particularly in fill or in areas where historic buildings have been demolished). Specific procedures for disturbance of soil with low level asbestos are provided in Appendix B. If ACM including pipes or building cladding is encountered on site, the Contractor will notify the Project Manager and the Contaminated Land Specialist and follow the procedures below:

- Demolition of asbestos-containing buildings must be done under the supervision of an approved asbestos contractor. A sub-contractor with the necessary certification is to be engaged and the works notified to WorkSafe New Zealand if necessary.
- Any cutting or excavation of asbestos pipe is to be undertaken in wet conditions with Contractors wearing full face and body protection and in accordance with the methods prescribed in the ACoP ². Depending upon the quantity of AC pipe being cut or excavated, the works may be notifiable and need to undertaken by a licensed asbestos removalist: check the ACoP for the thresholds.
- All workers on site must wear P2 masks as a minimum.
- Work shall not proceed if conditions are windy.
- All asbestos contaminated material, or potentially contaminated material, will be loaded directly onto trucks to be transported to a licensed facility approved to accept asbestos material. Material on the trucks needs to be covered prior to transport.
- Stockpiling of asbestos contaminated material is to be avoided wherever possible. If it must be stockpiled, the stockpile will be covered with a suitable geotextile to prevent generation of dust and transport of asbestos off-site.
- Asbestos products, and all personal protective equipment used to handle it, shall be double-bagged and disposed of at an approved disposal facility.
- Disposal receipts shall be provided to the Contaminated Land Specialist and LPC Project Manager.

¹ The removal shall be in accordance with the Regional Plan rules and the NES (soil).

² WorkSafe New Zealand – Approved Code of Practice – Management and Removal of Asbestos (November 2016)



4 SOIL DISPOSAL

4.1 DISPOSAL OF CONTAMINATED SOIL

All soils excavated from Category 2 areas shall be assumed to be contaminated unless testing (as per Section 3.1.9) has indicated that soils are clean. Contaminated soils shall be kept separate from other excavated material where possible in order to minimise cross-contamination and high disposal costs.

If sampling is required, it can be undertaken in situ (pre testing prior to excavation) or from stockpiles following excavation. All sampling must be undertaken by a Contaminated Land Specialist¹. Be aware that laboratory testing takes 5–7 working days and methodology should account for this potential delay.

The results of the testing will dictate the disposal locations. As an indication, broad guidelines are as follows:

- If the levels of contaminants are less than background concentrations then these materials may be disposed of to cleanfill (subject to approval from the cleanfill operator; see Section 4.3). This may also include disposal at the reclamation works at Lyttelton Port.
- If the levels of contaminants are greater than background but less than the Burwood Landfill acceptance criteria then these materials can be disposed of within the Burwood Landfill in the locations directed by the site operator.
- If the levels of contaminants exceeds the Burwood Landfill acceptance criteria, options for pre-treatment, disposal to the facility at Texco Remediation or disposal to Kate Valley should be sought.

- Excavated materials containing asbestos require disposal to a licensed facility approved to accept asbestos materials with the prior approval of the operator.

Records of the material disposed (weighbridge dockets etc.), and the location of disposal shall be kept for all loads.

4.2 DISPOSAL OF HYDRO EXCAVATION MATERIALS

Materials from all hydro excavation (slurry etc.) works undertaken at Category 2 sites must only be disposed of at the designated location at the Burwood Landfill as directed by the site operator.

4.3 DISPOSAL OF UN-CONTAMINATED SOIL

Soils from Category 2 that have been pretested (see Section 3.1.9) and proven to be uncontaminated may be transported to cleanfill for disposal, subject to approval from the cleanfill operator, or retained on site.

The loading of trucks and transport to the cleanfill shall be as per standard soil handling procedures.

Records of the material disposed, and the location of disposal should be kept.

¹ Where pre-testing is required for disposal or health and safety purposes then testing shall be undertaken in accordance with Ministry for the Environment Contaminated Land Management Guidelines. All testing shall be undertaken by a Contaminated Land Specialist. Analysis results will be compared to the receiving facility acceptance criteria and most recent and relevant human health assessment criteria.



5

HEALTH & SAFETY PROCEDURES

These health and safety procedures relate to the risk to workers as a result of moderate potential for significant ground contamination. These are additional to standard health and safety requirements of the Contractor during excavation works. The procedures in Section 5.1 must be implemented for all works in Category 2 sites, with additional procedures in Section 5.2 for specific contaminating activities (refer to Table on page 5) and Appendix B for disturbing low levels of asbestos in soil. The Contractor must incorporate these health and safety procedures should be incorporated into their overall health and safety plan for the site.

5.1

GENERAL REQUIREMENTS

Health and Safety requirements shall be managed through site specific and job specific safety authorisations (JSA's). The following procedures are to be used as a guide for the preparation of these JSA's. **The following procedures deal with health and safety matters relating to contaminated ground only and do not cover other hazards on site.**

These general procedures are designed as a base level for all sites, and are designed to cover the generic health and safety set up and controls related to contaminated ground. Specific hazard management procedures for some Category 2 areas are provided in latter parts of this section, depending on the contaminating activity present.

5.1.1 Site Establishment

The following shall be put in place by the Contractor prior to ground works commencing:

- The site is to be fenced with 1.8 metre secured fencing to restrict entry to authorised workers and prevent access by the general public. Appropriate warning signs (e.g., "Restricted entry", "Danger open excavations") shall be erected around the fenced site.

- Health and safety inductions and daily prestart meetings shall be completed.
- Health and safety facilities as required by the hazard management procedures, such as wash facilities, personal protection equipment stores and first aid points shall be provided.

5.1.2 General Safety Requirements

Contractor's staff, sub-contractors and visitors shall be required to undergo a site specific safety induction before entering and/or commencing work. The purpose of the safety induction is to make sure staff, sub-contractors and visitors are aware of the hazards related to contaminated soil relevant to the site, safe working procedures, safety equipment and requirements and the action plan in case of an emergency.

The Contractor is to appoint an environmental safety officer (ESO) for the duration of the works. The ESO shall be responsible for ensuring health and safety procedures are adhered to and that the risks associated with the potential hazards are controlled.

The following general safety procedures shall be followed by all staff entering and/or working in the immediate area of the project activities (extra procedures apply for the disturbance of low levels asbestos in soil – refer Appendix B):

- All incidents shall be reported to the ESO.



- Workers shall be made aware of potential hazards on site so they can be identified and appropriate control measures can be taken to ensure the safety of workers, and passers-by.
- Site workers shall avoid unnecessary contact with site soils.
- Site workers shall avoid exposure to asbestos containing material.
- Site workers shall wear personnel protective clothing and equipment as outlined in Section 5.1.5.
- A first aid kit and fire extinguisher must remain and be available on site at all times.
- Hand washing facilities must be provided onsite.

5.1.3 Emergency Procedures

It is the responsibility of the ESO to develop an emergency response plan (ERP) and ensure everyone working on the site is familiar procedures to be carried out in an Emergency. This plan must be tested onsite to ensure that the availability of appropriate emergency services and equipment prior to the start of works. These will include:

- the Assembly Point;
- the location of the nearest telephone;
- location of the nearest first aid kit, fire extinguisher; and
- appropriate local medical emergency numbers.

The ESO must be notified immediately of any injury or accident occurring at the site. If serious harm occurs WorkSafe NZ (or the Ministry of Business Innovation and Employment prior to WorkSafe NZ being established) must be notified immediately.

The following is a list of emergency numbers:

Emergency:	111
Christchurch Hospital:	03 364 0640
Christchurch Fire Department:	03 372 3600
Christchurch Police:	03 363 7400
WorkSafe New Zealand:	0800 030 040
Contaminated Land Specialist:	To be determined
Contractor:	To be determined

5.1.4 Hazard Identification

Works within Category 2 sites can be expected to encounter a range of contaminated ground conditions, including exposure to the following contaminants:

- heavy metals;
- hydrocarbons (fuels, oils and greases);
- solvents;
- asbestos;
- volatile contaminants.

Exposure to the above can result in acute and long term adverse health effects, some of which manifest themselves long after the exposure occurs. It is important that the ESO makes the workers aware of these risks and the importance of complying with the procedures set out in this document.

Workers on contaminated sites can also be subject to unusual stresses, for example, manual work while wearing dust masks or respirators, or exposure to elevated concentrations of contaminants. The Contractor shall undertake continual monitoring and checks that any site workers in Category 2 areas do not have any pre-existing condition which might place them at risk as a result of such stresses.

The ESO shall ensure that all personnel are familiar with the application and use of the equipment and procedures specified in this plan, in addition to the Contractor's standard Site Safe procedures before commencement of site work. No personnel are to commence work without prior knowledge and understanding of this plan and with the Contractors safety requirements.

5.1.5 General Hazard Minimisation Procedures

Works undertaken in Category 2 areas are likely to encounter contaminated soil and groundwater. Therefore it is appropriate for all workers, sub-contractors and visitors adopt the Contractor's health and safety measures to prevent exposure to potentially contaminated soils. The procedures set out below aim to prevent workers, sub-contractors and visitors being exposed to the soils by use of appropriate PPE as well as behavioural practices.

Workers may be exposed to contaminants via the ingestion of soil, skin contact with contaminated soil



or inhalation of vapours. To prevent this exposure, the following procedures must be followed by workers who are likely to come into contact with soil or contaminants:

- Wear cloth coveralls.
- The cloth coveralls shall be removed at the end of each day and shall be stored at the work site. The coveralls shall not be left in vehicles or taken home (this is to prevent tracking contaminated material to the workers' homes).
- The coveralls shall be laundered weekly by a commercial laundry, unless heavily soiled in which case they shall be washed daily. The coveralls shall under no circumstances be taken home and washed.
- Wear P2 dust masks during dusty conditions.
- All staff physically involved in excavations, handling soil or working in excavations shall wear chemical resistant disposal gloves which shall be regularly changed.
- Minimise hand to mouth contact.
- Wash hands and face prior to eating, drinking using the toilet or smoking.
- Do not eat or drink within the excavation area.

The Contractor must review any new work element and continually monitor and assess whether there are any new associated hazards, and whether these can be eliminated, isolated or minimised. If these hazards are related to ground contamination, the Contractor shall seek advice from the Contaminated Land Specialist. The Contractor shall then instruct all staff, sub-contractors and visitors on the health and safety procedures associated with the new hazard.

5.2 ADDITIONAL HAZARD MANAGEMENT FOR SPECIFIC CATEGORY 2 AREAS

The following sections outline the measures to minimise the effects of the hazards associated with specific contaminating activities as identified in the Table on page 5.

5.2.1 Explosion Risk Control

Volatile components have the potential to produce an explosion risk if present in air at levels above the lower explosion limit (LEL). The following sets out the procedures that the Contractor shall follow for monitoring the presence of volatile organic compounds and mitigating potential explosive risk. To manage the potential explosion risk, the Contractor shall:

- only use machinery fitted with spark arrestors to excavate and handle contaminated materials;
- treat any excavation greater than 1 m depth and narrower than 3 m, using confined space procedures. This will require persons entering excavations to be trained and competent in confined space entry, and will require the appropriate emergency response plan, permits safety and rescue equipment to be present. It is the responsibility of the Contractor to ensure their staff are trained, have practiced the ERP and comply with all the relevant regulations relating to confined space entry;
- have a LEL meter onsite at all times, monitor the atmosphere continuously and placed as near as practical to the excavation face of all excavated areas;
- undertake no work while explosive gases are present above the lower explosive limit;
- establish a ventilation system where required to dissipate explosive gases to below the LEL;
- keep a fire extinguisher on site at all times.



5.2.2 Inhalation of Toxic Gases

To minimise the risks associated with toxic gases the following measures will be undertaken:

- Before the start of work each day, and following any break longer than 15 minutes the atmosphere in the area of works shall be tested and recorded.
- All staff working in an excavation shall wear personal gas meters.
- If the results show concentrations of H_2S greater than 2 ppm, half face respiratory masks (with appropriate cartridges) must be worn. If results of H_2S are above 10 parts per million (ppm), all work must cease until the levels reduce below that level.
- If the levels of O_2 are greater than 21.5% or less than 19.5 % all work must cease and staff must leave the excavation.
- If levels of CO_2 are greater than 5,000 ppm all work must cease and staff must leave the excavation.
- If concentrations of CO are greater than 25 ppm all work must cease until levels reduce.
- Appropriate respiratory protection shall be made available to workers, including half or full face mask with the appropriate cartridges to reduce the inhalation of organic compounds.
- The Contractor is responsible for providing workers with this equipment, are trained in the correct wearing of, and ensuring it is used where appropriate.
- During all works within landfill materials the appropriate rescue systems shall be in place and tested as required by the confined space regulations.

5.2.3 Inhalation of Asbestos Fibres

Respiratory protection shall be worn at all times when there is a risk that asbestos-containing material (ACM) could be exposed during earthworks. This shall be assessed daily by the Contractor. The minimum requirement if ACM is present is a P2 dust mask. Half face respirators with asbestos fibre filters may also be required depending on the review of the nature and extent of ACM present by the Contaminated Land Specialist.

Appropriate procedures shall be implemented for works disturbing low level asbestos in soil and ACMs (e.g., AC pipe) to comply with the Asbestos Regulations 2016.



6 WORKS VERIFICATION

6.1 INFORMATION REQUIRED BY LPC

In conjunction with the Contaminated Land Specialist, the Contractor is required to complete a Works Verification Form (included in Appendix C) for each earthworks project. The Works Verification Form is to be submitted to LPC's Project Manager and Environmental Manager. The Works Verification Form includes items such as:

- confirmation that the soil disturbance works are complete;
- whether or not contaminated material was encountered during the works;
- confirmation that soil disturbance works were completed according to the CSMP and details of any variations during the works;
- information regarding any environmental incidents during the works;
- results of any contamination tests undertaken; and
- confirmation of the disposal destination of clean and contaminated soils and the verification test results undertaken for disposal permitting.

The following information also needs to be appended to the Works Verification Form:

- copies of weigh bridge summaries for the disposal destination for contaminated soil;
- disposal volumes for uncontaminated soil removed and disposed;
- records of visits by council representatives;
- details of any complaints (by the public or Council); and
- details of any health and safety incidents related to the contamination and how they were resolved.

The Contractor is required to provide the above information within 1 month of completion of works to which the information relates.

6.2 VALIDATION SAMPLING

The requirements for validation sampling will be determined on a case-by-case basis by LPC and the Contaminated Land Specialist. It is anticipated that validation sampling will only be required on sites that will remain unsealed on completion of works or where unexpected contamination is identified that may present a risk to future site users or the environment.

Any validation sampling results will be appended to the Works Verification Form



7 APPENDICES



APPENDIX A

CONTRACTOR CHECKLIST

Task	Talk to/ liaise with	Completed?
<i>Tendering stage</i>		
Read through contaminated land technical chapter		
Locate area of works on Contamination Risk Area Map	Confirm interpretation with LPC	
Choose Category 1/2/3 SMP (Appendix A-D) based on location. <i>Read and understand Category SMP</i>	Discuss any questions with LPC	
<i>Job awarded/ Pre-earthworks stage</i>		
Appoint Contaminated Land Specialist (CLS)	Consultants/CLS, LPC may be able to assist	
Discuss proposed works with CLS and provide them with copy of the Category SMP for works.	CLS	
Arrange disposal permits for any excavated material that has to be disposed off-site.	Christchurch City Council and fill operators, CLS if sampling required	
Arrange permits for water discharge if necessary	Christchurch City Council, CLS if sampling required	
Set up hazard boards, site fencing, PPE, wheel washes, etc. as required by Category SMP.		
Undertake staff training as per Category SMP and have start-of-works briefing with CLS	All staff, CLS	
<i>During earthworks</i>		
Ongoing monitoring by staff, with CLS as required by Category SMP	CLS	
Any unexpected contamination or contamination-related incidents – immediately talk to LPC and CLS	LPC, CLS, Council if required	
Record all material being disposed off-site and imported to site		
Maintain earthworks controls and erosion and sediment and erosion controls as per Category SMP		
Undertake testing as required for soil disposal and validation	CLS	
<i>Earthworks completion</i>		
Complete Works Verification Form	CLS, LPC	
Ensure all other resource consent requirements are met		



APPENDIX B

LOW LEVEL ASBESTOS IN SOIL – CONTROLS & PROCEDURES

1 Introduction

This appendix provides additional controls and procedures to Sections 3 and 5 of the CSMP for use by LPC and their contractors for earthworks disturbing **low levels of asbestos** in soils and where there is a low likelihood that such works will produce above trace levels of asbestos in air (<0.01 fibres/mL) as required by the Asbestos Regulations¹.

Procedures and controls for managing the disturbance of asbestos in soil are provided in WorkSafe New Zealand's ACoP² and the BRANZ Asbestos in Soil Guidelines³. The level of control for disturbing low levels of asbestos in soil materials depends on the quantity of asbestos present in soil, as measured in the laboratory:

- ≤0.001% w/w asbestos fines (AF) and/or fibrous asbestos (FA) – *unlicensed asbestos works*;
- >0.001% to ≤0.01% w/w AF/FA – *asbestos related works*.

For bonded asbestos containing material (ACM), these are:

- ≤0.01% w/w ACM – *unlicensed asbestos works*;
- >0.01% to ≤1% w/w ACM – *asbestos related works*.

The controls and procedures are **mandatory** for all persons (employees, contractor and sub-contractors) disturbing soils containing low levels of asbestos.

NOTE: If the asbestos content in soils is more than the upper limits above, the works are either Class A or Class B asbestos removal works, and require a **task specific asbestos removal control plan** (Asbestos Regulations – Regulation 32 and ACoP Section 26).

The procedures and controls presented in this Appendix are not sufficient for Class A or Class B works. Therefore LPC and/or its contractor will need to engage the services of licensed asbestos removalist to prepare the asbestos removal control plan and undertake such works.

2 Roles & Responsibilities

LPC is responsible for engaging a Contaminated Land Specialist to investigate and assess asbestos in soil conditions. The Contaminated Land Specialist shall confirm whether the works should be classified as **asbestos related** or **unlicensed asbestos works**. If offsite disposal of low level asbestos in soil materials is required, the Contaminated Land Specialist shall identify potential disposal locations.

The Contractor is responsible for implementing the controls and procedures detailed in this appendix and the CSMP including, when offsite disposal is required, arranging this before commencing disposal.

¹ Health and Safety at Work (Asbestos) Regulations 2016.

² Approved Code of Practice – Management and Removal of Asbestos – WorkSafe New Zealand (November 2016).

³ New Zealand Guidelines for Assessing and Managing Asbestos in Soil – BRANZ (November 2017).



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 2

For works disturbing low level asbestos in soil on LPC land, the following roles and responsibilities apply.

ORGANISATION	ROLES & RESPONSIBILITIES
Lyttelton Port Company	<ul style="list-style-type: none">• Principal (i.e., PCBU) and client, site owner and operator, global consent holder and project manager.
Contractor	<ul style="list-style-type: none">• Responsible for implementation of the CSMP and the asbestos-specific procedures detailed in this appendix.• Responsible for distribution of the CSMP including this appendix to subcontractors undertaking the unlicensed asbestos work and/or asbestos related works.• Appointing a Site Controller – responsible for compliance with the controls and procedures of the above documentation, including subcontractors. Role required to fulfil requirements of the Asbestos Regulations (i.e., a competent person).
Contaminated Land Specialist	<ul style="list-style-type: none">• Contaminated Land Specialist as defined described in the CSMP.• Competent person (per Asbestos Regulations, Regulation 3 (1)).• Delivery of pre-works site induction(s) for asbestos in soil controls.• Undertake asbestos in air monitoring (if required) and report to LPC and Contractor air monitoring results per Section 5 below.• Clearance inspection of decontaminated equipment leaving works area after completion of all soil disturbance (if this task is not completed by the Contractor's competent person).• Conduct soil validation sampling and reporting as required.

NOTE: With adequate training/proof of experience and documentation, some functions of the competent person can be undertaken by designated personnel employed by the Contractor instead of the Contaminated Land Specialist (e.g., clearance inspection of decontaminated equipment).

3 Site Access, Set Up, Demarcation & Signage

Any area in which asbestos-contaminated soils could be disturbed or encountered (e.g., soil stockpiles) are considered to be 'Asbestos Works Areas' and the controls and procedures in this appendix shall apply.

The asbestos work areas must be defined/separated from other LPC activities; if the asbestos works area is within an existing development area, it requires its own demarcation (e.g., fencing, delineation with glow netting within the working area).

Access to the asbestos work areas shall be controlled by the Contractor and limited to pertinent personnel only (e.g., excavator operator, labourers, contaminated land specialist). All personnel must be inducted before working in this area.

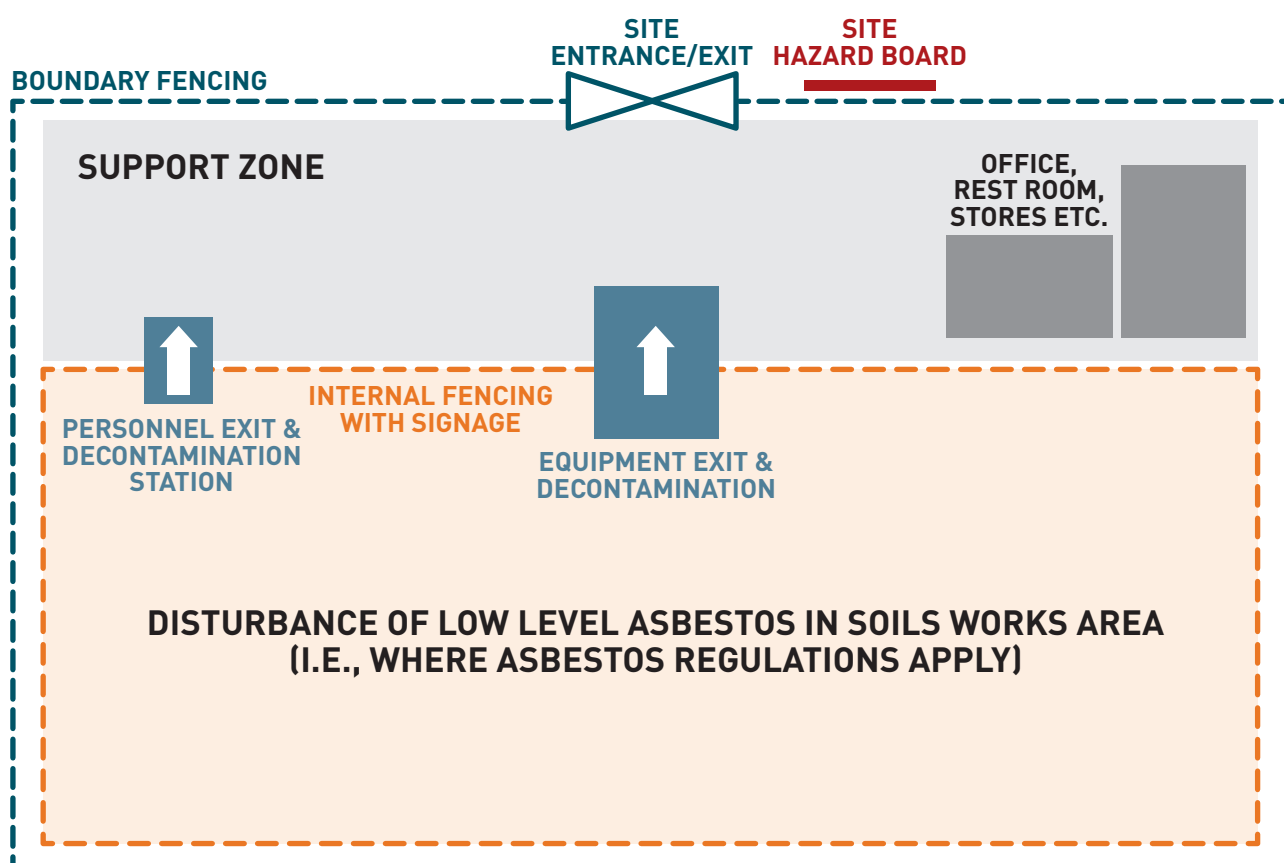
Prior to starting earthworks involving soils containing asbestos, the Contractor shall:

- Erect fencing to separate the asbestos works area and support zone from other LPC activities and internal fencing to demarcate the asbestos works area from the support zone(s). The figure on page 25 illustrates a typical asbestos works area set up. Internal delineation demarcating the asbestos related works area from the support zone can be constructed with ropes and waratahs or other temporary fencing.
- Establish designated exit point(s) for equipment and personnel leaving the asbestos works area to the support zone. The exit point(s) shall allow for



the completion of decontamination procedures before entering the support zone (see below).

- Erect signage on the internal fence (i.e., orange dashed line, figure below) to inform that access is restricted to inducted personnel only and works are subject to Asbestos Regulation 2016 controls. This signage is additional to the Contractor's hazard identification board at the site entrance(s).



4 Personnel Training

The asbestos induction shall be delivered by the Site Controller and Contaminated Land Specialist and include:

- nature and extent of asbestos-in-soil materials;
- site layout/setup including internal separation of asbestos works areas (where the asbestos controls apply) from support zone, as well as and entry/egress points between these;
- personnel decontamination procedures;
- equipment decontamination procedures;
- use of personal protective equipment;

- accidental discovery protocols and emergency procedures for managing unexpected ground contamination.

Drivers **who do not exit their vehicles** while in the asbestos works area do not need to complete the specific asbestos induction, but do need to be aware that they may not leave their vehicle.



5 Air Monitoring

Daily air monitoring shall be undertaken during the first three working days of asbestos works. The purpose of the air monitoring is to confirm the earthworks controls (see Section 7 below) are working effectively. If the works extend to more than three days, additional daily monitoring may be undertaken based on:

- changes in site conditions (e.g., change in nature of materials being handled, weather conditions observed by the Contractor and/or Contaminated Land Specialist);
- changes in works method;
- at the request of LPC.

Undertaking air monitoring during rainfall is not required so long as this is documented, with reasoning, by the Contaminated Land Specialist/competent person.

Air monitoring shall be undertaken by the Contaminated Land Specialist or competent person as detailed in the Asbestos Regulations and the samples analysed at an IANZ accredited laboratory (per Asbestos Regulations, Regulation 3 (1)). Monitoring shall be undertaken in accordance with the procedures of the ACoP (Section 30).

At a minimum, air monitoring shall be undertaken at three stations around the work area at locations determined by the Contaminated Land Specialist/competent person, based on the spatial extent of disturbance works and prevailing wind directions at the time of monitoring. As a minimum the set up shall comprise one upwind station and two stations downwind of the asbestos work area.

Each day's results shall be reviewed against the trace level in air threshold (<0.01 fibres/mL) (Asbestos Regulations (Regulation 3 (1))). If monitoring results are below trace level, the works shall continue following the procedures established. If monitoring results exceed trace level, works shall cease while the Contractor and Contaminated Land Specialist/competent person review the previous day's activities and site conditions to determine if additional procedures are required. Works shall only recommence on LPC's instruction, which will be informed by written advice from the Contaminated

Land Specialist/competent person to LPC on any required changes in earthworks controls.

Further air monitoring shall be undertaken if site conditions or earthworks method change. The Contractor's Site Controller shall inform LPC and the Contaminated Land Specialist/competent person immediately if there is a change in conditions (e.g., implement contingency measures).

6 Personal Protective Equipment

The following asbestos related personal protective equipment (PPE) (based on the Asbestos in Soil Guidelines) is required for all personnel working in the asbestos works area:

For unlicensed asbestos work (based on air monitoring demonstrating less than trace level in air)

- No specific personal protective equipment or respiratory protective equipment.

For asbestos related work

- Disposable coveralls (rated type 5, category 3), or dedicated cloth overalls ¹ for sole use in this works area.
- Overshoes or designated safety boots.
- Disposable gloves (nitrile).
- Disposable P2 dust mask. Note all personnel shall be cleanly shaven if working in the asbestos related works area to ensure the mask provides effective protection (ACoP Section 14.6).

These requirements are in addition to the Contractor's own PPE requirements for its works on site (e.g., hi-visibility clothing, safety boots etc.).

7 Earthworks Controls

The following sub-sections are supplementary to the controls and procedures set out in the CSMP and related solely to the disturbance of low level asbestos in soil materials.

7.1 Dust Suppression

The dust controls section of the CSMP shall apply to the works, with the primary difference being when low level asbestos soils are being disturbed they will

¹ On completion of the works, these shall be either laundered in accordance with Asbestos Regulations – Regulation 53 (3), or disposed offsite as asbestos waste.



be subject to active dust control at all times, not just an ad hoc manner (i.e., the direct and continuous application of mist and/or water). The following additional considerations are applicable based on the level of asbestos in soil and condition of the materials being disturbed (e.g., moisture content):

- The Contaminated Land Specialist shall advise the Contractor if the use of proprietary dust suppressants is necessary to manage the potential for the generation and discharge of dust from the earthworks and stockpiles.
- The Contractor's Site Controller shall continually observe for dust generation and implement further wetting (i.e., addition of more water) as necessary during the works, but avoid the generation of run-off from the site. The required visual monitoring of dust applies to activities such as, but not limited to, loading of asbestos contaminated materials into trucks, tipping from trucks and blading/grading. Works shall cease if the Contractor's Site Controller and/or LPC (or their delegated party) acting on advice from the Contaminated Land Specialist deem wind conditions are too strong to manage potential discharge of dust from the asbestos related works.

7.2 Excavation, Loading & Unloading

Disturbance of low level asbestos in soil materials, including excavation and loading into trucks for transport shall be conducted in accordance with the CSMP general soil handling procedures (Section 3). Loading shall be undertaken with continuous application of mist/water to prevent dust generation. All trucks moving low level asbestos soils shall be covered before setting off (e.g., with tarpaulin). Before trucks that have been used for moving low level asbestos in soil materials can be used for moving other (non-contaminated) materials they will be decontaminated following the procedures detailed in Section 8.2 below.

7.3 Offsite disposal of asbestos waste materials

The following asbestos waste materials generated from the works shall be disposed offsite to a licensed facility approved to accept asbestos materials. Materials generated by the disturbance of low level asbestos in soils include:

- disposable coveralls, gloves, P2 masks;
- wet wipes used for decontamination, wiping down equipment;
- non-woven geotextile, AP60 (if used) used in decontamination stations;
- sediment from boot wash station.

Waste materials (e.g., spent PPE, decontamination materials) shall be stored in proprietary asbestos waste bags or dedicated lined skips prior to offsite disposal (per ACoP Section 18.2).

Disposal of asbestos waste materials shall be to a licensed facility approved to accept this waste type.

8 Decontamination Procedures

Personnel, plant and equipment leaving the asbestos works area shall pass through a designated decontamination area and complete the following procedures.

8.1 Personnel Decontamination

Personnel decontamination procedures for exiting the asbestos works areas shall comprise:

For unlicensed asbestos work

- Cleaning of footwear or removal and storage for re-use.

For asbestos related work

- Cleaning of footwear or removal and storage (subsequently donning suitable footwear for working in support area as prescribed by the Contractor) at the designated exit point. Cleaning shall be by low pressure hose or two stage bootwash.
- Wash or wet wipe hands before leaving area. Any waste materials shall be stored in suitable bag/container for offsite disposal as asbestos waste.



8.2 Equipment Decontamination

All equipment and plant (e.g., excavator, hand tools) used in the works areas (either unlicensed asbestos work or asbestos related work) shall be decontaminated before exiting the area. A designated decontamination area shall be established as follows:

- Place non-woven geotextile (e.g., Biddim™) approximately 5 m x 5 m in plan on flat ground and secure at edges (e.g., peg or sand bag).
- Depending on quantity of traffic using the pad, Contractor could consider placing either steel plates, or approximately 150 mm thick layer of AP60 onto the geotextile with approximately 1 m of geotextile extending beyond plates/gravel.
- Equipment drives onto prepared pad and is hosed down (i.e., low pressure water supply only) to systematically remove all soil materials from the equipment's exterior (e.g., wheels, tracks, buckets). The washing shall be undertaken with care to prevent water and washed off materials overshooting geotextile cloth area. The geotextile and if used, AP60, shall be disposed as asbestos waste.
- The interior of cab shall be wet wiped down. Used wet wipes shall be disposed as asbestos waste.
- Cleaned equipment shall be inspected by the Contaminated Land Specialist or competent person to confirm decontamination completed to required level. The equipment can then drive into the support zone and is ready to undertake other tasks on or offsite.

9 End of Asbestos Works Controls

Controls and procedures described above in Sections 3 to 8 inclusive shall cease to apply when:

Soil Disturbance

- asbestos contaminated soils have been capped with a minimum of 200 mm of non-asbestos containing materials; or
- complete removal of the low level asbestos in soil materials, i.e., change in strata; or
- validation sampling and laboratory analysis undertaken/scheduled by the Contaminated Land Specialist records non-detects for asbestos in soil.

Contractor Demobilisation

Asbestos related controls shall cease to apply for the Contractor when:

- all soil disturbance work is complete (as above); and
- equipment has been decontaminated and inspected by the Contaminated Land Specialist/competent person; and
- waste materials from the decontamination pad and/or personnel decontamination process have been removed from the works area.

Works Verification Reporting

The existing controls from Section 6 of the CSMP shall apply.



APPENDIX C

WORKS VERIFICATION FORM



SECTION 3 CONTAMINATED SOIL WORKS VERIFICATION FORM CATEGORY 2 SITES

Job name:		
Location:		
Dates and duration:		
Summary of works:		
Contaminated soil/water identified? (If yes, detail actions undertaken):		
Material disposed (fill name and volume disposed):	Cleanfill: Landfill:	
Imported material	Source: Volume:	
Test results (including validation sampling):		
Form completed by:		Date:
Contractor's Project Manager:		Signed:
Contaminated Land Specialist:		Signed:



APPENDIX D

INCIDENT & MONITORING REPORTING FORM



INCIDENT REPORTING FORM

In the event of an incident, the following steps are to be taken:

- stop work in the immediate vicinity of the contamination incident and isolate the area by taping, coning or fencing off
- advise the Site Manager who is then to advise LPC and the Contaminated Land Specialist
- implement contaminated soil Health & Safety procedures as per the SMP
- implement surface water, sediment, dust and other controls as required as per the SMP
- update the Hazard Board as required
- implement specific controls as advised by the Site Manager and Contaminated Land Specialist
- ensure monitoring and disposal records are kept, including the form below:

Task	Details	Date/Time & Person
Isolate area of contaminated incident	Materials used, areas:	
Arrange disposal of contaminated material offsite as required	Disposal location and volumes:	
Implement additional controls as per the SMP and as advised by the Site Manager and Contaminated Land Specialist	Additional control details:	
Monitoring of water/air/soil (to be done by Contaminated Land Specialist)	Monitoring results:	
Notify Christchurch City Council and ECan as required	Person/team notified from CCC: ECAN:	
Incident resolved and site returns to normal	How did resolution occur, what additional actions were taken:	



MONITORING FORM

This form can be used for soil testing, water testing or air monitoring:

Date / Time	Parameter / location monitored	Who by	Site results / observations	Lab results (if applicable)	Comments



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 2







3.0

**CONTAMINATED SOIL
MANAGEMENT PLAN**

CATEGORY 3

LOW POTENTIAL FOR CONTAMINATION



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 3



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3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 3

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1 INTRODUCTION

This report has been prepared in general accordance with national guidance and standards for conducting ground contamination-related desk study investigations in New Zealand. This includes compliance with the general format described in the Ministry for the Environment (MfE) Contaminated Land Management Guideline No. 1 *Reporting on Contaminated Sites in New Zealand*.

1.1 BASIS FOR THESE PROCEDURES

Sites within Category 3 are within general Port operations areas (a contaminating activity), but are not subject to additional contaminating activities such as fuel storage. They are therefore judged to have a low to medium potential for having contaminated soil. Category 3 covers a large portion the Lyttelton sites and there is generally little or no recorded contamination. Areas of Category 3 land are shown on the Risk Category Zoning maps in Section 3 of the technical chapter.

Although the potential for contamination is relatively low compared to other categories, there is still some potential for contamination to arise from general Port or transport operations. All staff working on site should be aware of this potential and work methods should allow for early identification of contamination.

Excavations can proceed in accordance with standard earthworks procedures as set out in Section 3. As with other categories, the excavation shall also be undertaken in a manner which allows soils of a different type/composition/contaminant levels to be kept separate, should contamination be identified. If this is carried out the cleaner better material may be able to be disposed at a lower landfill cost, following sampling and testing, reducing the overall project costs.

The excavation method should allow for regular inspections and monitoring of the subsurface conditions to allow identification of any areas of unforeseen contamination. Inspection requirements are covered in Section 3.1, with soil sampling procedures in Section 3.10.

1.2 SITE MANAGEMENT

The following are key aspects of site management during all earthworks on Category 3 areas:

- The site Hazard Board shall include information pertaining to contamination that may be present.
- Personal protective equipment (PPE) relevant to the expected contamination shall be available on site (Section 5).
- The site shall remain secured during non-working hours to prevent access by the public or unauthorised personnel.
- Appropriate earthworks controls (Section 3) shall be emplaced prior to works commencing.
- Additional controls and procedures for disturbing low levels of asbestos in soil (Appendix B) shall be established prior to works commencing.

A Contractor's Checklist is included in Appendix A and covers the key site management and reporting requirements for Category 3 sites.



1.3 IDENTIFICATION OF CONTAMINATION

A range of contaminants may be present within Category 3 areas, although the potential for them is lower than other categories. Indicators of contamination in Category 3 areas include the following:

- A hydrocarbon odour (typically smells like petrol, diesel, kerosene etc.).
- Other abnormal odours not normally associated with soil.
- Discoloured soil (i.e., areas of soil with dark staining, abnormal or unnatural colouring).
- Soil with waste material or building debris (i.e., plastics, metal, bricks, timber etc.) indicating the ground has been filled.
- An oily substance or sheen on the surface of soil, or on the surface of water in the excavation.

If any of the above indicators of contamination are identified, notify the Contaminated Land Specialist to inspect the excavation and provide advice on appropriate handling procedures if required in addition to the procedures in Section 3. Otherwise, soil shall be handled in accordance with the procedures in Section 3.

1.4 POST WORKS VERIFICATION

Works verification procedures are outlined in Section 6 and are centred on the use of a works verification form by the Contractor and contaminated land specialist. A copy of the Works Verification Form is included in Appendix C.



2 PLAN MANAGEMENT & CONTROL

2.1 ROLES & RESPONSIBILITIES

LPC is Responsible for:

- Ensuring that the site works are undertaken in accordance with the category-specific Contaminated Soil Management Plans (CSMPs).
- Ensuring that all site staff and sub-contractors understand and comply with the procedures and the health and safety requirements.
- Making the relevant CSMP available to site Contractors carrying out works and ensure the most recent updated copy is kept on site.
- Compile annual report.

The Contractor is Responsible for:

- Identifying the appropriate category-specific CSMP and implementing the required management procedures and health and safety controls.
- Notifying the Contaminated Land Specialist prior to commencing works which require observation.

- Communicating contaminated-land related incidents to LPC in a timely manner.

Contaminated Land Specialist:

This document refers to a Contaminated Land Specialist as a role which provides technical expertise to oversee the identification and disposal of contaminated soil. For the purposes of this CSMP the Contaminated Land Specialist shall meet the following criteria:

The Contaminated Land Specialist shall be a person who is qualified to undertake a detailed site investigation (supervised) and who should have at least tertiary education in environmental science or engineering or a related field and 2 or more years of professional experience in environmental investigations and risk assessment.

Personnel with decision making roles in relation to contamination management procedures and their training requirements are set out below:

	SITE CREW (e.g., excavator operators, site construction staff)	TRAINED STAFF (e.g., Project Manager, Site Engineer, Environmental Managers)	CONTAMINATED LAND SPECIALIST
Training Requirement	15 min tool box	2 Hour Training from Contaminated Land Specialist	Degree qualified + 2 or more years professional experience
Decision Authority	Day to day site inspections during works	Regular inspections on Category 2 sites, daily inspections on Category 1 sites	Disposal of soil from works, additional mitigation measures



2.2 DISTRIBUTION

The following parties have been provided with this CSMP and the three category-specific CSMPs:

- LPC;
- CCC; and
- Environment Canterbury (ECan).

A copy of the CSMP shall be kept onsite at all times.

2.3 REVIEW & UPDATE OF STANDARD CSMPs

Any variations to this CSMP must be approved by LPC and Christchurch City Council (CCC). If the Contractor wants to change any aspect of this CSMP please contact LPC in the first instance. Any changes made to the CSMP shall not reduce the level of control of the works without good evidence that this is acceptable. The Contaminated Land Specialist should be consulted in the event of any CSMP changes.

It is the responsibility of Contractor to distribute updated versions of the CSMP and to ensure the correct copy of the report is onsite at all times.

2.4 IMPLEMENTATION

Contractors undertaking the works must implement the CSMP.

2.5 REPORTING FOR CONSENT COMPLIANCE

LPC is obliged to submit an annual report to CCC. In order to prepare the report, LPC requires the following information from all Contractors:

- Records of all contaminated land inspections completed in the preceding annual period (LPC will advise the dates).
- Any contaminated land reports or testing undertaken to comply with this CSMP.
- Details of any incidents related to contamination, such as fuel spills, encountering asbestos, health and safety incidents as a result of contamination, etc.
- Details of any variations to the procedures in the CSMP, including why variations occurred and who approved them.

A full list of all requirements is included in Section 6. Templates for reporting of incidents and monitoring can be found in Appendix D.

Annually, a report shall be compiled by LPC and provided to the CCC¹. The report shall set out:

- the records of all contaminated land inspections completed in the preceding annual period where contaminated material has been positively identified; and
- any contaminated land reports or testing results undertaken to comply with this CSMP.

Contractors undertaking the works will provide LPC² copies of all reports produced by the Contaminated Land Specialist produced in relation to the sampling, analysis and assessment of all contaminated materials encountered. These reports will include information relating to the location, type and depths of contamination observed (if any), photographs, surrounding land uses and any monitoring/validation (if any).

¹ Marked for the attention of Team Leader Environmental Compliance Team (l&EEEnvComplianceINBOX@ccc.govt.govt.nz)

² Attn Kim Kelleher, Environmental Manager, LPC



3

SOIL MANAGEMENT PROCEDURES

Due to the relatively low potential for contamination in Category 3 areas, standard soil management procedures will generally be applicable, with some additions to allow for low level contamination. The additional procedures focus on the early identification of contaminants and implementation of appropriate handling and disposal procedures. Additional procedures for the disturbance of soil with low level asbestos are in Appendix B.

3.1 INSPECTION PROCEDURES

Inspections of Category 3 excavations will be undertaken by a Trained Staff member on a regular basis as determined by the Contaminated Land Specialist prior to works commencing.

If unforeseen contamination is encountered, the Contaminated Land Specialist will be contacted to inspect the excavation and advise on the appropriate soil handling and health and safety procedures.

Training requirements are discussed in Technical Section 3.0 – Contaminated Soil (Section 3.2 – Roles & Responsibilities).

3.2 GENERAL SOIL HANDLING PROCEDURES

The following general handling procedures should be followed where contamination may be present in any Category 3 area, except where testing of soils has proven soils to be not impacted (see Section 3.3):

- Material excavated shall be loaded by the Contractor directly onto trucks for offsite disposal, or temporarily stockpiled to prevent contamination of other areas.
- Trucks shall be loaded within the site where runoff and possible spills during loading will be controlled and contained.
- Measures shall be put in place to ensure potentially contaminated soil is not tracked offsite on wheels of trucks.
- Each truck shall have a tracking document¹ signed onsite and collected at the receiving facility to track each load of material.
- Stockpiling shall be in accordance with Section 3.3.
- A permit/manifest shall be obtained by the Contractor from the disposal destination prior to transportation and the Contractor is responsible for obtaining this approval.
- Any contaminated material removed from site shall be disposed as per the procedures set out in Section 4.1.
- All weighbridge dockets shall be retained by the Contractor and provided to the Engineer to the Contract.

Health and safety precautions identified in Section 5 shall also be followed.

¹ Driver's log sheets will be sufficient as tracking documents.



3.3 STOCKPILING OF CONTAMINATED SOILS

It is possible stockpiling of contaminated soil on site may be required due to phasing of work, or other construction constraints. Where possible stockpiling should be avoided and, if required, the time material is stockpiled shall be minimised as much as practical.

Any material that may be contaminated that requires stockpiling shall be managed by the Contractor as below:

- Sediment control measures shall encircle the stockpile, this may include:
 - earth bunds with a minimum height of 0.3 m;
 - hay bales;
 - silt fences;
 - proprietary products such as filter socks etc.
- If the stockpile is to be remain for more than 1–2 days, the stockpile shall be covered with clean soil, geotextile or a polythene cover to prevent rainfall induced erosion.
- Fenced or otherwise secured so that the general public cannot have access to the stockpile.
- If the material is odorous, odour control measures shall be put in place as per the procedures in Section 2.3.1 for Category 2 sites.

3.4 DUST GENERATION

From an environmental and human health perspective, dust generated from soils in Category 3 areas has the potential to contain contaminants and, during windy conditions, may discharge offsite.

Where there is potential for contamination in Category 3 areas, the Contractor shall:

- limit the amount of material to be excavated as much as practicable;
- limit vehicle access onto contaminated areas;
- use a water truck or portable water sprays in trafficked areas to dampen dust during dry and windy conditions;

- if required, cover stockpile material awaiting laboratory testing/removal to prevent dust generation;
- visually monitor dust emissions in the vicinity of the excavation until exposed material has been covered by clean material; and
- avoid work during windy conditions.

When utilising water to control dust, the Contractor shall ensure that:

- the volume of water used for dust suppression does not cause surface ponding or runoff;
- the application does not cause surface runoff that would discharge into natural water bodies; and
- the application of water does not induce soil erosion and soil pugging.

3.5 STORMWATER & SEDIMENT CONTROL MEASURES

Rainwater has the potential to come into contact with contaminated material and become contaminated itself. Contaminated sediment may also be entrained in the stormwater.

Where contamination is suspected/identified in Category 3 areas, the Contractor shall ensure that stormwater and sediment control procedures are put in place prior to any ground breaking works commencing and include at a minimum:

- limiting the duration of exposure of contaminated ground as much as possible;
- containment of any runoff during rainfall events within the excavation;
- bund stockpiles as set out in Section 3.3;
- controlled site exit points and methods to prevent contaminated soils being tracking offsite by vehicles;
- the purpose of the above stormwater and sediment control measures is to prevent contaminated water from entering surface water (the Harbour, rivers and streams) via the stormwater network.



3.6 CROSS CONTAMINATION

To avoid transferring contaminated soils from one site to another the site, where contamination has been observed all machinery and equipment shall be decontaminated prior to moving from the site to a different location.

3.7 PREVENTION OF PREFERENTIAL PATHWAYS ALONG PIPELINES

Installation of pipelines through contaminated soils can provide a preferential flow path, through which contaminants can migrate. When laying pipe work through areas of contaminated soil with high groundwater where the contaminants may be mobile, measures (such as pipe dams) shall be put in place to prevent these contaminants from travelling along the permeable bedding of the pipeline. Advice on the design of the mitigation measures (pipe dam etc.) shall be sought from the Contaminated Land Specialist.

3.8 PROCEDURE FOR REMOVING & REPORTING ON UNFORESEEN STRUCTURES & CONTAMINATION

It is possible that subsurface structures with potential to cause ground contamination may be encountered during the works. Structures of concern are those associated with the storage, transfer or disposal of fuels, chemicals or wastes. These may include USTs, pipelines, waste tanks or sumps etc, but does not include structures associated with stormwater or municipal wastewater. If unforeseen structures of this type are encountered, the Contaminated Land Specialist shall inspect the structures and advise on handling, disposal, and site validation procedures. Any abandoned drainage

lines shall be capped off with concrete and inspected by the Contaminated Land Specialist prior to reinstatement.

Underground fuel storage tanks (USTs) are a special case, and a procedure for their removal when encountered in the excavation is set out in the procedures for Category 1 sites.

3.9 IMPORTED MATERIAL PROCEDURES

Material imported to site is generally virgin quarry material or certified cleanfill, including demolition cleanfill from the Christchurch rebuild. Any other soil imported to site that is not certified cleanfill shall be sampled by a contaminated land specialist at a rate of one sample for every 500 m³ and tested for metals and hydrocarbons as well as any other contaminants as determined by the Contaminated Land Specialist. Results must be consistent with expected background, unless otherwise authorised by consent conditions at the receiving location (i.e., the reclamation). It is preferable that fill is tested at its source prior to its use at the site. However, if not, then the Contractor shall stockpile the fill on site until test results are available.

Hardfill imported for backfill, if sourced directly from a quarry or supplier, does not require testing.

3.10 SOIL SAMPLING REQUIREMENTS & PROCEDURES

Any soil sampling required shall be undertaken by the Contaminated Land Specialist according to the requirements of the NES Regulations 2012 and the MfE Contaminated Land Management Guidelines No. 5¹. Soil samples shall be collected according to the following procedure:

- The materials encountered shall be described in accordance with the NZ Geotechnical Society “Guidelines for the classification and field description of soils and rocks for engineering purposes”.

¹ Ministry for the Environment, 2004: Contaminated Land Management Guideline No. 5 – *Site Investigation and Sampling*, revised 2011.



- Freshly gloved hands shall be used to collect soil samples and shall be placed immediately into 300 ml glass jars.
- Any equipment used to collect the samples shall be decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent) or similar.
- Samples shall be shipped in a chilled container to an IANZ accredited laboratory under chain of custody documentation.

The Contaminated Land Specialist shall identify potential contaminants on the basis of visual and olfactory observations. However, at a minimum they shall include metals (arsenic, chromium, copper, nickel, lead and zinc), TPH, BTEX and PAH. Other contaminants may be tested for at the discretion of the Contaminated Land Specialist.

Any evidence of the presence of asbestos shall trigger testing for asbestos content in soil.

The Contaminated Land Specialist shall report the results of any testing to Lyttelton Port Company, the Contractor and CCC. It is appropriate to evaluate the results with respect to:

- NES Regulations (2012) soil contaminant standards for an industrial/commercial land use with respect to protection of human health; and
- background concentrations for the local area.

3.11 GROUNDWATER DISPOSAL

It is possible that groundwater will be encountered in excavations within Category 3 areas. Groundwater and ponded surface water within Category 3 areas shall not be discharged to stormwater unless testing confirms that contaminants are within CCC's permitted stormwater concentrations.

The Contractor shall in the first instance contact the Contaminated Land Specialist to advise if contamination is present. Disposal shall be to sewer at the discretion of CCC. Treatment of the water may be required prior to disposal. Alternatively, disposal by sucker truck and transport to a Treatment Plan may also be possible.

3.12 ASBESTOS HANDLING PROCEDURES

There is potential for pipe work or buildings to contain asbestos, or for asbestos (either as fragments or free fibres) to be identified within soils on site (particularly in fill or in areas where historic buildings have been demolished). Specific procedures for disturbance of soil with low level asbestos are provided in Appendix B. If ACM including pipes or building cladding is encountered on site, the Contractor will notify the Project Manager and the Contaminated Land Specialist and follow the procedures below:

- Demolition of asbestos-containing buildings must be done under the supervision of an approved asbestos Contractor. A sub-contractor with the necessary certification is to be engaged and the works notified to WorkSafe New Zealand if necessary¹.
- Any cutting or excavation of AC pipe is to be undertaken in wet conditions with Contractors wearing full face and body protection and in accordance with the methods prescribed in the ACoP. Depending upon the quantity of AC pipe being cut or excavated, the works may be notifiable and need to be undertaken by a licensed asbestos removalist: check the ACoP for the thresholds.
- All workers on site must wear P2 masks as a minimum.
- Work shall not proceed if conditions are windy.
- All asbestos contaminated material, or potentially contaminated material, will be loaded directly onto trucks to be transported to a licensed facility approved to accept asbestos materials. Material on the trucks will be covered prior to transport.
- Stockpiling of asbestos contaminated material will be avoided if possible. If it must be stockpiled, the stockpile will be covered with a suitable geotextile to prevent generation of dust and transport of asbestos off-site.
- Asbestos products, and all personal protective equipment used to handle it, shall be double-bagged and disposed of at an approved disposal facility.
- Disposal receipts shall be provided to the contaminated land specialist and LPC Project Manager.

¹ WorkSafe New Zealand – Approved Code of Practice – Management and Removal of Asbestos (November 2016)



4 SOIL DISPOSAL

4.1 DISPOSAL OF CONTAMINATED SOIL

All soils excavated from Category 3 areas shall be assumed to be contaminated unless testing (as per Section 3.10) has indicated that soils are uncontaminated. Contaminated soils shall be kept separate from other excavated material where possible in order to minimise disposal costs.

If sampling is required, it can be undertaken in situ (pre testing prior to excavation) or following excavation from stockpiles. All sampling must be undertaken by a Contaminated Land Specialist¹. Contractors should be aware that laboratory testing takes 5–7 working days and methodology should account for this potential delay.

The results of the testing will dictate the disposal locations, broad guidelines are as follows:

- If the levels of contaminants are less than background concentrations then these materials may be disposed of to cleanfill (subject to approval from the cleanfill operator; see Section 3.3). This may also include disposal at the reclamation works at Lyttelton Port.
- If the levels of contaminants are greater than background but less than the Burwood Landfill acceptance criteria then these materials can be disposed of within the Burwood Landfill in the locations directed by the site operator.
- If the levels of contaminants exceeds the Burwood Landfill acceptance criteria, options for pre-treatment, disposal to the facility at Texco Remediation or disposal to Kate Valley should be sought.

- Excavated materials containing asbestos require disposal to a licensed facility approved to accept asbestos materials with the prior approval of the operator.

Records of the material disposed (weighbridge dockets etc), and the location of disposal shall be kept for all loads.

4.2 DISPOSAL OF HYDRO EXCAVATION MATERIALS

Materials from all hydro excavation (slurry etc.) works undertaken at Category 3 sites must only be disposed of at the designated location at the Burwood Landfill as directed by the site operator.

4.3 DISPOSAL OF UN-CONTAMINATED SOIL

Soils from Category 3 that have been pretested (see Section 3.10) and proven to be uncontaminated may be transported to cleanfill for disposal, subject to approval from the cleanfill operator, or retained on site.

The loading of trucks and transport to the cleanfill shall be as per standard soil handling procedures.

Records of the material disposed, and the location of disposal should be kept.

¹ Where pre-testing is required for disposal or health and safety purposes then testing shall be undertaken in accordance with Ministry for the Environment Contaminated Land Management Guidelines. All testing shall be undertaken by a Contaminated Land Specialist. Analysis results will be compared to the receiving facility acceptance criteria and most recent and relevant human health assessment criteria.



5

HEALTH & SAFETY PROCEDURES

These health and safety procedures relate to the risk to workers as a result of low to moderate potential for significant ground contamination. These are additional to standard health and safety requirements of the Contractor during excavation works. These procedures should be incorporated into the overall health and safety plan for the works. Additional procedures for disturbing low levels of asbestos in soil are presented in Appendix B.

Health and Safety requirements shall be managed through site specific and job specific safety authorisations (JSA's). The following procedures are to be used as a guide for the preparation of these JSA's. **The following procedures deal with health and safety matters relating to contaminated ground only and do not cover other hazards on site.**

5.1 SITE ESTABLISHMENT

The following shall be put in place by the Contractor prior to ground works commencing:

- The site is to be fenced with 1.8 m secured fencing to restrict entry to authorised workers and prevent access by the general public. Appropriate warning signs (e.g., “*Restricted entry*”, “*Danger open excavations*”) shall be erected around the fenced site.
- Health and safety inductions and daily prestart meetings shall be completed.
- Health and safety facilities as required by the hazard management procedures, such as wash facilities, personal protection equipment stores and first aid points shall be provided.

5.2 GENERAL SAFETY REQUIREMENTS

Contractor's staff, sub-contractors and visitors shall be required to undergo a site specific safety induction before entering and/or commencing work. The purpose of the safety induction is to make sure staff, sub-contractors and visitors are aware of the hazards related to contaminated soil relevant to the site, safe working procedures, safety equipment and requirements and the action plan in case of an emergency.

The Contractor shall appoint an environmental safety officer (ESO) for the duration of the works. The ESO shall be responsible for ensuring health and safety procedures are adhered to and that the risks associated with the potential hazards are controlled.

The following general safety procedures shall be followed by all staff entering and/or working in the immediate area of the project activities:

- All incidents shall be reported to the ESO.
- Workers shall be made aware of potential hazards on site so they can be identified and appropriate control measures can be taken to ensure the safety of workers, and passers-by.
- Site workers shall avoid unnecessary contact with site soils.
- Site workers shall avoid exposure to asbestos containing material.



- Site workers shall wear personnel protective clothing and equipment as outlined in Section 5.3.
- A first aid kit and fire extinguisher must remain and be available on site at all times.
- Hand washing facilities must be provided onsite.

5.3 HAZARD MANAGEMENT

Works undertaken in Category 3 areas are unlikely to contain highly contaminated soil. However, as there is still some risk, it is appropriate for all workers to adopt a certain precautionary level of hazard management related to contaminated soils. This section sets out the procedures to manage the potential hazards on sites where no obvious signs of contamination are observed.

Additional procedures are contained in the procedures for Category 2 sites where obvious signs of contamination are noted. To prevent exposure to potentially present contaminants, the following procedures shall be followed on Category 3 sites where no obvious signs of contamination are present. All workers physically involved in excavating soil, or working within the excavations shall:

- wear clothes that cover arms and legs;
- wear P2 dust masks during dusty conditions; and
- have good hygiene practises (i.e., wash hands before eating, drinking, using the toilet or smoking).

If signs of contamination are noted, the Contractor must be prepared and must halt works until the additional health and safety measures set out for Category 2 sites are instituted.

The Contractor shall review any new work element and assessing whether there are any new associated hazards, and whether these can be eliminated, isolated or minimised. If these hazards are related to ground contamination, the Contractor shall seek advice from the Contaminated Land Specialist. The Contractor shall then instruct all staff, sub-contractors and visitors on the health and safety procedures associated with the new hazard.

5.4 EMERGENCY PROCEDURES

It is the responsibility of the ESO to develop an emergency response plan (ERP) and ensure everyone working on the site is familiar procedures to be carried out in an Emergency. This plan must be tested onsite to ensure that the availability of appropriate emergency services and equipment prior to the start of works. These will include:

- the Assembly Point;
- the location of the nearest telephone;
- location of the nearest first aid kit, fire extinguisher; and
- appropriate local medical emergency numbers.

The ESO must be notified immediately of any injury or accident occurring at the site. If serious harm occurs WorkSafe NZ (or the Ministry of Business Innovation and Employment prior to WorkSafe NZ being established) must be notified immediately.

The following is a list of emergency numbers:

Emergency:	111
Christchurch Hospital:	03 364 0640
Christchurch Fire Department:	03 372 3600
Christchurch Police:	03 363 7400
WorkSafe New Zealand:	0800 030 040
Contaminated Land Specialist:	To be determined
Contractor:	To be determined



6 WORKS VERIFICATION

6.1 INFORMATION REQUIRED BY LPC

In conjunction with the Contaminated Land Specialist, the Contractor is required to complete a Works Verification Form (Appendix C) for each earthworks project. The Works Verification Form is to be submitted to LPC's Project Manager and Environmental Manager. The Works Verification Form includes items such as:

- confirmation that the soil disturbance works are complete;
- whether or not contaminated material was encountered during the works;
- confirmation that soil disturbance works were completed according to the CSMP and details of any variations during the works;
- information regarding any environmental incidents during the works;
- results of any contamination tests undertaken; and
- confirmation of the disposal destination of clean and contaminated soils and the verification test results undertaken for disposal permitting.

The following information also needs to be appended to the Works Verification Form:

- Copies of weigh bridge summaries for the disposal destination for contaminated soil.
- Disposal volumes for uncontaminated soil removed and disposed.
- Records of visits by council representatives.
- Details of any complaints (by the public or Council).
- Details of any health and safety incidents related to the contamination and how they were resolved.

The Contractor must provide the above information within 1 month of completion of works to which the information relates.

6.2 VALIDATION SAMPLING

The requirements for validation sampling will be determined on a case-by-case basis by LPC and the Contaminated Land Specialist. It is anticipated that validation sampling will only be required on sites that will remain unsealed on completion of works or where unexpected contamination is identified that may present a risk to future site users or the environment.

Any validation sampling results will be appended to the Works Verification Form.



7 APPENDICES



APPENDIX A

CONTRACTOR CHECKLIST

Task	Talk to/ liaise with	Completed?
<i>Tendering stage</i>		
Read through contaminated land technical chapter		
Locate area of works on Contamination Risk Area Map	Confirm interpretation with LPC	
Choose Category 1/2/3 SMP (Appendix A-D) based on location. <i>Read and understand Category SMP</i>	Discuss any questions with LPC	
<i>Job awarded/ Pre-earthworks stage</i>		
Appoint Contaminated Land Specialist (CLS)	Consultants/CLS, LPC may be able to assist	
Discuss proposed works with CLS and provide them with copy of the Category SMP for works.	CLS	
Arrange disposal permits for any excavated material that has to be disposed off-site.	Christchurch City Council and fill operators, CLS if sampling required	
Arrange permits for water discharge if necessary	Christchurch City Council, CLS if sampling required	
Set up hazard boards, site fencing, PPE, wheel washes, etc. as required by Category SMP.		
Undertake staff training as per Category SMP and have start-of-works briefing with CLS	All staff, CLS	
<i>During earthworks</i>		
Ongoing monitoring by staff, with CLS as required by Category SMP	CLS	
Any unexpected contamination or contamination-related incidents – immediately talk to LPC and CLS	LPC, CLS, Council if required	
Record all material being disposed off-site and imported to site		
Maintain earthworks controls and erosion and sediment and erosion controls as per Category SMP		
Undertake testing as required for soil disposal and validation	CLS	
<i>Earthworks completion</i>		
Complete Works Verification Form	CLS, LPC	
Ensure all other resource consent requirements are met		



APPENDIX B

LOW LEVEL ASBESTOS IN SOIL – CONTROLS & PROCEDURES

1 Introduction

This appendix provides additional controls and procedures to Sections 3 and 5 of the CSMP for use by LPC and their contractors for earthworks disturbing **low levels of asbestos** in soils and where there is a low likelihood that such works will produce above trace levels of asbestos in air (<0.01 fibres/mL) as required by the Asbestos Regulations¹.

Procedures and controls for managing the disturbance of asbestos in soil are provided in WorkSafe New Zealand's ACoP² and the BRANZ Asbestos in Soil Guidelines³. The level of control for disturbing low levels of asbestos in soil materials depends on the quantity of asbestos present in soil, as measured in the laboratory:

- ≤0.001% w/w asbestos fines (AF) and/or fibrous asbestos (FA) – *unlicensed asbestos works*;
- >0.001% to ≤0.01% w/w AF/FA – *asbestos related works*.

For bonded asbestos containing material (ACM), these are:

- ≤0.01% w/w ACM – *unlicensed asbestos works*;
- >0.01% to ≤1% w/w ACM – *asbestos related works*.

The controls and procedures are **mandatory** for all persons (employees, contractor and sub-contractors) disturbing soils containing low levels of asbestos.

NOTE: If the asbestos content in soils is more than the upper limits above, the works are either Class A or Class B asbestos removal works, and require a **task specific asbestos removal control plan** (Asbestos Regulations – Regulation 32 and ACoP Section 26).

The procedures and controls presented in this Appendix are not sufficient for Class A or Class B works. Therefore LPC and/or its contractor will need to engage the services of licensed asbestos removalist to prepare the asbestos removal control plan and undertake such works.

2 Roles & Responsibilities

LPC is responsible for engaging a Contaminated Land Specialist to investigate and assess asbestos in soil conditions. The Contaminated Land Specialist shall confirm whether the works should be classified as **asbestos related** or **unlicensed asbestos works**. If offsite disposal of low level asbestos in soil materials is required, the Contaminated Land Specialist shall identify potential disposal locations.

The Contractor is responsible for implementing the controls and procedures detailed in this appendix and the CSMP including, when offsite disposal is required, arranging this before commencing disposal.

¹ Health and Safety at Work (Asbestos) Regulations 2016

² Approved Code of Practice – Management and Removal of Asbestos – WorkSafe New Zealand (November 2016)

³ New Zealand Guidelines for Assessing and Managing Asbestos in Soil – BRANZ (November 2017)



3.0 CONTAMINATED SOIL MANAGEMENT PLAN – CATEGORY 3

For works disturbing low level asbestos in soil on LPC land, the following roles and responsibilities apply.

ORGANISATION	ROLES & RESPONSIBILITIES
Lyttelton Port Company	<ul style="list-style-type: none">• Principal (i.e., PCBU) and client, site owner and operator, global consent holder and project manager.
Contractor	<ul style="list-style-type: none">• Responsible for implementation of the CSMP and the asbestos-specific procedures detailed in this appendix.• Responsible for distribution of the CSMP including this appendix to subcontractors undertaking the unlicensed asbestos work and/or asbestos related works.• Appointing a Site Controller – responsible for compliance with the controls and procedures of the above documentation, including subcontractors. Role required to fulfil requirements of the Asbestos Regulations (i.e., a competent person).
Contaminated Land Specialist	<ul style="list-style-type: none">• Contaminated Land Specialist as defined described in the CSMP.• Competent person (per Asbestos Regulations, Regulation 3 (1)).• Delivery of pre-works site induction(s) for asbestos in soil controls.• Undertake asbestos in air monitoring (if required) and report to LPC and Contractor air monitoring results per Section 5 below.• Clearance inspection of decontaminated equipment leaving works area after completion of all soil disturbance (if this task is not completed by the Contractor's competent person).• Conduct soil validation sampling and reporting as required.

NOTE: With adequate training/proof of experience and documentation, some functions of the competent person can be undertaken by designated personnel employed by the Contractor instead of the Contaminated Land Specialist (e.g., clearance inspection of decontaminated equipment).

3 Site Access, Set Up, Demarcation & Signage

Any area in which asbestos-contaminated soils could be disturbed or encountered (e.g., soil stockpiles) are considered to be 'Asbestos Works Areas' and the controls and procedures in this appendix shall apply.

The asbestos work areas must be defined/separated from other LPC activities; if the asbestos works area is within an existing development area, it requires its own demarcation (e.g., fencing, delineation with glow netting within the working area).

Access to the asbestos work areas shall be controlled by the Contractor and limited to pertinent personnel only (e.g., excavator operator, labourers, contaminated land specialist). All personnel must be inducted before working in this area.

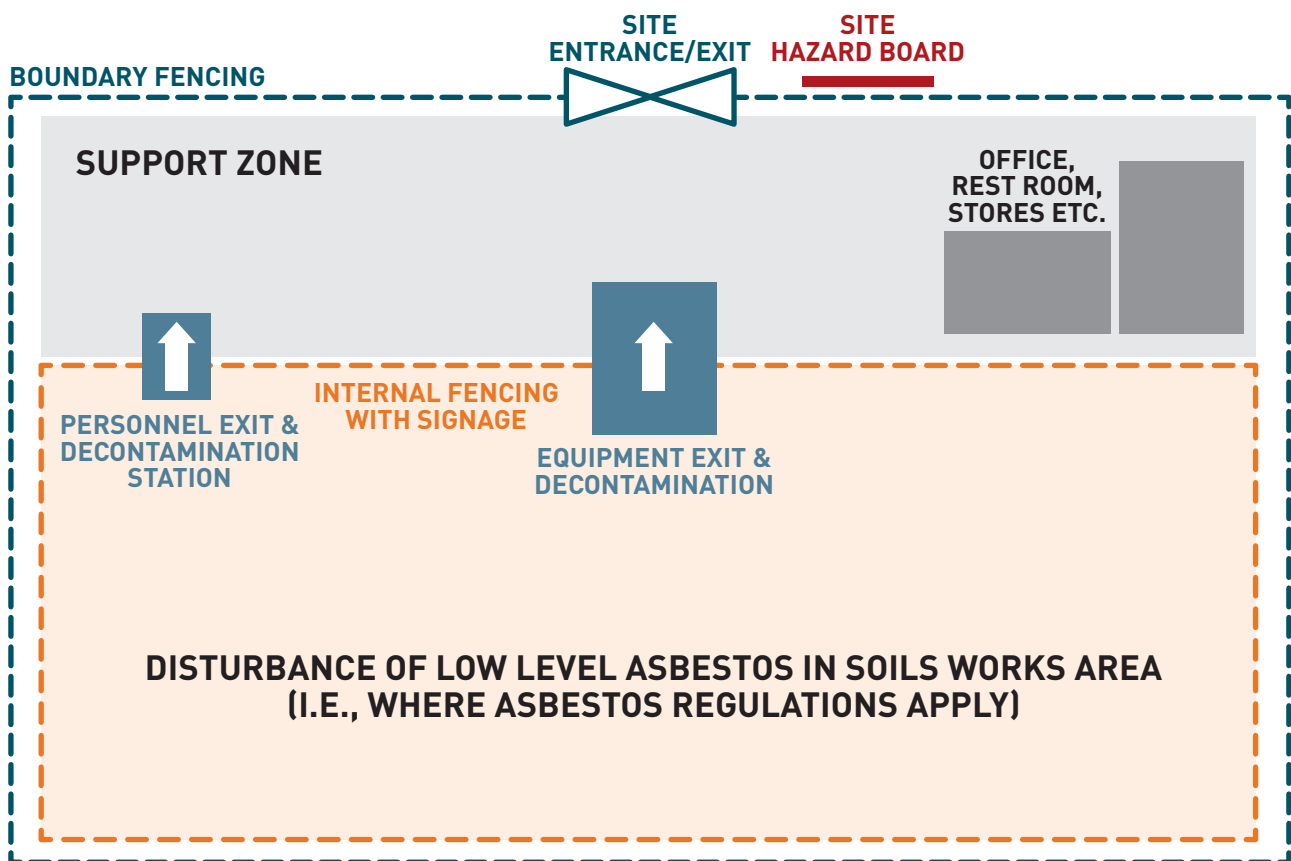
Prior to starting earthworks involving soils containing asbestos, the Contractor shall:

- Erect fencing to separate the asbestos works area and support zone from other LPC activities and internal fencing to demarcate the asbestos works area from the support zone(s). The figure on page 19 illustrates a typical asbestos works area set up. Internal delineation demarcating the asbestos related works area from the support zone can be constructed with ropes and waratahs or other temporary fencing.
- Establish designated exit point(s) for equipment and personnel leaving the asbestos works area to the support zone. The exit point(s) shall allow for



the completion of decontamination procedures before entering the support zone (see below).

- Erect signage on the internal fence (i.e., orange dashed line, figure below) to inform that access is restricted to inducted personnel only and works are subject to Asbestos Regulation 2016 controls. This signage is additional to the Contractor's hazard identification board at the site entrance(s).



4 Personnel Training

The asbestos induction shall be delivered by the Site Controller and Contaminated Land Specialist and include:

- nature and extent of asbestos-in-soil materials;
- site layout/setup including internal separation of asbestos works areas (where the asbestos controls apply) from support zone, as well as and entry/egress points between these;
- personnel decontamination procedures;
- equipment decontamination procedures;
- use of personal protective equipment;

- accidental discovery protocols and emergency procedures for managing unexpected ground contamination.

Drivers **who do not exit their vehicles** while in the asbestos works area do not need to complete the specific asbestos induction, but do need to be aware that they may not leave their vehicle.



5 Air Monitoring

Daily air monitoring shall be undertaken during the first three working days of asbestos works. The purpose of the air monitoring is to confirm the earthworks controls (see Section 7 below) are working effectively. If the works extend to more than three days, additional daily monitoring may be undertaken based on:

- changes in site conditions (e.g., change in nature of materials being handled, weather conditions observed by the Contractor and/or Contaminated Land Specialist);
- changes in works method;
- at the request of LPC.

Undertaking air monitoring during rainfall is not required so long as this is documented, with reasoning, by the Contaminated Land Specialist/competent person.

Air monitoring shall be undertaken by the Contaminated Land Specialist or competent person as detailed in the Asbestos Regulations and the samples analysed at an IANZ accredited laboratory (per Asbestos Regulations, Regulation 3 (1)). Monitoring shall be undertaken in accordance with the procedures of the ACoP (Section 30).

At a minimum, air monitoring shall be undertaken at three stations around the work area at locations determined by the Contaminated Land Specialist/competent person, based on the spatial extent of disturbance works and prevailing wind directions at the time of monitoring. As a minimum the set up shall comprise one upwind station and two stations downwind of the asbestos work area.

Each day's results shall be reviewed against the trace level in air threshold (<0.01 fibres/mL) (Asbestos Regulations (Regulation 3 (1))). If monitoring results are below trace level, the works shall continue following the procedures established. If monitoring results exceed trace level, works shall cease while the Contractor and Contaminated Land Specialist/competent person review the previous day's activities and site conditions to determine if additional procedures are required. Works shall only recommence on LPC's instruction, which will be informed by written advice from the Contaminated

Land Specialist/competent person to LPC on any required changes in earthworks controls.

Further air monitoring shall be undertaken if site conditions or earthworks method change. The Contractor's Site Controller shall inform LPC and the Contaminated Land Specialist/competent person immediately if there is a change in conditions (e.g., implement contingency measures).

6 Personal Protective Equipment

The following asbestos related personal protective equipment (PPE) (based on the Asbestos in Soil Guidelines) is required for all personnel working in the asbestos works area:

For unlicensed asbestos work (based on air monitoring demonstrating less than trace level in air)

- No specific personal protective equipment or respiratory protective equipment.

For asbestos related work

- Disposable coveralls (rated type 5, category 3), or dedicated cloth overalls ¹ for sole use in this works area.
- Overshoes or designated safety boots.
- Disposable gloves (nitrile).
- Disposable P2 dust mask. Note all personnel shall be cleanly shaven if working in the asbestos related works area to ensure the mask provides effective protection (ACoP Section 14.6).

These requirements are in addition to the Contractor's own PPE requirements for its works on site (e.g., hi-visibility clothing, safety boots etc.).

7 Earthworks Controls

The following sub-sections are supplementary to the controls and procedures set out in the CSMP and related solely to the disturbance of low level asbestos in soil materials.

7.1 Dust Suppression

The dust controls section of the CSMP shall apply to the works, with the primary difference being when low level asbestos soils are being disturbed they will

¹ On completion of the works, these shall be either laundered in accordance with Asbestos Regulations – Regulation 53 (3), or disposed offsite as asbestos waste.



be subject to active dust control at all times, not just an ad hoc manner (i.e., the direct and continuous application of mist and/or water). The following additional considerations are applicable based on the level of asbestos in soil and condition of the materials being disturbed (e.g., moisture content):

- The Contaminated Land Specialist shall advise the Contractor if the use of proprietary dust suppressants is necessary to manage the potential for the generation and discharge of dust from the earthworks and stockpiles.
- The Contractor's Site Controller shall continually observe for dust generation and implement further wetting (i.e., addition of more water) as necessary during the works, but avoid the generation of run-off from the site. The required visual monitoring of dust applies to activities such as, but not limited to, loading of asbestos contaminated materials into trucks, tipping from trucks and blading/grading. Works shall cease if the Contractor's Site Controller and/or LPC (or their delegated party) acting on advice from the Contaminated Land Specialist deem wind conditions are too strong to manage potential discharge of dust from the asbestos related works.

7.2 Excavation, Loading & Unloading

Disturbance of low level asbestos in soil materials, including excavation and loading into trucks for transport shall be conducted in accordance with the CSMP general soil handling procedures (Section 3). Loading shall be undertaken with continuous application of mist/water to prevent dust generation. All trucks moving low level asbestos soils shall be covered before setting off (e.g., with tarpaulin). Before trucks that have been used for moving low level asbestos in soil materials can be used for moving other (non-contaminated) materials they will be decontaminated following the procedures detailed in Section 8.2 below.

7.3 Offsite disposal of asbestos waste materials

The following asbestos waste materials generated from the works shall be disposed offsite to a licensed facility approved to accept asbestos materials. Materials generated by the disturbance of low level asbestos in soils include:

- disposable coveralls, gloves, P2 masks;
- wet wipes used for decontamination, wiping down equipment;
- non-woven geotextile, AP60 (if used) used in decontamination stations;
- sediment from boot wash station.

Waste materials (e.g., spent PPE, decontamination materials) shall be stored in proprietary asbestos waste bags or dedicated lined skips prior to offsite disposal (per ACoP Section 18.2).

Disposal of asbestos waste materials shall be to a licensed facility approved to accept this waste type.

8 Decontamination Procedures

Personnel, plant and equipment leaving the asbestos works area shall pass through a designated decontamination area and complete the following procedures.

8.1 Personnel Decontamination

Personnel decontamination procedures for exiting the asbestos works areas shall comprise:

For unlicensed asbestos work

- Cleaning of footwear or removal and storage for re-use.

For asbestos related work

- Cleaning of footwear or removal and storage (subsequently donning suitable footwear for working in support area as prescribed by the Contractor) at the designated exit point. Cleaning shall be by low pressure hose or two stage bootwash.
- Wash or wet wipe hands before leaving area. Any waste materials shall be stored in suitable bag/container for offsite disposal as asbestos waste.



8.2 Equipment Decontamination

All equipment and plant (e.g., excavator, hand tools) used in the works areas (either unlicensed asbestos work or asbestos related work) shall be decontaminated before exiting the area. A designated decontamination area shall be established as follows:

- Place non-woven geotextile (e.g., Biddim™) approximately 5 m x 5 m in plan on flat ground and secure at edges (e.g., peg or sand bag).
- Depending on quantity of traffic using the pad, Contractor could consider placing either steel plates, or approximately 150 mm thick layer of AP60 onto the geotextile with approximately 1 m of geotextile extending beyond plates/gravel.
- Equipment drives onto prepared pad and is hosed down (i.e., low pressure water supply only) to systematically remove all soil materials from the equipment's exterior (e.g., wheels, tracks, buckets). The washing shall be undertaken with care to prevent water and washed off materials overshooting geotextile cloth area. The geotextile and if used, AP60, shall be disposed as asbestos waste.
- The interior of cab shall be wet wiped down. Used wet wipes shall be disposed as asbestos waste.
- Cleaned equipment shall be inspected by the Contaminated Land Specialist or competent person to confirm decontamination completed to required level. The equipment can then drive into the support zone and is ready to undertake other tasks on or offsite.

9 End of Asbestos Works Controls

Controls and procedures described above in Sections 3 to 8 inclusive shall cease to apply when:

Soil Disturbance

- asbestos contaminated soils have been capped with a minimum of 200 mm of non-asbestos containing materials; or
- complete removal of the low level asbestos in soil materials, i.e., change in strata; or
- validation sampling and laboratory analysis undertaken/scheduled by the Contaminated Land Specialist records non-detects for asbestos in soil.

Contractor Demobilisation

Asbestos related controls shall cease to apply for the Contractor when:

- all soil disturbance work is complete (as above); and
- equipment has been decontaminated and inspected by the Contaminated Land Specialist/competent person; and
- waste materials from the decontamination pad and/or personnel decontamination process have been removed from the works area.

Works Verification Reporting

The existing controls from Section 6 of the CSMP shall apply.



APPENDIX C

WORKS VERIFICATION FORM



SECTION 3 CONTAMINATED SOIL WORKS VERIFICATION FORM CATEGORY 3 SITES

Job name:		
Location:		
Dates and duration:		
Summary of works:		
Contaminated soil/water identified? (If yes, detail actions undertaken):		
Material disposed (fill name and volume disposed):	Cleanfill: Landfill:	
Imported material	Source: Volume:	
Test results (including validation sampling):		
Form completed by:		Date:
Contractor's Project Manager:		Signed:
Contaminated Land Specialist:		Signed:



APPENDIX D

INCIDENT & MONITORING REPORTING FORM



INCIDENT REPORTING FORM

In the event of an incident, the following steps are to be taken:

- stop work in the immediate vicinity of the contamination incident and isolate the area by taping, coning or fencing off
- advise the Site Manager who is then to advise LPC and the Contaminated Land Specialist
- implement contaminated soil Health & Safety procedures as per the SMP
- implement surface water, sediment, dust and other controls as required as per the SMP
- update the Hazard Board as required
- implement specific controls as advised by the Site Manager and Contaminated Land Specialist
- ensure monitoring and disposal records are kept, including the form below:

Task	Details	Date/Time & Person
Isolate area of contaminated incident	Materials used, areas:	
Arrange disposal of contaminated material offsite as required	Disposal location and volumes:	
Implement additional controls as per the SMP and as advised by the Site Manager and Contaminated Land Specialist	Additional control details:	
Monitoring of water/air/soil (to be done by Contaminated Land Specialist)	Monitoring results:	
Notify Christchurch City Council and ECan as required	Person/team notified from CCC: ECan:	
Incident resolved and site returns to normal	How did resolution occur, what additional actions were taken:	



MONITORING FORM

This form can be used for soil testing, water testing or air monitoring:

Date / Time	Parameter / location monitored	Who by	Site results / observations	Lab results (if applicable)	Comments





4.0

TECHNICAL SECTION

ARCHAEOLOGY





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4.1 INTRODUCTION

This Technical Section provides guidance to Contractors in regards to archaeological sites, and to help them prepare the archaeology sections of their CEMP.

Please note, throughout this Section, any references to 'you' or 'your' are directed at the Contractor.

An archaeological site is defined as any place in New Zealand (including buildings, structures or shipwrecks) that was associated with pre-1900 human activity, where there is evidence relating to the history of New Zealand that can be investigated using archaeological methods.

It is illegal to destroy or damage an archaeological site unless under the direction of an approved archaeologist (see below, roles and responsibilities).

Lyttelton Harbour/Whakaraupō has been the site of human activity for over 800 years. The first occupants of the area were Waitaha, followed by Ngāti Māmoē in the 16th century. Ngāti Māmoē was eventually displaced in the 18th century by Ngāi Tahu, who established a settlement at Rāpaki. Whakaraupō and the Port Hills remain important mahinga kai (food gathering places) for local Māori. Māori archaeological sites in the vicinity of the Port include a historic market area, several whare (dwellings) and pre-European fishing villages.

By 1849 the proposed site for the town of Lyttelton had been chosen as a port. 1850 saw the arrival of the immigrants coming ashore at the Port. Lyttelton began to grow and a number of reclamations of the foreshore were undertaken that radically altered the shape of the shoreline around the Port. Prior to the 2010–2011 Canterbury earthquakes, the Port's most recent reclamation was Cashin Quay, opened in 1964.

An archaeological assessment commissioned by LPC¹ has found 60 pre-1900 archaeological sites within the boundaries of the Lyttelton Port of Christchurch.

LPC operate under a Global Archaeological Authority across the majority of the Port which allows for the modification of archaeological sites. The Global Authority includes specific conditions which LPC and its Contractors must comply with. This includes working with an archaeologist to ensure information about these sites is recorded before they are modified or destroyed. When working outside areas covered by the Global Authority a separate approval must be obtained. Please contact your LPC Project Manager if you are unsure if your works site is covered by the Global Authority.

The Section sets out:

- your role as the Contractor, and that of the archaeologist in relation to archaeological sites;
- where the high risk areas/sites are;
- the relevant regulatory requirements in relation to archaeological sites;
- performance criteria in regards to working with archaeological sites;
- a list of possible construction activities that may impact archaeological sites; and
- mitigation measures for managing impacts on archaeological sites, including details on how and when to engage an archaeologist, and the advice they can provide.

This Section is designed to work through from start to finish. Further information, relevant for the archaeologist, is provided in the Appendices. A flowchart summarising the content of each Section is provided over the page

¹ Carter, M., 2014. Lyttelton Port of Christchurch (LPC) Reconstruction: An Archaeological Assessment. Unpublished report for Lyttelton Port Company.



ASSESSMENT



4.2 ROLES & RESPONSIBILITIES

Lists what is the responsibility of the Contractor, the archaeologist and the LPC Project Manager.

4.3 SETTING

Provides a brief description of the archeological context at the Port.

4.4 RISK ASSESSMENT

Steps you through deciding if archaeological risk is high/medium/low for your project.



DESIGN



4.5 PERFORMANCE STANDARDS

What your control measures have to achieve.

4.6 CONTROL MEASURES

What to do for low/medium/high risk projects. For medium and high risk projects these are specified by the archaeologist.



OPERATION



4.7 MONITORING REQUIREMENTS

These will be specified by the archaeologist.

4.8 REPORTING REQUIREMENTS

If an accidental discovery is made the Contractor must inform the archaeologist immediately.

4.9 PROJECT CLOSURE

Reinstatement and post-project reporting requirements.

4.10 CONTINGENCY MEASURES

Details the Accidental Discovery Protocol (ADP). This is to be implemented if you suspect you have discovered an archaeological site.



4.2 ROLES & RESPONSIBILITIES

4.2.1 CONTRACTOR

- If your site is in a red risk area you must contact the archaeologist as early as possible, and at least **three weeks** prior to any works that may damage or destroy a known or unknown archaeological site.
- Work with the archaeologist to assess the risk of your works and the associated control procedures.
- Document archaeological mitigation requirements in your CEMP (Heritage New Zealand requirements are detailed in Appendix 4A).
- Implement the control measures at all times. All Contractors and sub-contractors have a legal obligation to stop work and inform the project archaeologist of the discovery of any suspected archaeological sites. Failure to take these steps can result in prosecution of the specific Contractor/sub-contractor involved:
 - If you are working under an Accidental Discovery Protocol¹ (ADP) you must contact the archaeologist if archaeological material is encountered during the works.
 - If a cultural monitor is required, you must meet those costs.
 - If an archaeologist is required, you must meet those costs.
- On rare occasions, when works are within an archaeological site outside the scope of the Global Archaeological Authority, provide input (likely on methodology) to the archaeologist for their application to obtain a separate Archaeological Authority.

¹ Accidental Discovery Protocol is the process to follow if you suspect you have encountered an archaeological site.



4.2.2 ARCHAEOLOGIST

- Ensuring the requirements of the Global Archaeological Authority¹, and archaeological mitigation requirements in the CEMP are complied with.
- Deciding what control methods are appropriate to meet requirements of the Authority to mitigate the damage or destruction of archaeological sites.
- In conjunction with the site foreman, engineers and/or Project Manager(s), direct works in relation to archaeological sites.
- Stop works if they are impacting archaeological sites.
- Notifying the HNZPT regional archaeologist of any significant archaeological finds.
- Responsible for all artefacts recovered from the site (see Appendix 4B).
- Producing a report on the archaeological work at the completion of each major project and a final report within 12 months of the completion of the on-site archaeological work.
- If works are within an archaeological site outside the scope of the Global Archaeological Authority, prepare and obtain a separate Archaeological Authority with input from the Contractor.

4.2.3 LPC PROJECT MANAGER

- In conjunction with the archaeologist, site foreman, and engineers, direct works in relation to archaeological sites.
- Notify Te Hapū o Ngāti Wheke at least one month prior to works commencing if they are in an area with a high likelihood of disturbing a Māori archaeological site (see Map 2). Must provide Te Hapū o Ngāti Wheke with details of the nature, scale and duration of the activity.
- If a cultural monitor is required, liaising with them and the Contractor so that the archaeologist, and the cultural monitor are on-site while relevant works are occurring.
- Notifying Te Hapū o Ngāti Wheke of any Māori archaeological finds.
- If works are within an archaeological site outside the scope of the Global Archaeological Authority, work with the archaeologist to prepare and obtain a separate Archaeological Authority with input from the Contractor. Time frames for this process may be several months and this process should be initiated as soon as possible.

The contact details for a Heritage New Zealand approved archaeologist is in Section 4.6.2. It is recommended that the same archaeologist is used for all works at the Port, to ensure consistency and efficiency.

¹ A Global Authority provides conditions which all works that could impact archaeological sites at the Port must comply with.



4.3 SETTING

An archaeological assessment commissioned by LPC¹ has found a total of 60 pre-1900 archaeological sites within the boundaries of the Lyttelton Port of Christchurch. These sites are evidence of both Māori and European activity in the area. An historical summary is provided in Appendix 4C and a summary of known sites is provided in Appendix 4D. The summary includes the sites name, date, a statement of its archaeological values and brief recommendations for management.

Due to their high archaeological values, five of the 60 archaeological sites recorded within the boundaries of Lyttelton Port are not included in the global authority (see Map 2). This means that an authority to disturb these sites must be obtained from Heritage New Zealand separately.

In addition there are three areas where there is a high risk of finding a Māori archaeological site have been identified (see Map 2). If the proposed works are within any of these areas, the LPC Project Manager will contact Ngāti Wheke at least 1 month before the works commence to ascertain whether a cultural monitor will be required in addition to an archaeologist.

¹ Carter, M., 2014. Lyttelton Port of Christchurch (LPC) Reconstruction: An Archaeological Assessment. Unpublished report for Lyttelton Port Company.





4.4 RISK ASSESSMENT

Any works that require excavation or will impact structures or buildings within the areas of the Port have the potential to impact archaeological sites. The risk assessment is required to ensure there is a comprehensive assessment of potential adverse effects.

You need to rank archaeological risk as high or low for your project. The ranking will be translated into your CEMP as a **red (high)** or **green (low)** box where specified in the template. To make this assessment you need to rank your project against each of the criteria in the table below.

If your project rates 'high' for one of the criteria below your project's overall archaeological risk rating is high. If both criteria are 'low' then the risk rating is also low.

Low risk projects **do not** require further archaeological consideration. For low risk projects, just detail the risk assessment in the CEMP.

Archaeological Risk Assessment

CRITERIA	RISK	
	LOW	HIGH
Archaeological sites	Works to be undertaken in green area.	Works to be undertaken in a red area or a white area with red marker.
Māori archaeological sites	Works outside the areas with a high probability of finding a Māori archaeological site.	Works in an area with a high probability of finding a Māori archaeological site (see Map 2).

¹ Contaminating activities referred to are activities which appear on the Hazardous Activities and Industries List (HAIL). The NES Soil regulations do not apply to non-HAIL land.



Technical Section 4.0 Archaeology

MAP 1: Archaeological Risk Zones

Source: Underground Overground Archaeology







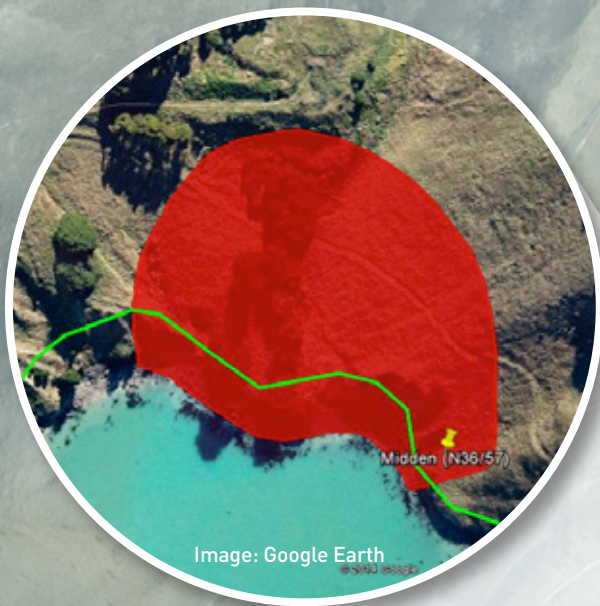
Technical Section 4.0 Archaeology

MAP 2: Māori Archaeological Risk Zones

Source: Underground Overground Archaeology

There is a high risk of finding a Māori archaeological site in the red area.





There is a high risk of finding a Māori archaeological site in the red area.

The high risk area associated with recorded site M36/42 (a destroyed adze cache).



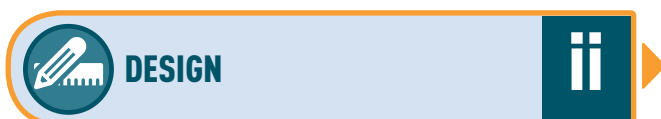
0 100 200 300 400 500 m



4.5 PERFORMANCE STANDARDS

All work must be undertaken in a manner that ensures compliance with all authority requirements under the Heritage New Zealand Pouhere Taonga Act 2014. All construction works and equipment will be operated, maintained, supervised, monitored and controlled at all times, so that any impact on archaeological sites is minimised and archaeological information is not lost.

LPC has a Global Authority to manage the reconstruction and development works at the Port in relation to archaeological sites. The Global Authority outlines conditions that you as the Contractor must comply with, in conjunction with the archaeologist, to mitigate the damage or destruction of archaeological sites.



4.6 CONTROL MEASURES

Table below details what controls are required to achieve the performance standards discussed earlier.

The control measures required depend on the risk rating from Section 4.4:

- Low risk projects need to detail the risk assessment in the CEMP template, but have no additional controls, monitoring or reporting requirements.
- For high risk projects, project specific controls will be determined by the archaeologist for high risk activities. Some typical control measures are detailed in Appendix 4D.

Control Measures

CONTROL MEASURE	RISK	
	LOW	HIGH
Detail risk assessment in the CEMP template.	✓	✓
Include the ADP in your CEMP in the contingency section.	✓	✓
Engage an archaeologist 3 weeks before works start. They will compile a list of appropriate mitigation measures (indicative list in Appendix 4D).		✓
Incorporate archaeologist advice and mitigation measures into the CEMP.		✓
Implement archaeological control measures in the CEMP.		✓
NOTE: LPC Project Manager to consult Ngāti Wheke if the works are in an area with a high probability of finding a Māori archaeological site (red in Map 2).		✓
Awareness training for project team.		✓



4.6.1

WHICH MEASURES ARE REQUIRED FOR YOUR ACTIVITY

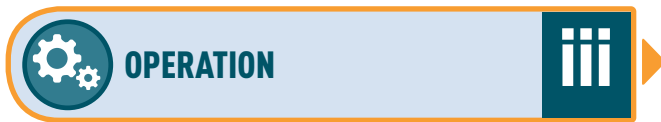
In all cases where an archaeological site will be damaged or destroyed, mitigation will be required. The control measures selected by the archaeologist will be based on the significance of the archaeological site and the nature of the activities proposed. You will have to implement the controls specified by the archaeologist.

Appendix 4D provides a summary of the known archaeological sites at the Port and an initial assessment of control measures that may be appropriate for each site should they be affected by works.

4.6.2

ARCHAEOLOGY CONTACT DETAILS

ROLE & ORGANISATION	NAME	EMAIL	PHONE
Archaeologist: Underground Overground Archaeology Ltd	Katharine Watson	katharine.watson@underoverarch.co.nz	027 656 3985
Regional Archaeologist: Heritage New Zealand	Frank van der Heijden	ArchaeologistCW@heritage.org.nz	03 365 9615 027 688 9741
Pouarahi/Māori Heritage Advisor: Heritage New Zealand	Huia Pacey	hpacey@heritage.org.nz	03 365 9620 027 249 3604
Contact person: Te Hapū o Ngāti Wheke	Kopa Lee	kopa.lee@ngaitahu.iwi.nz	03 974 0194 021 917 305



4.7 MONITORING

There are no monitoring requirements for low risk activities.

Project specific monitoring requirements for high risk activities will be specified by the archaeologist, but are likely to include archaeological monitoring during earthworks. This requires an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it may then need to be archaeologically excavated.



4.8 REPORTING DURING WORKS

No reporting requirements for low risk activities.

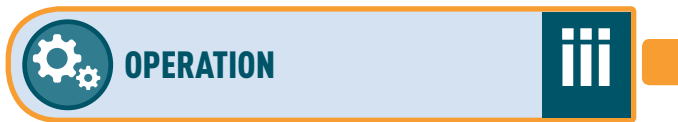
If an accidental discovery is made you must notify the archaeologist immediately in accordance with the accidental discovery protocol. The archaeologist will provide an on-site briefing for Contractors about the archaeological work required and how to identify archaeological sites during works.

The archaeologist will inform the LPC Project Manager of any accidental discoveries.

4.9 PROJECT CLOSURE

Not required for low risk activities.

In addition to any reinstatement required under the CEMP (will be specified by the archaeologist), if archaeological mitigation has been required during your works, the archaeologist is required to complete a final report to the satisfaction of Heritage New Zealand Pouhere Taonga. Reporting requirements are outlined in Appendix 4E.



4.10 CONTINGENCY: ACCIDENTAL DISCOVERY PROTOCOL

The accidental discovery protocol applies across the Port in areas with low and high risk activities. In the event of any discovery of a suspected archaeological site, the worker/Contractor shall take the following action:

- Cease all works immediately within a 20 m radius.
- Advise the site supervisor of a find.
- The site supervisor shall contact the appointed archaeologist, who will advise on the significance of the find and outline what steps are to be taken. In all instances, the appointed archaeologist will advise Heritage New Zealand Pouhere Taonga of the discovery.
- The archaeological site will be recorded and excavated in accordance with standard archaeological practice.
- In the event of a Māori archaeological site being found, Te Hapū o Ngāti Wheke will be advised of the find and will be consulted with regard to any matters of tikanga in relation to the discovery.
- In the case of uncovering kōiwi (human remains), Te Hapū o Ngāti Wheke, Heritage New Zealand and the New Zealand Police must be contacted. Te Hapū o Ngāti Wheke will be consulted with regard to any matters of tikanga in relation to the discovery.
- In the event of the discovery of kōiwi tangata (human remains), discussions about the future of the site shall be entered into by Te Hapū o Ngāti Wheke and LPC (or their nominated representative). All parties shall work towards operations recommencing in the shortest possible time frames.



4.11 REFERENCES

- Carter, M., 2014. Lyttelton Port of Christchurch (LPC) Reconstruction: An Archaeological Assessment. Unpublished report for Lyttelton Port Company.
- HNZPT, 2014. Guidelines for the investigation and recording of buildings and standing structures. Archaeological Guidelines Series. Heritage New Zealand, Wellington.



4.12 APPENDICES



APPENDIX 4A

HERITAGE NEW ZEALAND REQUIREMENTS

Heritage New Zealand Pouhere Taonga (HNZPT) requires that the archaeologist cover the following details in the archaeological management plan (incorporated in the CEMP):

- The role, responsibility and level of authority of the project archaeologist.
- Methods to protect any archaeological sites or features.
- The procedures for any archaeological investigation or recording of archaeological information.
- Requirements for stand down periods to enable archaeological work.
- The time frames for archaeological work.
- The protocols for the unexpected discovery of archaeological material.
- On-site briefing by project archaeologist for Contractors about the archaeological work required and how to identify archaeological sites during works.
- The responsibilities of Contractors with regard to notification of the discovery of archaeological evidence.
- The procedures for the management and safekeeping of any artefacts recovered during the exercise of this authority.
- Mechanisms for dispute resolution.
- Emergency contact details for the project archaeologist, Heritage New Zealand Regional Archaeologist and Te Hapū o Ngāti Wheke.



APPENDIX 4B

MANAGEMENT OF ARTEFACTS

All artefacts recovered from the site will be managed by the archaeologist in accordance with the policies and procedures outlined in Underground Overground Archaeology's artefact management plan. The relevant sections of this plan are summarised below. Please note that management of kōiwi (human remains), shall be in accordance with the accidental discovery protocol, Section 9.10.

Māori Artefacts

In the event that taonga tūturu are found, the following steps will be taken:

- Heritage New Zealand and Te Hapū o Ngāti Wheke will be notified.
- Te Hapū o Ngāti Wheke will be kept informed of all developments with regard to the taonga tūturu and will be given the opportunity to inspect it, as well as to advise on tikanga, including with regard to storage.
- The taonga tūturu will be labelled and bagged appropriately on site, and the bag will be labelled "contains taonga tūturu".
- The taonga tūturu will be returned to the offices of Underground Overground Archaeology (Unit 8, 31 Stevens Street, Christchurch) at the end of the day, boxed and entered into the artefact management database. The box and database will both record the presence of taonga tūturu.
- The excavation of taonga tūturu is to be notified to the Ministry of Culture and Heritage (MCH) within 28 days of being found or within 28 days the end of the excavation (whichever is the longest).
- A 'Z' registration number will be issued after the details of the find have been confirmed and approved.
- The artefact bag will be labelled with the 'Z' number and the 'Z' number will be added to the artefact spreadsheet.
- While custody or ownership is being determined, taonga tūturu will be stored in a location determined in conjunction with HNZPT, Te Hapū o Ngāti Wheke and other relevant parties.

In the event that other Māori archaeological material is found (such as midden), the following steps will be taken:

- HNZPT and Te Hapū o Ngāti Wheke will be notified.
- Te Hapū o Ngāti Wheke will be kept informed of all developments with regard to the material and will be given the opportunity to inspect it, as well as to advise on tikanga, including with regard to storage.
- The material will be labelled and bagged appropriately on site.
- The material will be returned to the offices of Underground Overground Archaeology (Unit 8, 31 Stevens Street, Christchurch) at the end of the day, boxed and entered into the artefact management database.
- The artefacts will be analysed and the data entered into an Excel spreadsheet, which will be appended to the final report.
- The archaeological value of the artefacts will be determined. If they are found to be of medium or high archaeological value, HNZPT and the Canterbury Museum will be notified.
- Long-term storage options will depend on the value of the archaeological assemblage and will be determined in conjunction with Te Hapū o Ngāti Wheke, HNZPT, Canterbury Museum and LPC (although taonga tūturu are legally the property of the Crown, other Māori archaeological material is not).



European Artefacts

- European artefacts will be labelled and bagged appropriately on site.
- They will be returned to the offices of Underground Overground Archaeology (Unit 8, 31 Stevens Street, Christchurch) at the end of each day, boxed and entered into the artefact management database.
- The artefacts will be analysed and the data entered into an Excel spreadsheet, which will be appended to the final report.
- The archaeological value of the artefacts will be determined. If they are found to be of medium or high archaeological value, HNZPT and the Canterbury Museum will be notified.
- Long-term storage options will depend on the value of the archaeological assemblage and will be determined in conjunction with the landowner (non-Māori artefacts are legally the property of the landowner), HNZPT and the Canterbury Museum.



APPENDIX 4C

HISTORICAL SUMMARY

Māori Settlement

Lyttelton Harbour/Whakaraupō has been the site of human activity for over 800 years. The first occupants of the area were Waitaha, followed by Ngāti Māmoe in the 16th century. For Ngāti Māmoe the area surrounding Lyttelton, which they named Ōhinehou, was a mahinga kai (food gathering place). Ngāti Māmoe was eventually displaced in the 18th century by Ngāi Tahu, who established a settlement at Rāpaki.

Māori travelled backwards and forwards across the Port Hills, between the settlements around Whakaraupō and the settlements and resources on the inland side of the hills. Both the Port Hills and Banks Peninsula provided access to forest-related resources, including a rich bird life. By the time the first Europeans arrived in the area the settlement at Ōhinehou appears to have been abandoned.

By the 1820s the Ngāi Tahu population of Banks Peninsula was in decline due to the Kai Huanga feud. The population suffered a further decrease in the 1830s following the massacres of the Ngāti Toa war chief Te Rauparaha. By this stage there had been a migration of populations to the Horomaka harbours frequented by trading vessels and whaling ships, particularly to Akaroa, Port Levy/Koukourarata, and Lyttelton Harbour/Whakaraupō.

During this early period of Māori-European interaction, local Māori had a market area – and several whare – at the east end of Norwich Quay (now recorded as archaeological site M36/229). This was subsequently moved to the west end of the original foreshore, around the corner of Norwich Quay and Dublin Street, including Sutton Reserve and the area around the Moorhouse tunnel mouth. Both these areas were also the site of fishing villages before European arrival in the area.

European History

In 1848 Captain Joseph Thomas was sent by the Canterbury Association to survey the region and plan the new settlement of Lyttelton. By 1849 the proposed site for the town had been surveyed and it was officially gazetted as a port of entry. The following year saw the arrival of the first four ships that brought the Canterbury Association's first settlers to Canterbury with the immigrants coming ashore at the Port.

From this time the Port and town of Lyttelton began to expand with the construction of jetties, wharves, warehouses, hotels, commercial premises and houses. Against the backdrop of these developments, plans were also being made to connect the Port to Christchurch via railway. Work began on the tunnel in 1860 and was completed in 1867. In conjunction with the tunnel, a number of reclamations of the foreshore were undertaken that, over the next 65 years, radically altered the shape of the shoreline around the Port.

Between 1867 and 1876 the Naval Point and Officers Point breakwaters were constructed, enclosing the inner harbour into the shape that it is today. The increasing volume of shipping entering the Harbour meant that additional wharfage was required and as a result a number of wharves, piers and breastworks were built around the inner harbour from 1867 to 1885.

In 1876 the Provincial Government was disestablished and the Lyttelton Harbour Board took over the management of the Port. One of their first major projects was the construction of the £92,000 graving dock in 1878. As well as Harbour improvements, the 1880s also saw the installation of military defences including the battery and associated infrastructure at Battery Point in 1885.

The dawn of the 20th century was marked by Lyttelton being the Port of operations for three expeditions to Antarctica, culminating in Robert Falcon Scott's ill-fated 1910–1912 voyage. Work at the Port continued with the repair and maintenance of



the various wharves and the completion of the Naval Point reclamation in 1925. A new reclamation project, situated between Windy Point and Gladstone pier, started in 1957. The new eastern reclamation, named Cashin Quay, was opened in 1964. This quay provided the ample space required for the newly implemented cargo containers and in 1973 the container wharf was opened. At the time Lyttelton, along with Port Chalmers, was one of only two cargo container ports in the South Island.

The Lyttelton Harbour Board continued to manage the Port until October 1989 when the organisation was disestablished by the Port Companies Act 1988 and taken over by the Lyttelton Port Company. Despite the damage caused by the 2010–2011 Canterbury earthquakes, the Port of Lyttelton continues to operate in its original role as an export and import zone between the South Island and the rest of the world.



APPENDIX 4D

PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION

Principal Control Measures for Managing Archaeological Sites

There are ten principal control measures for managing archaeological sites:

- **Exclusion from global authority:** due to their high archaeological values, five of the 60 archaeological sites recorded within the boundaries of Lyttelton Port were not included in the global authority (see Map 1). A separate authority is required to work in these areas.
- **Archaeological excavation:** any in situ archaeological features will need to be excavated using standard archaeological techniques. If possible, consideration should be given to undertaking this work prior to the beginning of LPC works at the site.
- **Archaeological monitoring:** during earthworks that may impact an archaeological site an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will then need to be archaeologically excavated.
- **Archaeological survey:** prior to earthworks the area will need to be visited and inspected by an archaeologist. Once this has been undertaken it will be able to be ascertained if further archaeological excavation or monitoring will be required.
- **Accidental discovery protocol:** a set of procedures outlining what steps a Contractor must take if archaeological features are accidentally encountered during any works.
- **Do not disturb:** the site should not be damaged, destroyed or modified in any way. Any planned works should be redesigned to avoid impacting the site.
- **Leave foundations in situ:** the remains of the building should not be damaged, destroyed or modified in anyway.
- **Level III recording:** where a structure of archaeological or heritage significance is to be damaged, destroyed or modified it will need to be recorded using: measured drawings of selective elevations, written records, photography and selective sampling of relevant materials (NZHPT 2014).
- **Site visits:** the archaeologist will need to physically inspect the site during earthworks at appropriate intervals as decided by the archaeologist.
- **Sympathetic reinstatement:** where heritage items are to be moved in order for reconstruction or repair works to be undertaken they should be reinstated in as similar setting as possible.

This is not an exhaustive list, and there may be additional measures that are deemed appropriate at the project archaeologist's discretion. How these control measures may be enacted on particular sites is outlined below

Methods to Protect Archaeological Sites & Features

In the first instance, consideration should be given to preserving archaeological sites in situ. Where this is not possible, impact to archaeological sites will be minimised by only disturbing those areas necessary to undertake the repair and reconstruction projects. Additionally, five of the 60 archaeological sites recorded within the boundaries of Lyttelton Port were excluded from the global authority application. This is largely because of the high archaeological value of the sites.

If significant archaeological material is exposed during any works that may impact archaeological sites, discussion will be entered into with Heritage New Zealand Pouhere Taonga, Ngāti Wheke and LPC with regard to preserving the site in situ.



Procedures for Archaeological Investigation

For each site a provisional procedure for archaeological investigation is outlined in the Table over the page. These recommendations are based on

the information currently available and will potentially change as more information becomes available through the archaeological investigations.

Recorded archaeological sites and the procedures for their archaeological investigation:

NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Ōhinehou (1465–1660) (M36/229)	High	<p>In the first instance, consideration should be given to preserving the site in situ. If earthworks are required that could destroy or damage any archaeological material, including the two features left in situ at 7 Norwich Quay, these features will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples, including (where possible) material for radiocarbon dating and/or soil samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice, including (where possible) obtained radiocarbon dates. <p>A cultural monitor may also need to be present during this work. If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Midden (pre-1769) (N36/57)	If destroyed, none. Otherwise, medium-high.	<p>If earthworks are proposed in this area, it will first need to be inspected to establish whether or not any archaeological evidence is visible. Depending on the location of the earthworks proposed, an archaeologist may need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples, including (where possible) material for radiocarbon dating and/or soil samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice, including (where possible) obtained radiocarbon dates. <p>A cultural monitor may also need to be present during this work. If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Musket trenches (pre-1900) (N36/106)	High	<p>This site should be preserved in situ and is thus excluded from the global authority application. If LPC are proposing works that will affect the site, a separate archaeological authority will be required. As this is a high value archaeological site, with identified physical remains, it should not be destroyed, damaged or modified.</p>
Canterbury Association's boathouse (1849) (M36/292)	<p>If destroyed, none.</p> <p>Otherwise, high.</p>	<p>If any works are planned that may destroy, damage or modify the area within the vicinity of the Canterbury Association's boathouse an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Erskine Bay sea wall (1849) (M36/293)	High	<p>This is a high value archaeological site but it is not known whether or not any archaeological fabric remains in situ. Any earthworks in this area will require an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Government wharf (1849) (M36/294)	If destroyed, none. Otherwise, high.	<p>This is a high value archaeological site but it is not known whether or not any archaeological fabric remains in situ. If any works are planned that may destroy, damage or modify the area within the vicinity of the Government wharf an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Canterbury Association's store (1850) (M36/291)	If destroyed, none. Otherwise, medium-high.	<p>This is a high value archaeological site but it is not known whether or not any archaeological fabric remains in situ. If any works are planned that may destroy, damage or modify the area within the vicinity of the Government wharf an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
First post office (1851) (M36/295)	If destroyed, none. Otherwise, medium-high.	<p>If any works are planned that may destroy, damage or modify the area within the vicinity of the First post office an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Henry Le Cren's house & wharf (1850s) (N36/153)	If destroyed, none. Otherwise, high.	<p>This site should be preserved in situ and is thus excluded from the global authority application. If LPC are proposing works that will affect the site, a separate archaeological authority will be required. The area should first be surveyed for any surface evidence of archaeological features that may survive. The results of that survey should then determine the management of any archaeological remains.</p>
John Grubb's slipway and boatyard (1853) (M36/296)	If destroyed, none. Otherwise, medium.	<p>If any works are planned that may disturb the remains of John Grubb's slipway and boatyard an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Peacock's wharf (1857) (M36/297)	If destroyed, none. Otherwise, medium.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the wharf are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Gollans Bay quarry (c.1860) (N36/154)	None	<p>An accidental discovery protocol should be initiated and followed in regard to possible archaeological remains at the site.</p>
J. Drummond Macpherson's store (c.1862) (M36/298)	If destroyed, none. Otherwise, medium.	<p>Any earthworks in this area will need an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Forbes/ Heywood's building (c.1863) (M36/220)	Medium	<p>If any earthworks are planned that may disturb the footprint of the Forbes building, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Heywood's jetty (c.1863) (M36/299)	If destroyed, none. Otherwise, medium.	<p>If any earthworks are planned that may disturb the remains of the jetty an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Breastwork (1866) (M36/301)	If destroyed, none. Otherwise, medium.	<p>If any pre-1900 components of this breastwork are to be modified, they should first be recorded by an archaeologist to a Level III standard (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This recording will enable the phases of construction, development and use of the breastwork to be understood and would also provide information about the relationship between the breastwork and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Railway yard reclamation (1865) (M36/302)	If destroyed, none. Otherwise, medium.	If earthworks that will affect the reclaimed land are to take place, those carrying out the work should be given a briefing on what archaeological features might be encountered and what to do if they are. An accidental discovery protocol should be initiated and followed in regard to possible archaeological remains at the site and site visits should be carried out by an archaeologist during such works. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.
Lighter jetty (1865) (M36/303)	If destroyed, none. Otherwise, medium.	<p>Any earthworks that may disturb the remains of the lighter jetty will need an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Polhill's Bay rifle range (1866) (M36/99)	High	This site should be preserved in situ and is thus excluded from the global authority application. If LPC are proposing works that will affect the site, a separate archaeological authority will be required.
Railway yard (1867) (M36/304)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned that may disturb earlier railway alignments an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Lyttelton Station (1867) (M36/305)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned that may disturb remains of the station an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
No. 2 wharf (1867) (M36/306)	If destroyed, none. Otherwise, high.	<p>If the No. 2 wharf is to be demolished, or requires repairs that would destroy, damage or modify any pre-1900 material it should first be recorded by an archaeologist to a Level III standard (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This recording will enable the phases of construction, development and use of the wharf to be understood and would also provide information about the relationship between the wharf and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Officers Point breakwater (1867–1876) (M36/307)	If destroyed, none. Otherwise, medium.	<p>Where remediation works could provide information relating to the original construction, development and use of the Officers Point breakwater an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
No. 3 wharf (1871) (M36/308)	Medium	<p>If the No. 3 wharf is to be demolished, or requires repairs that would destroy, damage or modify any pre-1900 material, it should first be recorded by an archaeologist to a Level III standard (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This recording will enable the phases of construction, development and use of the wharf to be understood and would also provide information about the relationship between the wharf and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Naval Point breakwater (1872) (M36/309)	If destroyed, none. Otherwise, medium.	<p>Where remediation works could provide information relating to the construction, development and use of the Naval Point Breakwater an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
NZ Loan and Mercantile Company grain store (1872) (M36/310)	If destroyed, none. Otherwise, medium.	<p>Any earthworks in this area will need an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
First eastern reclamation (1873) (M36/311)	If destroyed, none. Otherwise, low-medium.	If earthworks that will affect the reclaimed land are to take place, those carrying out the work should be given a briefing on what archaeological features might be encountered and what to do if they are. An accidental discovery protocol should be initiated and followed in regard to possible archaeological remains at the site and site visits should be carried out by an archaeologist during such works. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.
Boatmen's jetty and slip (1873) (M36/312)	If destroyed, none. Otherwise, low-medium.	<p>If any earthworks are planned in this area, they will need an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Second railway station (1873) (M36/3130)	If destroyed, none. Otherwise, low-medium.	<p>If any earthworks are planned in this area, they will need an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the jetty and slip are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Gladstone pier (1874) (M36/314)	If destroyed, none. Otherwise, medium.	<p>Prior to, and during demolition, the Gladstone pier should be recorded by an archaeologist to investigate the construction, development and use of the pier. The structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This will not only document the stages of construction but also provide information about the relationship between the Gladstone Pier and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
Government sheds (1874) (M36/315)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Short wharf (1874) (M36/316)	If destroyed, none. Otherwise, low-medium.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If archaeological material is encountered it will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Second post office (1875) (M36/230)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the post office are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
No. 6 wharf (1875) (M36/317)	If destroyed, none. Otherwise, medium.	<p>Prior to, and during demolition, any pre-1900 sections of the No. 6 wharf should be recorded by an archaeologist to investigate the construction, development and use of the wharf. Recording of this structure should be to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This recording will enable the phases of construction, development and use of the wharf to be understood and would also provide information about the relationship between the wharf and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Produce sheds (c.1875) (M36/318)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the sheds are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Railway goods sheds (c.1875) (M36/319)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the sheds are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Lighthouse (M36/320)	Medium-high	<p>Prior to any activity (including reinstatement) that may destroy, damage or modify the pre-1900 structure it should first be recorded by an archaeologist. This structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none">• Measured drawings of selective elevations.• Written records.• Photography of selective contextual views, elevations, spaces, fixtures and other features.• Selective sampling of relevant materials. <p>This level of recording would enable the phases of construction, development and use of the lighthouse to be understood and would also provide information about the relationship between the lighthouse and its original setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
Eastern reclamation (1879) (M36/321)	If destroyed, none. Otherwise, medium.	<p>If earthworks that will affect the reclaimed land are to take place, those carrying out the work should be given a briefing on what archaeological features might be encountered and what to do if they are. An accidental discovery protocol should be initiated and followed in regard to possible archaeological remains at the site and site visits should be carried out by an archaeologist during such works. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
No. 1 breastwork (c.1879) (M36/341)	If destroyed, none. Otherwise, medium.	<p>If the No. 1 breastwork is to be demolished, or requires repairs that would destroy, damage or modify any pre-1900 material, it should be recorded by an archaeologist. This structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>Recording to this level would enable the phases of construction, development and use of the breastwork to be understood and would also provide information about the relationship between the No. 1 breastwork and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
Dampiers Bay reclamation (c.1879) (M36/342)	If destroyed, none. Otherwise, medium.	<p>If earthworks that will affect the reclaimed land are to take place, those carrying out the work should be given a briefing on what archaeological features might be encountered and what to do if they are. An accidental discovery protocol should be initiated and followed in regard to possible archaeological remains at the site and site visits should be carried out by an archaeologist during such works. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Graving dock (1879–82) (M36/322)	High	<p>This site is excluded from the global authority application. LPC should discuss any planned works with Heritage New Zealand to see if an archaeological authority is required (this will depend on the nature of the works proposed). To facilitate this LPC should commission a conservation plan that will provide further guidance on how works are best undertaken, and identify which works trigger the requirement for an archaeological authority from Heritage New Zealand.</p> <p>It is recommended that no authority be granted for the demolition of the structure.</p> <p>Where an archaeological authority is required for repair works that will destroy, damage or modify any pre-1900 components of the dock, these should first be recorded by an archaeologist to Level II standard (NZHPT 2014). Any repair works should be monitored by an archaeologist. This recording and monitoring will not only document details of the construction and use of the dock, but also provide information about the relationship between the graving dock and its setting.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
No. 1 wharf (pre-1881) (M36/323)	If destroyed, none. Otherwise, low-medium.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the sheds are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Export shed (pre-1881) (M36/324)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the sheds are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Import shed (pre-1881) (M36/325)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the shed are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
No. 4 wharf (1881) (M36/326)	If destroyed, none. Otherwise, medium.	<p>Prior to, and during demolition, any pre-1900 sections of the No. 4 wharf should be recorded by an archaeologist to investigate the original construction, development and use of the wharf. The structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This will not only document the stages of construction but also provide information about the relationship between No. 4 wharf and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
No. 5 wharf (1881) (M36/343)	If destroyed, none. Otherwise, medium.	<p>Prior to, and during demolition, any pre-1900 sections of No. 5 wharf should be recorded by an archaeologist to investigate the original construction, development and use of the wharf. The structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This will not only document the stages of construction but also provide information about the relationship between No. 5 wharf and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
Graving dock pump house (c.1881–82) (M36/327)	Medium	<p>Given the association of the foundations with the graving dock, in the first instance consideration should be given to preserving the site in situ. If any earthworks are planned that will impact this feature an archaeologist will need to be on site to identify and record the archaeological remains in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice.



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Graving dock jetty (c.1881–82) 9M36/328]	Medium	<p>Where works are required that will destroy, damage or modify any remaining pre-1900 components of the structure. The jetty should be recorded by an archaeologist to investigate the original construction, development and use of the jetty. The structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This will not only document the stages of construction but also provide information about the relationship between the dry dock jetty and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
No. 5 grain store (1882) [M36/329]	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the shed are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Patent slip (1884) [M36/330]	If destroyed, none. Otherwise, low.	<p>If works are to take place in or around the patent slip, those carrying out the work should be given a briefing on what archaeological features might be encountered and what to do if they are. An accidental discovery protocol should be initiated and followed in regard to possible archaeological remains at the site and site visits should be carried out by an archaeologist during such works. Consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Pilgrims Rock (1934) [M36/340]	Low	<p>The rock will need to be removed prior to any work in the area that may affect it. Once any works are completed the monument should either be reinstated or moved to a more suitable location.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
No. 6 breastwork (1884) (M36/333)	Medium	<p>If the No. 6 breastwork is to be demolished, or requires repairs that would destroy, damage or modify any pre-1900 material, it should be recorded by an archaeologist. The structure should be recorded to Level III (NZHPT 2014) which includes, but is not limited to, the following:</p> <ul style="list-style-type: none"> • Measured drawings of selective elevations. • Written records. • Photography of selective contextual views, elevations, spaces, fixtures and other features. • Selective sampling of relevant materials. <p>This would enable the phases of construction, development and use of the breastwork to be understood and would also provide information about the relationship between the No. 1 breastwork and its setting, particularly as part of the broader Port of Lyttelton archaeological landscape. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
Battery Point battery (1885) (M36/93)	High	<p>The buildings that make up this site should be preserved in situ and are thus excluded from the global authority application. A conservation plan of the complex should be completed as soon as possible to aid in the assessment and management of the area in relation to the proposed haul roads and future damage. Any expansion of Port operations towards Battery Point should be designed to avoid any unnecessary impact on the historic area. If LPC are proposing works that will affect the site and historic area, a separate archaeological authority will be required.</p> <p>The damage to the structures caused by their exposure to the marine environment and the Canterbury earthquakes should be examined by an expert in ferro-concrete deterioration to assess the severity of the situation and what remedies may be feasible. Furthermore, damage caused to the structures by water run-off should be reduced and where possible halted through stabilisation works.</p>
No. 7 wharf (1885) (M36/334)	If destroyed, none. Otherwise, low.	<p>Any remains of the original No. 7 wharf are likely to be underwater, or where the wharf met the shore. Any earthworks in the latter area will need an archaeologist to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the wharf are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If below water works could impact any extant remains of the No. 7 wharf, consideration should be given to recording these using the techniques of underwater archaeology. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>



ARCHAEOLOGICAL		
NAME	VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Cast iron drains (c. 1885) (M36/344)	Medium	<p>In the first instance consideration should be given to preserving the drains in situ. If the cast iron drains will be affected by any of the proposed works, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>The extent of investigation and recording will be governed by the extent of the works proposed. The archaeological work required to record this feature could take place before LPC begin works at the site.</p>
Andersons Ltd engineering shop (1886) (M36/335)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the building are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Gladstone Quay wool storage sheds (c.1890) (M36/336)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the sheds are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none">• Mapping the location.• Stratigraphic drawing.• Photography of any archaeological features.• Measurements of any archaeological features.• Recovery of archaeological samples.• Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



NAME	ARCHAEOLOGICAL VALUE	PROCEDURES FOR ARCHAEOLOGICAL INVESTIGATION
Turntable and engine sheds (c.1890) (M36/337)	If destroyed, none. Otherwise, low-medium.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the sheds are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
NZ Loan & Mercantile wool and grain stores (c.1890) (M36/338)	If destroyed, none. Otherwise, low.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the stores are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>
Harbour Board cool stores (1891) (M36/339)	If destroyed, none. Otherwise, low-medium.	<p>If any earthworks are planned in this area, an archaeologist will need to be on site to identify and record archaeological deposits or features that may be uncovered or affected by the works. If remains of the stores are exposed, they will need to be investigated and recorded in accordance with standard archaeological techniques. These include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • Mapping the location. • Stratigraphic drawing. • Photography of any archaeological features. • Measurements of any archaeological features. • Recovery of archaeological samples. • Analysis and investigation of any archaeological samples recovered, in line with standard archaeological practice. <p>If this site is to be disturbed by any earthworks, consideration should be given to carrying out the necessary archaeological work prior to the beginning of LPC works at the site.</p>



Stand-down Periods

Investigating any archaeological discoveries may require a stand-down period. Every effort will be made to minimise this, and opportunities for work to continue in other areas will be investigated. Stand-down periods will be required if kōiwi tangata are found and/or if it becomes apparent that an archaeological investigation could provide significant information as to the historical and cultural heritage of New Zealand under section 52(2) of the Heritage New Zealand Pouhere Taonga Act (2014). Such circumstances may include, but are not limited to, the discovery of an early or significant period in New Zealand's history, the discovery of unusual or rare artefacts or other archaeological material or features, or the discovery of large, complex or unusual features not identified in the archaeological assessment provided with the authority application. In such instances, work will be required to stop and Heritage New Zealand (and when relevant Te Hapū o Ngāti Wheke) must be contacted to discuss the next steps. During this stand-down period, an archaeological assessment, and if deemed necessary by Heritage New Zealand, a research strategy will need to be prepared. Following this, a decision regarding how, and if, work will continue at the site will be made (HNZPT will respond to this notification within five working days of when sufficient information is provided to make a decision)

Time Frames for Archaeological Work

- In the event of the accidental discovery of an archaeological site, the archaeologist will provide advice on how/where work can proceed within half a day, except in the case of kōiwi tangata. Work within 20 m of any kōiwi tangata cannot resume until a response has been received from HNZPT, the New Zealand Police and Te Hapū o Ngāti Wheke.
- The amount of time required to investigate an archaeological site will depend on the extent and significance of the site.

On-site Briefings

All Contractors involved in earthworks will receive a briefing on the following:

- The significance of the Lyttelton area, archaeologically and culturally.
- The role of the HNZPT and the conditions of the archaeological authority.
- What sort of archaeological sites could be expected at the site and what they might look like (photographs will be included in the hand-out).
- What to do if they find an archaeological site.

A hard copy of the briefing will be given to all those who attend it, a laminated hard copy will be kept in the site office and a poster about archaeological sites will be displayed in the site office. Any new staff at the site (who are involved in earthworks or any other activity that may impact subsurface, or standing archaeological sites) will need to be briefed in the same way.



APPENDIX 4E

REPORTING REQUIREMENTS

In addition, the archaeologist is responsible for producing an annual report for Heritage New Zealand and Ngāti Wheke, containing the following:

- A summary of the progress of the project.
- A plan showing where archaeological work was carried out in the preceding 12 months.
- A plan of works that are anticipated to be undertaken in the upcoming 12 months.
- Lists of any archaeological finds or samples taken.
- A brief interpretation of the archaeological results to date.
- The report shall document any breaches of any authority conditions, the nature of the investigations into that breach and the action taken.





5.0

TECHNICAL SECTION

EROSION & SEDIMENT CONTROL





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5.1 INTRODUCTION

This Technical Section provides guidance to Contractors on erosion and sediment control, to help them prepare the erosion and sediment generation sections of their CEMP. For the avoidance of doubt, wherever “you” and “your” are used in this Section, this refers to the Contractor.

The purpose of erosion and sediment control while working at Lyttelton Port is to protect the Harbour from the damaging effects of large or ongoing sediment discharges, which can result from construction activities.

This Technical Section sets out:

- the relevant rules and permitted activity criteria in relation to erosion and sediment;
- a risk assessment of typical construction activities in the context of the sensitivity of the receiving environment; and
- mitigation measures for managing erosion and sediment generation, and advice on how to incorporate them into the CEMP.

Specialist design is required if you are installing or decommissioning the following control measures:

- Cut off drains – perimeter diversion.
- Flumes/pipes.
- Sediment Retention Ponds (SRP).
- Decanting Earth Bunds (DEB).

The Section has been structured to reflect the development of the process for designing and operating erosion and sediment control measures. The process is as follows:



ASSESSMENT

i

5.2 ROLES & RESPONSIBILITIES

5.3 SETTING

Things about the Port which may impact on the erosion and sediment control (ESC) for a project.

5.4 PERFORMANCE STANDARDS

Gives a guide to monitor against.

5.5 POTENTIAL SOURCES/TYPES OF WORK

Lists construction activities at the Port most likely to require ESC.

5.6 RISK ASSESSMENT

Is ESC a high/medium/low risk issue for your project?



DESIGN

ii

5.7 EROSION & SEDIMENT CONTROL MEASURES

Typical ESC measures for each activity, and describes each of the measures and situations in which they'd be used.



OPERATION

iii

5.8 MAINTENANCE, INSPECTION & MONITORING REQUIREMENTS

Checklist for inspections, frequency of inspections and who should be present.

5.9 REPORTING REQUIREMENTS

Specifies who monitoring data should be submitted to.

5.10 DECOMMISSIONING CONTROLS

For those measures which have specific requirements.

5.11 CONTINGENCY MEASURES

What to do if things go wrong.



This report references Erosion and Sediment Control guidelines prepared by Environment Canterbury. The relevant reports are:

- Environment Canterbury has prepared "Erosion and Sediment Control Guideline 2007 – A better way of managing earthworks, www.ecan.govt.nz/publications/General/FullErosionandSedimentControlGuideline.pdf; and
- Erosion and Sediment Control Guidelines for Small Sites, www.ecan.govt.nz/advice/your-land/earthworks-soil-eroison/Documents/EandSCG_SmallSiteGuideline.pdf.

NOTE: There are known areas of contaminated soil at the Port. These are referenced in the Contamination Technical Section. If your project is within a known area of soil contamination you must adhere to both the Contaminated Soil Management Plan (CSMP) and the erosion and sediment controls specified in the CEMP. If there is a conflict between the two you must use the most rigorous.



5.2 ROLES & RESPONSIBILITIES

The Contractor is responsible for writing the CEMP and obtaining professional erosion and sediment control advice as needed to do this. The Contractor is responsible for implementing the CEMP. This includes training staff to do what is required by the CEMP, undertaking inspections and reporting to LPC on the success of implementation, and reporting any complaints or incidents to the LPC Project Manager.

The LPC Project Manager (with the assistance of an LPC Environmental Manager) is responsible for reviewing the CEMP to determine whether the control measures are appropriate, and provide oversight of the implementation of the CEMP.



5.3 SETTING

Understanding the environment you are working in is essential to decide what erosion and sediment control measures are required. This section describes the environment of the Port of Lyttelton (the Port) and discusses the significance erosion and sediment control in this context. This section covers existing stormwater systems, materials to be encountered on site, topography, climate and the receiving environment.

5.3.1 STORMWATER SYSTEM

Some parts of the Port do not have a stormwater system. The implications of whether a stormwater connection is (or is not) available at a specific location are as follows:

- Connection to stormwater system available.
 - No need to design a discharge point to the receiving environment.
 - Requirements for scour protection do not need to be addressed, provided flows are not significantly increased by the works.
 - Design has to ensure discharges of coarse material with potential to block stormwater system is avoided.
 - Calculations are required to determine if system can take additional discharge from construction area. Some detention maybe required to reduce peak flows.

- No connection to stormwater system.
 - Erosion and sediment control measures need to allow for design of discharge points and scour protection.

Regardless of the presence of a stormwater system the discharge when measured in the receiving environment must meet the performance standard set out in Section 5.4. The connection to the stormwater system may provide an opportunity for dilution with other stormwater in the system, but this depends upon the characteristics of the other water discharging to the system.



5.3.2 TOPOGRAPHY

The Port is located on the north coast of Lyttelton Harbour. The site consists of approximately 65 ha of predominantly flat, reclaimed land which is used for Port activities, and approximately 100 ha of steep, loess-covered slopes (loess is a wind-blown silt). 71 ha of this is non-operational farm land through which a haul road runs to the Quarry, which covers the remaining 29 ha.

The land owned by LPC can be divided simply on topographic basis as generally flat or steep. This simple classification of LPC land is shown in the map on page 5-8. The flat land is areas of former beaches or reclaimed land. The areas which classified as steep have significantly greater potential to be eroded and produce sediment, particularly given the presence of loess.

The few permanent streams which flow into the Harbour transport large amounts of sediment into the Harbour during heavy rainfall. No significant streams are located within the Port land, but a number of ephemeral water courses are located in the surrounding farm land and quarry area. These are characterised as being very steep and of an incised nature.

Materials

The materials encountered in construction activities strongly influence the potential for sediment generation.

The loess cover on the steep slopes can be up to 7 m deep in places¹. The loess is easily mobilised when disturbed or exposed, and there is potential for large-scale erosion, including slope failure. The removal of loess from stormwater is difficult and it is hard to achieve high removal without the use of flocculants. The presence of loess in a construction area will require special attention on erosion and sediment control. This is likely to require specialist assistance, particularly in steep areas (such as the quarry).

Much of the flat part of the Port is paved in concrete and asphalt. Left intact, these surfaces have little potential to generate sediment. These pavements are generally underlain by historic beaches and reclamation fill, which have potential to generate sediment if the paving is disturbed or removed.

The reclamation works on site are currently using construction debris. The use of recycled concrete as fill material or base course has the potential to significantly increase the pH of stormwater runoff to above a pH of 9. If large amounts of crushed concrete is used the pH of the stormwater discharge should be monitored. Over time the volume of construction debris will reduce and other fill material may be required. This material will most probably be sourced from LPC's quarry.

Other material that will be encountered are sediments within the Harbour. These materials may be disturbed during wharf removal and wharf repairs, and causing visible plumes.

¹ The Benthic Ecology and Community Structure in Lyttelton Harbour, Christchurch, New Zealand, University of Canterbury Masters Thesis, G. Knight, 1971. http://ir.canterbury.ac.nz/bitstream/10092/7388/1/knight_thesis.pdf



Technical Section 5.0 Erosion & Sediment Control

MAP 1: Topography Surrounding Lyttelton Port





20 m contour lines





Climate

The table below summarises rainfall data from NIWA's Governors Bay and Lyttelton Harbour weather stations between 1961 and January 2014. It shows that May–August are the wettest months of the year. Works should ideally be scheduled to avoid earth works between May and August.

Rainfall Data at Niwa's Governors Bay & Lyttelton Harbour Weather Stations 1961–2014

MONTH	RAINFALL (mm)			AVERAGE NUMBER OF WET DAYS (>1 mm)
	HIGH	MEDIUM	LOW	
January	8	230	47	6
February	6	121	41	6
March	2	152	49	7
April	7	265	62	7
May	10	348	82	8
June	11	225	81	9
July	5	290	82	9
August	17	302	92	9
September	0	136	49	7
October	3	229	60	7
November	8	196	48	7
December	7	173	56	7

5.3.3 RECEIVING ENVIRONMENT

The receiving environment for any runoff from the LPC's land is Lyttelton Harbour. Lyttelton Harbour is shallow, muddy-bottomed and covers an area of approximately 44 square kilometres. The Harbour is deepest at Godley Head and decreases to Governors Bay, where the Harbour floor is largely uncovered at low-tide. Wave action disturbs a lot of mud in the upper harbour. The main source of the Harbour sediment is loess from the surrounding hills (Knight 1971).

The swell can be exacerbated by NE and SW winds due to the funnelling effect of the surrounding hills.

The Harbour has been dredged since 1877. The dredged material is dumped within the Harbour and is moved up the Harbour by tidal flows, resulting in much of the northern side (and some of the southern side) of the Harbour being covered by a poorly sorted layer of dredged material.



5.4 PERFORMANCE STANDARDS

NOTE: this is a summary of section 107 of the RMA. It is the basis for the rules in the Regional Coastal Plan. The Coastal Plan as it stands has some useful permitted activity standards and some that are not easily applied (e.g., the Munsell Scale). It is envisaged that through a recovery plan (or other regulatory process) a set of permitted activity rules for the Port will be developed, and these will form the basis of this section.

The water quality requirements for discharges from LPC to the Harbour are set out in the Regional Coastal Plan. These give effect to section 107 of the RMA, which can be summarised as follows. After reasonable mixing none of the following effects will occur in the receiving waters:

- The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials.
- Any conspicuous change in the colour or visual clarity.
- Any emission of objectionable odour.
- The rendering of fresh water unsuitable for consumption by farm animals (unlikely to be applicable for most discharges directly to the marine environment).
- Any significant adverse effects on aquatic life.

The exact performance standards for your project will be set either in resource consent conditions or the permitted activity standards in the Regional Coastal Plan. If the requirements are not clear from your tender documents, contact the LPC Project Manager.

In the design and operation of erosion and sediment control measures these performance standards have to be achieved and monitoring put in place to demonstrate the standards have been met. Failure to meet the performance standards leaves both LPC and the Contractor open to enforcement action under the RMA. These have potentially significant programme and financial implications to the project.

These performance standards may change over time as a result of changes to the Regional Coastal Plan or as result of conditions on resource consents.

Additionally, it is likely that an erosion and sediment control plan will be required by Christchurch City Council as part of any building consent process.



5.5 POTENTIAL SOURCES – TYPE OF WORK

There are a number of works undertaken at the Port which may lead to erosion and/or generation of sediment.

Deciding whether a project requires erosion and sediment control measures must be done for each project, but examples of works which may require such measures include:

- piling;
- road and pavement works;
- building works;
- drilling investigations;
- stock piling material;
- wharf removal;
- seawall repairs;
- dewatering;
- ground improvements (e.g., deep soil mixing);
- reclamation; and
- quarry operation.



5.6 RISK ASSESSMENT

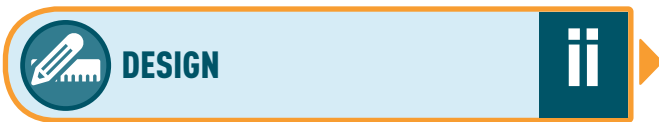
The risk assessment is required to ensure there is a comprehensive assessment of potential adverse effects. Once you've identified the risks then the probability and scale of impact need to be assessed.

You need to rank erosion and sediment generation as high, medium or low for your project. The ranking will be translated into your CEMP as a **high (red)**, **medium (orange)** or **low (green)** coloured entry in the risk assessment table where specified in the template. To make this assessment you need to rank your project against each of the criteria in the table below.

If your project rates 'high' for any of the criteria below your project's overall erosion and sediment control risk rating is 'high'. If the highest risk rating for any of the criteria is 'medium', then the overall erosion and sediment control risk rating is 'medium'. If all the criteria are rated 'low' the overall erosion and sediment control risk rating is 'low'.

Risk Assessment Evaluation Tool

CRITERIA	RISK		
	LOW	MEDIUM	HIGH
Area of disturbance	Less than 500 m ² .	500–3,000 m ² .	Greater than 3,000 m ² .
Slope	Flat–<5°	5–20°.	Greater than 20°.
Type of work	Refer to Sediment Generation Avoidance Measures Table (starts on page 5-15) – potential for sediment generation 'Small'.	Refer to Sediment Generation Avoidance Measures Table (starts on page 5-15) – potential for sediment generation 'Medium'.	Refer to Sediment Generation Avoidance Measures Table (starts on page 5-15) – potential for sediment generation 'Large'.
Materials	Imported fill material.	Minor loess content.	Significant portion of loess.



5.7 EROSION & SEDIMENT CONTROL MEASURES

The purpose of erosion and sediment control is to protect Lyttelton Harbour from the damaging effects of large or ongoing sediment discharges.

There are three steps to erosion and sediment control:

- **Avoidance** – preventing erosion and sediment generation.
- **Treatment** – removing sediment from water.

- **Stabilisation** – completing the works and removing the potential to generate sediment.

Each of the control measures listed in this section fall into one of these categories, these are listed in table below.

Erosion & Sediment Control Measures – Organised by Avoidance, Treatment & Stabilisation

AVOIDANCE	TREATMENT	STABILISATION
<ul style="list-style-type: none">• minimise the disturbance area• clean water cut off drains• flumes/pipes• check dams• armouring channels• site exit points• removal of erodible material• prompt stabilisation• staging works	<ul style="list-style-type: none">• soakage systems• sediment curtains• stormwater inlet protection• sediment fences/filter socks• sediment retention ponds (SRPs)• decanting earth bunds (DEBs)• impoundment within workings• sumps• sump protection measures• flocculation• filter gallery for dewatering• treatment tanks• bundled containment	<ul style="list-style-type: none">• sealing/aggregate cover• soil surface roughening• batter blankets• soil surface mulching• grassing and hydroseeding• soil binders and chemical treatments

NOTE: This is not a complete list, and there may be additional measures which are appropriate. Any alternative measures should be discussed with LPC before implementation.



5.7.1 WHICH CONTROLS TO USE

The table on page 5-17 and 5-19 outlines which measures are typically used for the activities likely to require erosion and sediment control measures. These should be viewed as a suggestion and may not be applicable in every situation. Consider the nature of the materials in the area you are working, spatial constraints, impact on operational areas, traffic, location of stormwater system, time of year and the receiving environment before deciding which measures are appropriate. The measures are described in Section 5.7.2, and design information is detailed in the Canterbury Erosion and Sediment Control Guidelines. Controls must be designed to treat a 2 year storm event, but survive a 20 year event.

All sites must employ site exit controls. Some options are detailed in Section 5.7.2.

The following controls require certification of the design by a suitably qualified person:

- cut off drains – perimeter diversion;
- flumes/pipes;
- SRPs; and
- DEBs.

Sediment Generation Avoidance Measures (S=Small, M=Medium, L= Large)

ACTIVITY	POTENTIAL TO GENERATE SEDIMENT	AVOIDANCE	TREATMENT	STABILISATION
Piling	S	N/A	<ul style="list-style-type: none"> • Sediment curtains if in the sea • Treatment tanks (if piles construction requires dewatering) • Soakage systems (if piles construction requires dewatering) • Bunded containment area (if piles construction requires dewatering) 	N/A
<p>Comment: Piling is generally undertaken on a staged basis so the area of potential sediment generation is small. The type of pile being constructed is an important consideration.</p> <p>In general terms there are two basic pile options a driven pile and an excavated pile. The excavated pile has the greatest potential to result in sediment generation from the removal of material and the displacement of water when the pile is placed.</p>				
Construction related dredging	L	<ul style="list-style-type: none"> • Staged development 	<ul style="list-style-type: none"> • Sediment curtains, timing works with tides 	N/A
<p>Comment: This is not designed to cover capital or maintenance dredging for the management of the shipping channel. Sediment curtains will work best in coastal dredging situations, such as when replacing wharf structures or piling in the sea.</p>				



ACTIVITY	POTENTIAL TO GENERATE SEDIMENT	AVOIDANCE	TREATMENT	STABILISATION
Road & pavement works	S, M	<ul style="list-style-type: none"> Clean water diversions Staged development 	<ul style="list-style-type: none"> Clean water diversions Staged development 	<ul style="list-style-type: none"> Prompt sealing.
Comment: Roothing and pavement works are generally on flat areas. The size of the roading project influences the potential for sediment generation.				
Building works	S	<ul style="list-style-type: none"> Clean water diversions/perimeter drains 	<ul style="list-style-type: none"> Silt fences/filter socks Sump protection measures 	N/A
Comment: This activity covers the construction of new buildings and alteration of existing buildings. The potential for sediment discharges comes from the excavation and construction of foundations.				
Drilling investigations	S	N/A	<ul style="list-style-type: none"> Treatment tanks Bunded areas Soakage systems 	N/A
Comment: Drilling investigations can produce discharges containing sediment which will require containment and disposal.				
Stock piling material	S	<ul style="list-style-type: none"> Cut off drains/perimeter diversion Cover 	<ul style="list-style-type: none"> Cut off drains/perimeter diversion Cover 	N/A
Comment: There may be times when construction materials such as roading aggregate and sand, need to be stored on site, requiring stockpile management.				
Wharf removal	S	<ul style="list-style-type: none"> Minimise working area Prompt removal of excavated materials 	<ul style="list-style-type: none"> Sediment curtains Armouring of completed surfaces 	<ul style="list-style-type: none"> Armouring of completed surfaces.
Comment: This will require the removal of piers. The associated potential for sediment generation is localised.				
Seawall repairs	S	<ul style="list-style-type: none"> Minimise working area Prompt removal of excavated materials Consider tides 	<ul style="list-style-type: none"> Sediment curtains 	<ul style="list-style-type: none"> Armouring of completed surfaces
Comment: Seawall repairs require the removal of protection armour which may expose finer material with the potential to cause a sediment plume.				
Dewatering	S	N/A	<ul style="list-style-type: none"> Treatment tanks Soakage systems 	N/A
Comment:				



ACTIVITY	POTENTIAL TO GENERATE SEDIMENT	AVOIDANCE	TREATMENT	STABILISATION
Ground improvements (e.g., deep soil mixing)	S, M	N/A	<ul style="list-style-type: none"> • Treatment tanks / bunded containment • Soakage systems 	N/A
Comment: The potential for sediment generation is dependent upon the method of ground improvement being utilised. Some methods can result in the production of cement rich slurries. Such discharges need to be contained and isolated from stormwater systems.				
Reclamation	M, L	<ul style="list-style-type: none"> • Minimise the disturbance area • Site exit points 	<ul style="list-style-type: none"> • Sediment curtains • Soakage systems • Filter gallery for dewatering • Impoundment within reclamation area 	<ul style="list-style-type: none"> • Placement of armour rock on face of the reclamation • Placement of aggregate on reclamation surface • Sealing
Comment: The active reclamation area may cover several hectares at any one time. The potential for sediment generation and discharge to the marine environment is strongly influenced by the reclamation strategy. There is two distinct phases to the reclamation process. The first is placement of material to raise the reclamation above the water and the second is the building up of the reclamation of to form the final surface, which will be several metres above water level. During the first phase there is potential for a direct discharge to the marine environment along the seaward edge of the reclamation whenever fill is placed and from tidal action. For the second phase the generation of sediment is across the reclamation surface in response to rainfall events.				
Quarrying	L	<ul style="list-style-type: none"> • Site exit points • Cut off drains – perimeter diversion • Contour drains – mid-slope runoff diversion • Flumes/pipes • Check dams • Removal of erodible material 	<ul style="list-style-type: none"> • SRPs • DEBs • Flocculation 	<ul style="list-style-type: none"> • Grassing and hydroseeding • Soil binders and chemical treatments • Soil surface mulching • Batter blankets
Comment: The operation of the quarry has the potential to require the removal and stock piling of loess and the creation of roads through loess-covered areas. Given the steep topography in the quarry area there is significant potential for erosion and sediment discharges. Special consideration is required to minimise the area of loess disturbed at any one time, the use of suitable methods to settle loess and method of transporting stormwater from the quarry area to sea level for discharge.				



5.7.2 DESCRIPTION OF MEASURES

Measures are grouped into avoidance, treatment and stabilisation measures. Each entry provides a description of the measure and situations in which it can be used. Design of these measures should be in accordance with the Canterbury Erosion and Sediment Control Guidelines.

AVOIDANCE MEASURES

Image source: Canterbury Erosion and Sediment Control Guidelines or Tonkin & Taylor unless otherwise stated.

NAME	DESCRIPTION
Minimising disturbed area	Reducing limits of clearing, staging the works and stabilising exposed surfaces as quickly as possible helps minimise the total area of disturbed soil exposed.
This also includes minimising the area vehicles travel over by creating clearly defined traffic routes	<p>Perimeter diversion channels/ bunds are installed to divert clean water away from working areas. These can also be called clean water diversion drains (CWDs) or cut off drains.</p> <p>The selection between a bund and a channel will be on the characteristics of the materials where the diversion is going to occur. The cut off drains can ensure that the clean runoff discharges to natural gullies or surface drains as appropriate. Should be designed to cope with a 5% AEP (20 year flood).</p>
Flumes/ pipes	<p>Where there is potential for erosion from water running over fill surfaces or loess deposits surface, flumes/pipes can be used. Essentially, water is intercepted above the works and transported over the surface via a flume. Three types of drainage flume/pipe can be utilised, namely a flexible pipe, open flume or flume sock. A flume sock is similar to flexible pipe but is made of canvas and is collapsible. Flumes should be held in place with warratahs or stakes.</p> <p>For slopes less than 10 percent the catchment for a flume must not exceed 5 ha.</p> <p>For slopes greater than 10 percent a flume catchment must not exceed 2.5 ha.</p>



Open flume



Closed flume



NAME	DESCRIPTION	
Check dams	Energy dissipation devices (e.g., check dams) can be located in water tables and cut off drains. The use and spacing of these devices will depend upon the grade and erodibility of the water table or cut-off drain. Stone placement in the water table or cut off drain is the preferred option for dissipating energy.	
Channel Armouring	The placement of armour reduces the potential for erosion of channels carrying stormwater.	
Remove or cover erodible material	Highly erodible materials such as loess can be excavated and replaced with more erosion-resistant materials like gravel. Similarly the erodible materials can be covered by a layer of material like gravel or coarse base course.	
Staged works	Where possible the works should be broken down in to smaller stages where practical. You would not disturb a surface if it is not going to be worked upon in the immediate future. An example is stripping top soil in advance of quarrying.	
Minimising work areas	Minimising the work area can be achieved by demarking the work area. This involves limiting the area of disturbance to the minimum required, controlling access to the site to designated trafficked paths. The construction area should be clearly delineated.	






TREATMENT MEASURES




The discharge from the sediment treatment measures will be to the Port’s stormwater system, soakage into the ground, or discharge into the Harbour. Where the discharge is into the Harbour special consideration is required for the discharge point. There is potential for scouring to occur at the discharge point. The scour potential is directly related to the flow volume and its head. The potential for

scouring can be avoided by placing armour rock at the discharge point or piping the discharge out into the receiving waters. Discharges from the quarry area and access roads need special consideration as these flows have the greatest erosive potential. Engineering advice should be sought on discharge points from these areas.

Image source: Canterbury Erosion and Sediment Control Guidelines or Tonkin & Taylor unless otherwise stated.

NAME	DESCRIPTION	
Soakage systems	Soakage systems can be used to treat water where infiltration rates are high enough. This can be either as in the adjacent photograph, or through the bottom of a sediment pond (if it has a forebay).	
Sediment curtains	Sediment curtains are placed vertically in the Harbour to prevent sediment-laden water from spreading, giving it an opportunity to settle out of suspension. They generally consist of a floating boom with a weighted geotextile cloth attached which extends through the water column. This is anchored to hold it in place.	
Stormwater inlet protection	Diverts sediment-laden water from entering the existing stormwater system, and treats it. It can take many forms (such as a flocculation socks and sediment fences). The protection must not cover the stormwater inlet.	


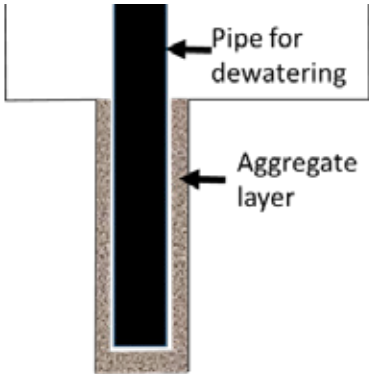


NAME	DESCRIPTION	
Sediment fences/ filter socks / Straw bale barriers	<p>Silt fences allow water to pass through while retaining sediment, and are a good temporary measure at the boundary of disturbed ground, as shown in the adjacent photograph.</p> <p>An alternative to silt fences is filter sock, which is a long tube of canvas or geotextile filled with flocculant, gravel or mulch which provides a check and treats water flowing through it.</p>	 <p>Sediment fence</p>
Site exit points	<p>Site exit points are any point where vehicles leave the site. Controls can be placed at site exit points to remove dirt and mud from vehicles exiting the site. This limits the transport of sediment off-site particularly onto public roads.</p> <p>Controls at site exit points can include:</p> <ul style="list-style-type: none"> • a rock apron over a needle-punched geotextile fabric – small sites no more than 1 ha; • shaker ramps (minimum 5 m long); • high-pressure wheel wash system. 	
Sediment Retention Ponds (SRP)	<p>SRPs are unlikely to be a practical treatment option at the Port. For catchments greater than 0.3 ha. SRPs are ponds in which water is stored for a period of time to allow sediment to settle out. Water enters the SRP through a fore bay (smaller pond on left in the adjacent photograph) which dissipates energy and removes coarse sediment and reduces disturbance of water in the SRP which would inhibit sediment settling. The discharge from the pond is normally via a floating decant.</p>	



NAME	DESCRIPTION	
Decanting Earth Bunds (DEB)	<p>For catchments less than 0.3 ha, DEBs can be utilised instead of a SRP.</p> <p>The discharge from the DEB is via an upright perforated pipe for DEBs smaller than 15 m³. For DEBs greater than 15 m³ in capacity, a floating decant similar to those used in SRPs is needed. In the event of a rainfall event greater than the capacity of the DEB, water escapes via an emergency spill way.</p>	
Vegetative strips	<p>Vegetation strips are areas of pasture that can be used to treat runoff. Effectiveness is influenced by slope angle, slope length, pasture composition and condition. Vegetation strips are considered a secondary treatment option and where practical should be used below any discharge from a sediment treatment device. The pasture in the vegetation strip needs to be a thick sward and not closely grazed.</p>	
Impoundment within workings	<p>One of the options for treating stormwater in areas where significant excavations are being undertaken (and there is limited space to construct DEBs or SRPs) is to retain storm water within the workings. Careful notice of the relative levels, diversion of clean water, and awareness of forecast weather conditions is required to ensure sufficient storage is provided.</p>	
Holding tanks/bunded containment	<p>Can be used on small sites where sediment-laden water needs to be stored. It can be left to settle out, treated with flocculant or moved for off-site treatment and discharge if required.</p>	



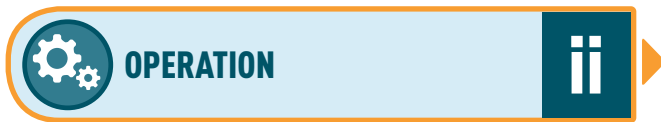
NAME	DESCRIPTION	
Sump protection measures	Can be used on small sites where sediment-laden water needs to be stored. It can be left to settle out, treated with flocculant or moved for off-site treatment and discharge if required.	 <p>Source: Ultratech International product brochure</p>
Filter gallery for dewatering	This is used to reduce the amount of sediment that comes up with the water as it is dewatered. The dewatering pipe is covered in a layer of filter fabric and placed in a hole lined with gravel to provide a filter for water being removed during dewatering.	
Flocculation	When fine particles suspended in water clump together and settle out. For erosion and sediment control this can be used to help the settling out process by adding chemicals which encourage flocculation (flocculants). Common flocculants include salt water and polyaluminium chloride (PAC). Specialist advice needs to be sought for the identification of a suitable flocculation system.	
Sump	A small pit with a sediment trap which surface runoff enters before entering a stormwater system.	



STABILISATION MEASURES

Image source: Canterbury Erosion and Sediment Control Guidelines or Tonkin & Taylor unless otherwise stated.

NAME	DESCRIPTION	
Paving	A gravel layer or asphalt/concrete paving to protect against erosion.	
Soil surface roughening	Using methods such as ripping or deep cultivation to give texture to the surface.	
Batter blankets	These are generally biodegradable and are pegged in place and rolled out. They can be designed to either promote or suppress vegetation growth and protect the soil surface.	
Soil surface mulching	Involves covering a surface of soil to protect it. Finely chopped vegetation, such as bark chips or straw, are often used. Straw mulch is applied with a tractor-mounted machine which can also apply a glue, fertiliser and seed mix. Straw should be used rather than hay as it has better stalk strength which is important for the success of the system.	
Grassing and hydroseeding	Vegetation can be used for stabilisation. This can be done using hydroseeding, where seeds are sprayed on with fertiliser, mulch and sometimes polymer, or where the contour of the land permits drilling, this method may be used as an alternative to hydroseeding.	
Soil binders and chemical treatments	Penetrate the soil and bind particles together to protect against erosion.	



5.8 MAINTENANCE, INSPECTIONS & MONITORING

The inspection of erosion and sediment control measures and monitoring of discharge points are required on a regular basis and either side of rainfall events to ensure they continue to work and that performance standards are not breached. Frequency of inspections and monitoring are outlined in the table below.

A check sheet covering what to look for during inspections, maintenance actions and monitoring of discharge points are included as Appendix 5A. This should be adapted to your project.

Inspection & Monitoring Requirements

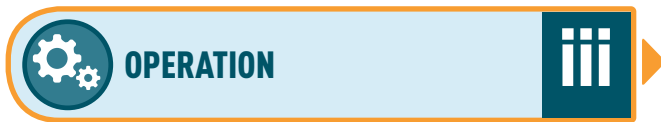
WORK PHASE	FREQUENCY	MONITORING ACTIONS
Surface is exposed and site is changing frequently.	<ul style="list-style-type: none"> • Daily • Before expected rainfall event • After rainfall event greater than 20 mm/24 hr 	<ul style="list-style-type: none"> • Inspect all structures (sediment curtain and sump protection are secured in place). • Check discharge points meet performance standards. • Once a week – fill in inspection sheet.
Surface is exposed but not changing.	<ul style="list-style-type: none"> • Daily • Before expected rainfall event • After rainfall event greater than 20 mm/24 hr 	<ul style="list-style-type: none"> • Inspect all structures and fill in inspection sheet. (culverts clear of debris, structural integrity of control measures is sound, all-weather access to measures is maintained). • Check discharge points meet performance standards.
After stabilisation if vegetation has been used.	<ul style="list-style-type: none"> • Weekly • After rainfall event greater than 20 mm • After vegetation has been established, 3 monthly 	<ul style="list-style-type: none"> • Inspect whether surface remains stabilised (80% coverage is maintained if vegetated).



Once a week the inspection sheet must be completed and provided to the LPC Project Manager. Once a month the LPC Project Manager should accompany the Contractor during the site inspection. The purpose of the inspection is to ensure compliance with the EMP and identify areas where improvements can be made or repairs and maintenance are needed. It is also to follow up on previous actions/improvements.

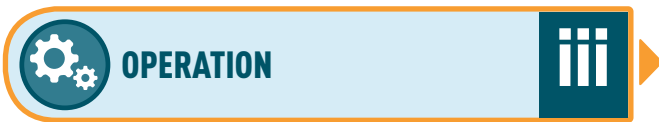
A regular meeting will be held on site by the Contractor to discuss the results of the weekly inspection and monthly audit.

Where inspections identify areas of non-compliance or improvement the contractor will be advised either verbally or in writing by either the LPC Project Manager or if applicable, via a Notice to Contractor prepared by the Project Engineer.



5.9 REPORTING

The contractor will provide the LPC Project Manager with their completed inspection/monitoring checklists (Appendix 5B) on a weekly basis.



5.10 DECOMMISSIONING OF CONTROLS

Removal of silt fences and SRPs will only occur once the disturbed area has been adequately stabilised to minimise erosion.

“Stabilised” is defined as inherently resistant to erosion or rendered resistant, such as by using indurated rock or by the application of base course, colluvium, grassing, mulch, or another method. Where hydroseeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once 80% vegetative cover has been established.

Decommissioning of controls which required certification of the design will also require certification that decommissioning has been undertaken adequately.

These are:

- cut off drains – perimeter diversion;
- flumes/pipes;
- SRPs; and
- DEBs.

The decommissioning of SRPs and DEBs will entail the following:

- Where required diverting water away from entering the structure.
- Decanting off water from dead storage.
- Removing the decant structures.
- Filling in the structure by placing the material originally excavated (this will cover over any sediment deposited in the base of the structures).
- Contouring the land to fit with the character of the surrounding land.
- Where required installing water channels (these may require protection to avoid scour).
- Top soiling and revegetating.




5.11 APPENDICES



APPENDIX 5A

INSPECTION CHECKLIST

<div>SECTION 5: MONITORING CHECKLIST FOR DISCHARGE POINTS</div>		
Monitoring date:		
Monitoring undertaken by:		
Weather conditions:		
Photograph taken showing condition of monitoring location (Y / N) Attach relevant photos		
Monitoring standard	Standard met (Y/N)	Comments
The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material		
Any conspicuous change in the colour visual clarity in the Harbour		
Any emission of objectionable odour		
The rendering of fresh water unsuitable for consumption by farm animals (unlikely to be applicable for most discharges)		
Any significant adverse effects on aquatic life		
Any additional performance standards as appropriate		



APPENDIX 5B

MAINTENANCE ACTIONS CONTROL MEASURES

SECTION 5: MAINTENANCE ACTIONS FOR EROSION AND SEDIMENT CONTROL MEASURES



Inspection date:		[type here]		
Inspection undertaken by:		[type here]		
Weather conditions:		[type here]		
Sediment Control Structure	Trigger	Maintenance action	Maintenance	
			(Y/N)	Complete/Comments
	Fore bay more than 20% full	Empty fore bay and remove sediment		
	Main pond more than 20% full	Empty pond and remove sediment		
	Floating decant blocked or sunk	Empty pond and repair decant		
	Scouring at discharge point from pond	Place material to dissipate energy from discharge		
	Level spreader not level	Re-level and seal with geotextile or concrete		
	Erosion of bund	Armour bund by either placement of geotextile or rock		
	Poor operating performance	Reduce catchment area by diverting runoff into adjacent catchments and control structures		
		Close down spoil area and immediately stabilise		
Sediment fence		Add flocculation system to pond		
	Fabric flapping in wind	Reattach fabric to guide wire and increase number of fabric locks. If required install additional waratahs		
	Build-up of sediment greater than 150mm in depth resulting in straining structure	Clean sediment away		
	Large rocks distorting fence alignment	Remove rocks		
	Bottom of silt fence not properly anchored	Dig fence into ground and secure pegs to keep in position		
	Under cutting of fence by concentrated flow	Identify options to avoid concentrated flow or replace with a DEB.		
	Silt fence broken off top wire	Install additional clips on top wire, in very windy locations a netting fence may be required to keep the silt fence in place		
Failure	Replace with super silt fence. Install runoff diversion channel/bund and divert to a DEB.			









6.0

TECHNICAL SECTION

NOISE & VIBRATION





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6.1

INTRODUCTION

This Technical Section provides technical guidance for Contractors on how noise and vibration effects must be managed during construction, and to help them to prepare the noise and vibration sections of their CEMP.

Please note, throughout this Section, any references to 'you' or 'your' are directed at the Contractor.

While Lyttelton is a working port, there is increasing residential use within the Township and noise must be carefully managed. LPC has been successfully working with the community to reduce noise effects from operational port noise over many years. Several initiatives to reduce noise levels from significant activities have been adopted over recent years (like rubber lining the equipment used for handling the scrap metal shipments), as well as applying acoustics treatment to residential buildings within a certain noise contour. To maintain this positive relationship with the community, Contractors must do the right thing.

Works associated with the reinstatement and redevelopment of the Port have the potential to generate noise impacts during construction. You will need to manage noise from your activities to avoid undue disturbance to neighbouring properties and to maintain this positive relationship with the community.

In general, vibration is not anticipated to be an issue for most projects, and can be omitted when not relevant.

The Section sets out:

- your role as the Contractor, and that of the acoustics specialist in relation to noise management;
- figures showing which areas of the Port different types of work can be carried out at different times during the week;
- performance criteria for noise; and
- mitigation measures for managing impacts of noise on neighbouring residents and businesses, including details on how and when to engage an acoustics specialist, and the advice they can provide.

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



ASSESSMENT

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6.2 ROLES & RESPONSIBILITIES

Lists what is the responsibility of the Contractor, the acoustics specialist, and the LPC Project Manager.

6.3 SETTING

Provides a brief description of the noise context at the Port.

6.4 RISK ASSESSMENT

Steps you through deciding if noise risk is high/medium/low for your project. High risk projects may require resource consent.



DESIGN

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6.5 PERFORMANCE STANDARDS

What noise criteria your project has to achieve.

6.6 CONTROL MEASURES

What to do for low/medium/high risk projects. For high risk projects additional mitigation is specified by the acoustics specialist as required.



OPERATION

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6.7 MONITORING REQUIREMENTS

Requires monitoring at the start of the project, and when changes occur to make sure noise predictions are correct.

6.8 REPORTING REQUIREMENTS

Noise monitoring results to be reported to the LPC Project Manager when required.

6.9 CONTINGENCY MEASURES

References the complaints procedure, and the need to have a contact person for noise on-site during works.



6.2 ROLES & RESPONSIBILITIES

6.2.1 CONTRACTOR

- Preparing and implementing the noise content of the CEMP in accordance with this Technical Section.
- Engaging an acoustics specialist if a complex noise calculation is required (Section 6.4.2), or they do not have personnel with skill to perform simple calculations, or the project has a high risk rating.
- If the project has a high noise risk rating, notifying the LPC Project Manager as soon as possible.
- Monitoring noise at the beginning of projects and when methodology or plant changes (if they do not have experienced staff or equipment, an acoustics specialist should be engaged).
- Liaison with the LPC Project Manager on any complaints received and undertaking investigation and reporting on complaints as required by the LPC Project Manager.

6.2.2 ACOUSTICS SPECIALIST

If engaged by the Contractor to do so:

- undertaking a complex noise calculation (Section 6.4.2) or a simple noise calculation if required;
- undertake, or provide advice on noise monitoring;
- providing advice on additional mitigation measures appropriate for high risk projects.

6.2.3 LPC PROJECT MANAGER

- Undertake consultation with the community, particularly potentially affected residents and businesses prior to works being undertaken;
- Direct the Contractor to undertake investigations, monitoring and methodology changes if required in light of monitoring results of complaints.



6.3 SETTING

The Lyttelton township rises steeply from the Harbour, with many residential properties overlooking the Port. The operational port noise consists of constant noise from ships at berth (generators), intermittent clangs and bangs from container handling, and vehicle moments including reversing beepers and other alarms. Where houses have line-of-sight to the Port, distinct noise sources can be heard, while at other locations, sources generally blend together.

Lyttelton Harbour is a suitable habitat for Hector's dolphins and other marine animals, and while they co-exist with the current shipping, care is required when piling in the Harbour, particularly during the breeding season (October–March).



6.4 RISK ASSESSMENT

All construction activities at the Port have the potential to generate a noise issue. The risk assessment is required to ensure there is a comprehensive assessment of potential adverse effects. You need to rank noise risk as high, medium or low for your project. The ranking will be translated into your CEMP as a **high (red)**, **medium (orange)** or **low (green)** box where specified in the template.

To make this assessment you need to rank your project against each of the criteria in table on the next page, the following sections will help you decide which criteria your project meets. Section 6.4.1 is a screening assessment, which consists of 6 plans, each for a different type of work, which give an indication of what time of day each type of work can be carried out within the noise criteria.

If your type of work does not fit within the scope of the screening assessment, or the assessment indicates your activity may exceed the criteria, you need to undertake a detailed assessment (Section 6.4.2).

All piling activities are considered high risk. Note, you still need to go through the detailed noise assessment for piling.

Your project's risk rating is determined by your highest risk criteria. For example, if a detailed noise assessment predicts the noise level 12 dB below the relevant performance standard for one type of work (low) but the project also involves piling (high), your project's overall noise risk rating is high.

Note that the risk for the project should be determined based on the highest risk type of work.



Noise Risk Assessment

CRITERIA	RISK		
	LOW	MEDIUM	HIGH
Noise assessment	Detailed noise assessment predicts noise level at least 10 dB below performance standard (Laeq).	EITHER: Project meets screening criteria and no detail noise assessment has been performed; OR: Detailed noise assessment predicts noise level between 10 and 2 dB below the performance standard.	Detailed noise assessment predicts noise level is either, less than 2 dB below performance standard, or is higher than the performance standard.
Piling	No piling	No piling	Piling

6.4.1 SCREENING NOISE ASSESSMENT

The screening assessment covers the types of work listed in the table below.

Screening Assessment Types of Work

ACTIVITY	DESCRIPTION AND ITEMS
Impact hammer	Impact hammer
	Tracked mobile crane (55 t)
	Drop hammer pile rig power pack
Petrol hand-held circular saw cutting concrete floor slab (3 kW)	Petrol hand-held circular saw cutting concrete floor slab (3 kW)
	Backhoe mounted hydraulic breaker (69 kW)
	Tracked excavator (35 t)
	Dump truck idling
	Angle grinder grinding steel (2.3 kW)
	Diesel generator (4 kW)
Tracked excavator (35 t)	Tracked excavator (35 t)
	Dump truck tipping fill (29 t)
Tracked mobile crane (55 t)	Tracked mobile crane (55 t)
	Hand-held welder (welding piles)
	Angle grinder grinding steel (2.3 kW)
	Diesel generator (4 kW)
Vibratory roller (8.9 t)	Vibratory roller (8.9 t)
	Asphalt paver + tipper lorry (18 t)
Tracked mobile crane (55 t)	Tracked mobile crane (55 t)
	Hand-held welder (welding piles)
	Diesel generator (4 kW)



If you are undertaking one of the above work types, refer to the matching figure below. For each type of work, the Port is broken into four areas, as follows:

- **GRAY ZONE** – you must undertake a detailed assessment;
- **BLUE ZONE** – you can do the work during the day (0730–1800h), Monday through Saturday;
- **BROWN ZONE** – you can work daytime all seven days of the week;
- **YELLOW ZONE** – you can work day or night, seven days of the week.

If you can do the work during the hours specified on the figures, include a copy of the screening assessment plans with the location of your activity marked on it in your CEMP and move to Section 6.6. If you need to do the work outside the hours allowed by the screening assessment figures, or you are undertaking a type of work in an area which is not coloured on the maps, you need to do a detailed assessment.



Technical Section 6.0 Noise & Vibration

MAP 1: General Civil Works Noise Screening Assessment Zones

Source: URS 2014







Technical Section 6.0 Noise & Vibration

MAP 2: Paving Works Noise Screening Assessment Zones

Source: URS 2014

Paving Works meets the predicted noise limits when undertaken at the following times:

Daytime Mon-Sat
07:30-18:00 (70 dBA)

Daytime Sunday
07:30-18:00
(55 dBA)

Paving Works meets the predicted noise limits when undertaken at the following times:

Daytime Mon-Sat
07:30-18:00
(70 dBA)

Paving Works does not meet noise limits. Noise assessment required for any Paving Works in the no colour zone.





Technical Section 6.0 Noise & Vibration

MAP 3: Wharf Rebuild Works Noise Screening Assessment Zones

Source: URS 2014







Technical Section 6.0 Noise & Vibration

MAP 4: Seawall Rebuild Works Noise Screening Assessment Zones

Source: URS 2014







Technical Section 6.0 Noise & Vibration

MAP 5: Piling Works Noise Screening Assessment Zones

Source: URS 2014

Piling Works does not meet noise limits.
Noise assessment required for any Piling Works in the no colour zone.

Piling Works meets the predicted noise limits when undertaken at the following times:
Daytime Mon-Sat
07:30-18:00
(70 dBA)





Technical Section 6.0 Noise & Vibration

MAP 6: Demolition Works Noise Screening Assessment Zones

Source: URS 2014

Demolition Works does not meet noise limits.
Noise assessment required for any Demolition Works in the no colour zone.

Demolition Works meets the predicted noise limits when undertaken at the following times:

Daytime Mon-Sat
07:30-18:00
(70 dBA)





EXAMPLE: A Contractor proposes to do paving in the orange area below. The screening assessment for paving shows that the works can be undertaken during the day (07:30-18:00h) on any day, but not at night.

If the works have to be done at night, a detailed assessment (Section 6.4.2) is required.





6.4.2 DETAILED NOISE ASSESSMENT

If the screening assessment indicates your activity may exceed the noise criteria you need to predict the level of noise your works will produce. Allowable noise criteria are detailed in Section 6.4.3.

You can use two different methods of calculating construction noise, which are outlined below:

- **SIMPLIFIED CALCULATION** – can be carried out by the Contractor (see the Simplified Noise Calculation section below). Only used if the following criteria are met:
 - Less than 100 m between source and the nearest residential/commercial building outside the Port.
 - The way the noise travels is not altered by complex topography (hills, valleys, cliffs etc.)
- **COMPLEX CALCULATION** – must be carried out by an acoustics specialist (see appropriate section in next column). This is used for distances greater than 100 m and/or complex topography.

Simplified Noise Calculation

Contractors may use the calculation procedures in New Zealand Standard 6803 Acoustics – Construction Noise to predict noise levels for simple cases. This can be implemented in a spreadsheet. Further information is provided in Section 4.1 of NZ Transport

Agency's Construction and maintenance noise and vibration guide. It is intended that Contractors will only use this method if they have personnel who are experienced in performing such calculations.

If you undertake a simplified noise calculation you need to include your calculation, including identification of nearby residential/commercial buildings (a map is a useful way to describe this) as an Appendix to your CEMP.

If you do not have the knowledge and experience to perform these calculations you must engage an acoustics specialist.

Complex Noise Calculation

Where situations are more complex you will need to engage an acoustics specialist who will use a computer model to predict noise levels. The LPC Noise Model Settings Table below details noise model settings that should be used for any computer predictions. If you are completing a major CEMP template, you need to document the software package, and the name of the person who undertook the calculation, their qualifications and the company they work for.

LPC Noise Model Settings

PARAMETER	SETTING/SOURCE
Software	Any recognised package
Algorithm	ISO 9613-2
Reflection model	Ray tracing, 1 order of reflections
Temperature	10°
Humidity	70%
Ground absorption	G = 0 (water/pavement), 0.5 elsewhere
Terrain contour resolution	1 m (LPC can provide these as a Shapefile)
Receiver height	1.5 m (4.5 m upper floors) – most exposed façade
Receivers	Façade (add 3 dB correction to any free field receivers)



Inputs for Noise Calculations

For both the simplified and complex noise calculation, use the standardised construction noise levels below, unless you have on-data of the actual plant/type of work. The Noise Source Levels Table below provides

an inventory of activities with associated octave band sound pressure levels (i.e., noise) measured at a distance of 10 m from the source.

Noise Source Levels

ACTIVITY	DESCRIPTION	REFERENCE	OCTAVE BAND SOUND PRESSURE LEVEL (dB at 10 m)								L _{AEQ'} (dB at 10 m)
			63	125	250	500	1 k	2 k	4 k	8 k	
Piling	Impact hammer	contractor	93	93	93	93	93	93	93	93	100
	Tracked mobile crane (55 t)	BS 5228-1 C.3.29	81	77	69	67	62	60	61	51	70
	Drop hammer pile rig power pack	BS 5228-1 C.3.7	77	78	73	66	63	57	50	42	69
Demolition	Petrol hand-held circular saw cutting concrete floor slab (3 kW)	BS 5228-1 C.4.70	72	89	81	80	80	82	86	85	91
	Backhoe mounted hydraulic breaker (69 kW)	BS 5228-1 C.5.6	90	79	75	78	78	83	91	92	88
	Tracked excavator (35 t)	BS 5228-1 C.5.18	76	79	75	75	76	73	70	65	80
	Dump truck idling	Estimate	63	63	63	63	63	63	63	63	70
	Angle grinder grinding steel (2.3 kW)	BS 5228-1 C.4.93	57	51	52	60	70	77	73	73	80
	Diesel generator (4 kW)	BS 5228-1 C.4.85	69	69	67	60	59	60	56	53	66
Seawall rebuild	Tracked excavator (35 t)	BS 5228-1 C.5.18	76	79	75	75	76	73	70	65	80
	Dump truck tipping fill (29 t)	BS 5228-1 C.2.30	85	74	78	73	73	74	67	63	79
Wharf rebuild	Tracked mobile crane (55 t)	BS 5228-1 C.3.29	81	77	69	67	62	60	61	51	70
	Hand-held welder (welding piles)	BS 5228-1 C.3.31	67	68	69	68	69	66	61	56	73
	Angle grinder grinding steel (2.3 kW)	BS 5228-1 C.4.93	57	51	52	60	70	77	73	73	80
	Diesel generator (4 kW)	BS 5228-1 C.4.85	69	69	67	60	59	60	56	53	66
Paving	Vibratory roller (8.9 t)	BS 5228-1 C.5.20	90	82	73	72	70	65	59	54	75
	Asphalt paver – tipper lorry (18 t)	BS 5228-1 C.5.31	72	77	74	72	71	70	67	60	77
General civil works	Tracked mobile crane (55 t)	BS 5228-1 C.3.29	81	77	69	67	62	60	61	51	70
	Hand-held welder (welding piles)	BS 5228-1 C.3.31	67	68	69	68	69	66	61	56	73
		BS 5228-1 C.4.85	69	69	67	60	59	60	56	53	66



6.4.3

MARINE BASED PILING

If you are piling in the Harbour, there is the potential that marine mammals will be affected. No specific assessment is required, however the controls documented in the Marine Piling Management Plan (Appendix 6A) must be adopted.



6.5 PERFORMANCE STANDARDS

Noise criteria apply for all projects, which are based on the New Zealand Standard for construction noise NZS 6803:1999. The human response to noise is difficult to express as a single number, therefore criteria are provided in terms of a time average ($L_{Aeq(15min)}$) and a maximum instantaneous (L_{AFmax}) level. These criteria are listed in the Construction Noise Criteria Table below. For most activities the relevant performance standard is the time average standard ($L_{Aeq(15min)}$), for impulsive sources (such as piling) the maximum instantaneous (L_{AFmax}) criteria is the relevant standard.

Where the noise criteria cannot be achieved, controls will be required to manage noise.

Construction Noise Criteria

		NOISE CRITERIA	
DAYS	TIMES	$L_{Aeq(15min)}$	L_{AFmax}
Residential:			
Weekdays	07:30–18:00	70 dB	85 dB
	18:00–20:00	65 dB	80 dB
	20:00–07:30	45 dB	75 dB
Saturdays	07:30–18:00	70 dB	85 dB
	18:00–20:00	45 dB	75 dB
	20:00–07:30	45 dB	75 dB
Sundays & public holidays	07:30–18:00	55 dB	85 dB
	18:00–20:00	45 dB	75 dB
	20:00–07:30	45 dB	75 dB
Industrial & Commercial:			
All days	07:30–18:00	70 dB	-
	18:00–07:30	75 dB	-



6.6 CONTROL MEASURES

6.6.1 ALL PROJECTS

Even if your project meets the screening criteria (Section 6.4.1), or the performance standards in Section 6.5, noise from your project can still cause disturbance to residential and commercial neighbours of the Port. Regardless of your noise risk rating, you need to use as many of the controls below as practical and include in your CEMP how you are going to minimise the noise nuisance of your activity. You may also need to consider stakeholder consultation (see the Stakeholder Engagement Section below).

The following controls should be considered:

- Use of quietest equipment and techniques to minimise noise. This may include a balance between the overall level of noise and the duration of the noise. In some situations it may be preferable to undertake short term noisy works rather than having lower noise levels which may occur for a significant period of time.
- Use temporary construction noise barriers or screens that provide acoustic shielding of the equipment/activity. For example, undertaking grinding of pile caps inside a shipping container.
- Reversing alarms from certain existing vehicles (e.g., straddle carriers) are clearly audible at Sumner Road and Reserve Terrace over the noise

of other Port activities. For permanent plant within the construction site, broad band reversing alarms should be installed. Further information is available on the Transport Agency's website (www.acoustics.nzta.govt.nz/transport-agency-publications).

- Limit hours of operation to avoid sensitive times for neighbouring residents/businesses, or provide periods of respite.
- Minimise night-works unless essential.
- Use of multiple items of plant to shorten the construction period, e.g., two items of plant may halve the duration of the activity but at most only lead to a 3 dB increase in noise level.
- Use of equipment and construction techniques in accordance with manufacturer's instructions/site protocols (method statements), for example monitoring of piling to final level/set.

Stakeholder Engagement

The LPC Project Manager will decide whether stakeholder engagement is required for a particular project. This will largely depend on the scale and duration of the project. Stakeholder engagement will generally be necessary for any projects with a high risk rating.



If your project has high noise risk (determined in Section 6.4) inform your LPC Project Manager immediately, so they can initiate the required conversations.

Effective stakeholder engagement is a critical part of managing construction and maintenance noise and vibration. Stakeholder engagement can have a greater bearing on acceptance of the works and complaints than the actual noise and vibration levels. Neighbours who understand what, when and why the works are happening are often able to adjust their activities accordingly and are generally more tolerant of construction noise and vibration.

You are required to work with LPC in identifying key activities with the potential for disturbance. In general, neighbours should be informed at least one week before work starts and any local issues should be identified.

LPC will prepare and distribute the information, but you will need to advise:

- reason for the works;
- reason for the construction methodology proposed;
- overall time frame and timing of specific noisy of vibration producing activities;
- reason for any night or weekend works; and
- expected noise and/or vibration effects.

The following table highlights where responsibilities lie and when particular tasks should be undertaken.

Timing of Key Stakeholder Stages

TASK	TIMING	RESPONSIBLE PARTY
Identifying potential effects	Prior to construction	Contractor
Preparing material	Ongoing	LPC
Progress updates	Ongoing	LPC
Liaising with regulators	Ongoing	LPC

6.6.2 MARINE BASED PILING

If you are piling in the Harbour you also need to adopt the LPC Marine piling management plan to protect noise sensitive marine species. This is included as Appendix A, and must be included in your CEMP. In summary, the marine piling management plan requires:

- 'all clear' for marine life within a 300 m radius of the pile driving unit to be confirmed before the commencement of pile driving operations;
- marine based pile driving operations to take place during daylight only (daylight is defined as where there is adequate light to see a minimum distance of 300 m from the piling location);
- the start procedure for the pile driving unit will comprise a soft-start approach or use an acoustic deterrent; and
- if marine life is spotted within 300 m of equipment, pile driving unit to suspend operations immediately.



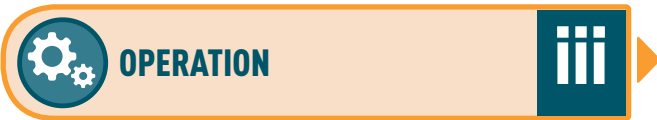
6.6.3

HIGH NOISE RISK PROJECTS

If your project is high risk you need to engage an acoustics specialist. The acoustics specialist will help design site specific controls to help your project meet the noise performance standards in Section 6.5, these site specific controls will form the basis of the noise components of Section 8 in the CEMP template (this can be done as a separate document/schedule and appended to the CEMP, but requires a reference in the body of the template). If sufficient detail about the high risk type of work is not available when the CEMP is prepared, the site specific controls can be designed later, but must be completed, and signed off by LPC before the work starts.

Regardless of the form this documentation takes, for high risk assessments both the following must be undertaken in addition to the requirements in sections 6.6.1 and 6.6.2 above:

- If criteria are exceeded with good practice management, then enhanced management measures will be investigated by an acoustics specialist and detailed in the CEMP.
- Specific requirements for stakeholder engagement will be determined in conjunction with LPC.



6.7 MONITORING

If the project falls under the screening assessment, no monitoring is required, unless noise complaints are received.

If you have done a detailed assessment (either with simple or complex calculations) of the noise risk for your project, at the beginning of project, noise testing must be performed to verify the source noise levels used in the calculations are correct. You may wish to engage an acoustics specialist to undertake monitoring, or provide advice on how to undertake monitoring yourself. All noise monitoring should be performed in accordance with NZS 6801:2008 Acoustics – Measurement of environmental sound by appropriately trained staff

If monitoring shows that the noise levels used in the model are wrong, go through the assessment again, and update the CEMP to reflect any changes in risk. If you move into a high risk classification as a result of monitoring you need to undertake the additional steps outlined in Section 6.6.3.

Whenever a new piece of equipment is used or a new type of activity is started the testing has to be repeated. For example, if the first stage of the project is piling in soft ground and the second stage of the project is piling in hard ground, you need to measure noise when you move from soft to hard ground, as the same plant is likely to make more noise in harder ground.

If complaints are received, noise monitoring may be required and additional mitigation required. Your LPC Project Manager will discuss this with you if this is the case.



6.8 REPORTING

Reporting requirements are determined by the outcome of the noise assessment and noise screening process. If this process identifies noise monitoring is required the Contractor is expected to report result of any monitoring to the LPC Project Manager.

6.9 CONTINGENCY

Complaints must be managed using the complaints process (see the Major Project Template in the folder). During works, there must always be a delegated person available (such as the site foreman) to discuss noise issues with the LPC Project Manager and to take immediate action if directed.





6.10 APPENDICES



APPENDIX 6A

LPC MARINE PILING MANAGEMENT PLAN

Introduction

In the context of this management plan, marine life principally refers to Hector's dolphins, fur seals, penguins and schools of fish. It is more likely that Hector's dolphins will be observed than any other large marine species.

Marine based pile driving operations to take place during daylight only (daylight is defined as where there is adequate light to see a minimum distance of 300 m from the piling location).

'All clear' for marine life within a 300 m radius of the pile driving unit to be confirmed before the commencement of pile driving operations. Contractors will either use:

- passive acoustic detectors deployed to listen for vocal communication; or
- trained marine mammal observers (MMOs) to visually observed activity up to a distance of 300 m.

The start procedure for the pile driving unit will comprise one of the following approaches:

- Soft-start approach which will incorporate piling commencing at low energy levels and then building up progressively to full impact force.
- Soft-start approach which will incorporate a single pile impact followed by another single pile impact after 5 minutes, then commencement of normal piling after another 10 minutes.
- If the soft-start approach is not feasible for operational reasons, the use of a noise producing device (acoustic deterrent) that is capable of gradually increasing the level of acoustic energy for 10 minutes prior to piling. The acoustic deterrent shall provide an initial noise level that is no greater than 140 dB re 1 μ Pa @ 1 m (this noise level is less than that known to produce a temporary threshold shift for cetaceans). This is to enable marine life to move away.

If marine life is spotted within 300 m of equipment, the following actions shall be taken:

- Pile driving unit to suspend operations immediately.
- If marine life are not seen to move beyond 300 m, operations may not restart until no marine life has been sighted for at least 15 minutes.
- If marine life are seen to move beyond 300 m, operations can recommence immediately.

Dolphins & Seals – Construction Vessel Manoeuvring (if applicable)

If within 300 m of the dolphin/seal the vessel must not:

- approach a dolphin/seal head on;
- restrict the path of a dolphin/seal;
- pursue a dolphin/seal;
- separate any dolphin/seal from a group;
- come between a mother and a calf; or
- drop or lower an anchor overboard from the vessel.

If within 300 m of a dolphin/seal, the vessel must:

- operate at a constant speed of less than 6 knots and minimise noise;
- avoid sudden changes in direction;
- post a lookout for dolphins/seals;
- if the dolphin/seal shows any signs of being disturbed, manoeuvre to a distance of at least 300 m at a constant speed of less than 6 knots (where safe to do so);
- if a calf appears, manoeuvre to a distance of at least 300 m from the calf at a constant speed of less than 6 knots (where safe to do so); and
- if the vessel drifts or approaches closer than 100 m, reduce speed and continue on a course away from the dolphin/seal.



Sightings & Log

Personnel on board vessels and sites adjacent to water are to report all sightings of marine mammals (dolphins/seals).

A log of cetacean (such as dolphins) sightings and action taken to be kept for all work areas.

The log shall be made available to interested parties such as Department of Conservation, Ministry of Fisheries, etc.









7.0

TECHNICAL SECTION

HAZARDOUS SUBSTANCES MANAGEMENT



7.0 HAZARDOUS SUBSTANCES MANAGEMENT



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7.1 INTRODUCTION

This Technical Section provides guidance to Contractors on hazardous substances, to help them prepare the hazardous substances sections of their CEMP.

Please note, throughout this Section, any references to 'you' or 'your' are directed at the Contractor.

While the type and volume of hazardous substances used will vary, most construction projects will use hazardous substances. Typical hazardous substances include:

- petrol and diesel;
- cement and concrete products;
- lubricating and hydraulic oils;
- acids and alkalis;
- pesticides;
- de-greasers;
- paint;
- compressed gases.

Good hazardous substance management is needed to protect works, prevent fires and protect the environment. At the Port, use of hazardous substances may be close to or in Lyttelton Harbour, so avoiding discharge to the Harbour is crucial.

Even if your project doesn't involve storage of hazardous substance, equipment requires refuelling, which if done on Port land will need to be managed under your CEMP. Additionally, most construction equipment contains hydraulic fuel lines, which can break, resulting in spills or leaks.

This Technical Section sets out:

- the relevant regulations for hazardous substances;
- requirements under these regulations;
- typical substances likely to be stored and the relevant trigger levels for controls;
- controls required for the storage and use of hazardous substances.

Hazardous substances controls specified in this Section are very prescriptive, this reflects the nature of the legislation governing hazardous substance management. If the work involves hazardous substances, an Approved Handler is required (refer Section 7.2).

The requirements set out in this Section are accurate as of October 2014. 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 is designed to be worked through from start to finish. A flowchart summarising the content of each Section is provided over the page.



ASSESSMENT

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7.2 ROLES AND RESPONSIBILITIES

Outlines the responsibility of the contractor.

7.3 SETTING

Provides a description of the context of hazardous substances storage and use at the Port.

7.4 RISK ASSESSMENT

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DESIGN & OPERATION

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7.5 PERFORMANCE STANDARDS

What your project has to achieve when storing and using hazardous substances.

7.6 CONTROL MEASURES

What to do for low and high risk projects, monitoring and reporting requirements throughout the project and the procedures you have to adopt in an emergency of spill situation.



7.2 ROLES & RESPONSIBILITIES

The Hazardous Substances and New Organisms Act 1996 (HSNO Act) requires facilities that store and use hazardous substances (excluding fuels within vehicles or equipment) to have a “Person in Charge”.

The “Person in Charge” as defined in the HSNO Act is responsible for ensuring that the hazardous substances under their control are correctly managed (including obtaining all necessary certification) and that the environment and health and safety of people are not adversely affected.

All Contractors who are using or handling hazardous substances shall identify a “Person in Charge”. For the purposes of the CEMP, the “Person in Charge” shall be an approved handler for the HSNO Class of substances to be used and stored and shall be responsible for ensuring the requirements of the CEMP are met.

All personnel working on the Project including the contractor’s staff and sub-contractors have the responsibility for following the requirements of this Technical Section.



7.3 SETTING

7.3.1 ENVIRONMENTAL SETTING

Given the Port's location over and adjacent to the Harbour, mishandling or spills of hazardous substances have a high likelihood of environmental effects. Further, the large number of people and different operators on the Port highlights the need to effectively store and manage hazardous substances.

7.3.2 REGULATORY SETTING

The following legislative requirements have been identified as relevant to the management of hazardous substances at the Port associated with construction activities:

- The Hazardous Substances and New Organisms Act, 1996 and regulations.
- The Resource Management Act 1991 (RMA).
- Land Transport Act 1998 (LTA).

Further detail of the regulatory setting is provided in Appendix 7A. Definitions associated with hazardous substances are included in Appendix 7B.



7.4 RISK ASSESSMENT

NOTE: The CEMP risk assessment is different from a HSN0 risk assessment.

Types of work which trigger hazardous substances related regulatory requirements are automatically high risk.

If you are not using or storing any hazardous substance your activity is deemed to be low risk. It is unlikely any projects will be low risk.

The first step is to compile a list of hazardous substances for your activity. Then compare this hazardous substances inventory to the Table which starts on page 7-13 (Section 7.6.3). This Table lists common hazardous substances used in construction. If any of the substances on your inventory appear in the Table, your activity is high risk.

If none of the substances appear on the list you need to determine whether any of them have regulatory requirements under HSN0. You can obtain the HSN0 classification from the supplier or Safety Data Sheet (SDS) and determine whether controls are required using the EPA Controls database¹.

If you are need help determining whether there are regulatory requirements under HSN0, contact your LPC Project Manager.

If the hazardous substances assessment confirms none of the substances on your inventory have regulatory requirements under HSN0 or the RMA, your project is low risk.

¹ www.epa.govt.nz/hazardous-substances/about/HSN0-controls/Pages/HSN0%20controls.aspx



7.5 PERFORMANCE STANDARDS

The management and control of hazardous substances at the Port shall be undertaken in accordance with the performance standards specified below:

- As a minimum comply with the statutory requirements for the storage, use and disposal of hazardous substances under the RMA and the HSNO Act, HSNO regulations, and gazette notices.
- Hazardous substances are transported to and from site in accordance with the requirements of the Land Transport Management Act, 2003.
- Storage facilities and equipment that hold significant quantities of hazardous substances are appropriately designed and operated to prevent/reduce the potential for any accidental spillage or leak of a hazardous substance from the facility.
- Containers, facilities and equipment containing or storing hazardous substances are appropriately labelled and signed to identify the potential hazards.
- Emergency Response Plans are in place which in the event of an incident/accident involving hazardous substances will be used to minimise the effect of the event on the environment.
- Staff and sub-contractors at the site are trained how to handle, use and store hazardous substances in a safe manner and how to respond in the event of an emergency incident.
- No spills and leaks to soil or water will occur from the storage or use of hazardous substances.
- No spills and leaks to soil or water will occur from the maintenance of any on-site equipment.
- No storage of hazardous substances shall occur within 20 metres of the Harbour.
- All refuelling of equipment on land or over water will be supervised throughout the whole activity and spill containment equipment must be immediately available.
- All refuelling equipment will have cut-off valves.
- If working in or near water then appropriate spill containment equipment must be available.
- A monitoring regime will be in place for daily/weekly inspections of all equipment, storage facilities, spill containment equipment.

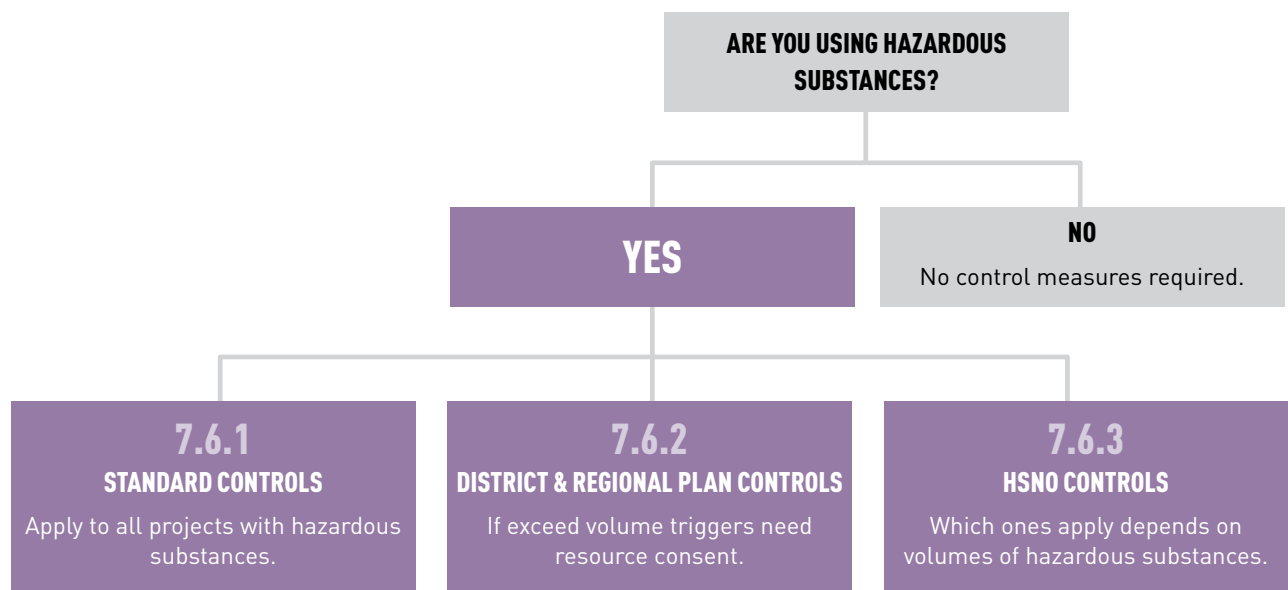
Prior to commencing work, the contractor must identify the requirements for any hazardous substances likely to be used or stored at LPC sites.



7.6 CONTROL MEASURES

The following flow chart summarises how control measures which apply to hazardous substances are divided in the rest of Section 7.6.

How Hazardous Substances Controls Apply to Projects





7.6.1 STANDARD CONTROLS

You must adopt all the controls in this Section. These controls are required regardless of the specific hazardous substances on your inventory. For each hazardous substance in your inventory you will also need to implement specific controls.

Controls Prior to Bringing Hazardous Substances On-site

The following controls are required for all construction activities where hazardous substances are to be used as part of the works:

- Provision of (or access to) a Hazardous Substance Store that meets the following requirements.
- The fire resistance ratings and requirements outlined Appendix 7D.
- Adequate bunding to meet the requirements of Section 7.6.3 – Secondary Containment, page 7-22.
- Shall be of sufficient size to achieve the segregation requirements including as a minimum 1 metre spacing between HSNO Class 3 flammable liquids and Class 2 aerosols. If large volumes are likely to be stored, separate stores for class 2 and class 3 may be required;.
- At least 1 fire extinguisher shall be located in each store.
- Provision of a cage for the storage of gas cylinders. Separate cages will be required for non-flammable (oxygen) and flammable gases (acetylene, LPG).
- Preparation of an Emergency Response Plan including a Spill Response Plan (see Section 7.6.3 – Spill Management Procedure, page 7-25).
- Contractors shall have an Approved Handler who is responsible for the Hazardous Substances stores and ensuring compliance with the CEMP (prepared in accordance with this Technical Section) and the requirements under HSNO.
- A process to review the requirements for new hazardous substances to be brought onto site during the works must be developed. This must include a process to ensure a copy of the safety data sheet is obtained, the requirements under

HSNO and the CEMP (prepared in accordance with this Technical Section) are identified and met, and that the substance is added to the Hazardous Substance Inventory prior to the substance coming on site.

- A process to monitor compliance with the requirements of the CEMP (prepared in accordance with this Technical Section).

Controls During Works

The following controls shall be maintained at all times during works:

- All hazardous substances shall be stored in the appropriate storage location.
- The “Person in charge” shall maintain a Hazardous Substance Inventory and ensure it is kept up to date and made available on request to LPC, Environment Canterbury and Worksafe staff.
- Copies of safety data sheets shall be held on-site and be available for staff to review at all times.
- Controlled zones shall be established around all Hazardous Substance stores and shall be included on a site map and should be clearly marked on-site.
- Requirements for hazardous atmosphere zones and location test certificates shall be identified and met, and copies of all location test certificates shall be held on-site.
- Appropriate signage shall be in place.
- All vehicles and works areas must have as a minimum a spill kit appropriate to the hazardous substances and volumes being used (for the purpose of this control, any equipment or hoses that could leak or fail should be considered).
- All refuelling of equipment on land or over water will be supervised throughout the whole activity and spill containment equipment must be immediately available.
- All refuelling equipment will have cut-off valves.
- If working in or near water then appropriate spill containment equipment must be available.



7.6.2

DISTRICT & REGIONAL PLAN CONTROLS

If you exceed the volume/weight trigger levels for either the regional or district plans, you may require resource consent.

The last two columns of the Table starting on page 7-13 lists the trigger levels for the relevant regional and district plans. If the volume/weight of a particular hazardous substance you will have on site is less than the trigger listed, adopt the controls listed further in this Section.

However, if none of the hazardous substances on your inventory have a trigger volume in the regional plan or district plan (check both the Table starting on page 7-13 and Appendix 7C), you do not need to adopt the controls listed further in this Section.

If you exceed the trigger level in either of the last two columns of the Table starting on page 7-13, you may require resource consent. Contact your LPC Project Manager immediately, as a resource consent application takes around 20 working days to be processed.

Storage of Hazardous Substances

The following are the relevant district and regional plan controls for the storage of substances:

- Stock reconciliation of a specified hazardous substance shall be undertaken at regular intervals.
- A container storing hazardous substances located on or over the land surface shall be visually inspected for leakage at least once per month.
- Copies of the stock reconciliation records or the most recent certification of the container shall be held and be available to Environment Canterbury on request within five working days.
- Maintain a current inventory of all specified hazardous substances on the site and shall be available on-site (see Section 7.6.3 – Hazardous Substance Register, on page 7-25).
- Store or use the substances in a facility which is designed, constructed and managed to (See Section 7.6.3 – Storage, on page 7-21):
 1. prevent the escape of substances or contaminated water;
 2. prevent stormwater runoff entering the facility; and
 3. contain a leak or spill and allow the leaked or spilled substance to either be collected or lawfully disposed of.
- Have spill kits to contain or absorb the spilled substance located close to the substance storage and use areas at all times, along with instructions on how to use the spill kit (see Section 7.6.3 – Spill Management Procedure, on page 7-25).



Controls for Portable Refuelling Containers

Rule 38A of the NRRP and Rule 5.179 of the PCLWRP include specific requirements for the storage and use of hazardous substances within portable containers. A portable container is defined as one or more containers of petrol, kerosene or diesel used for refuelling and the container(s) is fixed to a vehicle, towed by a vehicle or transported by a helicopter, but does not comprise part of the inbuilt fuel system required to power a vehicle or machine.

The requirements are outlined as follows:

- The container(s) are not located within 20 m of a water body.
- The aggregate quantity of specified hazardous substances stored on a site in a portable container shall not exceed 2,000 litres.
- A container shall be located in an area or structure that will contain a leak or spill of the substance and will allow the spilled substance to be collected.
- Equipment that is suitable to absorb any leak or spill of the substance shall be located with the container at all times, along with instructions on how to use the spill kit.
- A portable container shall not remain on a site for a continuous period of more than 90 days.

If greater than 2,000 L is to be stored on-site, discuss requirements with LPC Project Manager.

Hazardous Substances & Management Controls Triggered for Common Substances Used & Stored on Construction Sites

HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD	UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN TRIGGER QUANTITY	DISTRICT PLAN TRIGGER QUANTITY
1 Acetylene (non-permanent gas for welding)	2.1.1A	1001/HSR000987	Any quantity	Storage incompatibilities with all class 1, class 2.1.2, all class 3, and all class 4, all class 5 substances.		
			50 kg	Fire extinguisher		
				Approved handler		
			100 kg	Hazardous atmosphere zone requirements	None	None
				Location test certificate		
			250 kg	Secondary containment		
				Signage		
2 Cements, concrete admixtures, fillers, grouts, mortars, plasters, putties, roading products, concrete etching agents	Group Standards for Construction Products 2006 (4 standards)	HSR002542 (Corrosive 8.2C) HSR002543 (Corrosive 8.2C, Toxic 6.7A) – product contains respirable silica (carcinogen) HSR002544 (Subsidiary hazard) HSR002545 (Toxic 6.7A)	100 L or 100 kg (for a HSNO 9.1A substance) 1,000 L or 1,000 kg (for a HSNO 6.1D, 6.5A, 6.5B, 9.1B or 9.1C substance) 10,000 L or 10,000 kg (for all other substances) 50 L of 50 kg (for a HSNO 6.1A8.2A substance) 100 L of 100 kg (for a HSNO 9.1A substance) 1,000 L or 1,000 kg (for all other substances) 10,000 kg (for a HSNO 6.1D or 9.1D substance)	Secondary containment Signage	None	Class 8 5,000 L





7.0 HAZARDOUS SUBSTANCES MANAGEMENT

HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD		UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN TRIGGER QUANTITY		DISTRICT PLAN TRIGGER QUANTITY
3	Cutback Bitumen (>10% kerosene)	3.1D, 6.3B, 9.1C	HSR001508	Any amount	Storage incompatibilities with all Class 1, 2, 3.2, 4 and 5 substances	5,000 L	None	None
				500 L	2 Fire extinguishers			
				1,000 L	Signage			
					Secondary containment			
	Cutback Bitumen (7-10% kerosene)	3.1D, 9.1C	HSR001519	500 L	2 Fire extinguishers	5,000 L	None	None
				1,000 L	Signage			
					Secondary containment			
	Cutback Bitumen (2.5-7% kerosene)	9.1C	HSR001520	1,000 L	Signage	5,000 L	None	None
					Secondary containment			
4	Cleaning products (e.g., Envirocleaner) Note: other cleaning agents may trigger different controls. Check HSNO classification	6.1D Group Standards for Cleaning Products 2006 (9 standards)	HSR002530	1,000 L	Secondary containment	None	None	None
				10,000 L	Signage			
5	Diesel	3.1D, 6.1E, 6.3B, 6.7B, 9.1B	1202/HSR001441	Any amount	Storage incompatibilities with all Class 1, 2, 3.2, 4 and 5 substances	5,000 L not fixed or towed by vehicle	2,000 L if fixed or towed by vehicle	None
				500 L	2 Fire extinguishers			
				1,000 L	Secondary containment			
				5,000 L	Stationary container test certificate			
				10,000 L	Signage, Level 3 Emergency management plan			



HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD	UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN TRIGGER QUANTITY	DISTRICT PLAN TRIGGER QUANTITY
6 Engine oil (Note: Some engine oils may trigger different controls. Check HSNO classification)	Group Standards for Lubricants 2006 (Subsidiary Hazard)	HSR002602	100 L or 100 kg (for a HSNO 9.1A substance)	Secondary containment	500 L Class 9.1A	1,000 L for class 6.1A, B or C and class 8
			1,000 L or 1,000 kg (for a HSNO 6.1D, 6.5A, 6.5B, 9.1B or 9.1C substance)			
			10,000 L or 10,000 kg (for a HSNO 9.1D, 8.3A, 6.6A, 6.8A or 6.9A substance)			
			100 L or 100 kg (for a HSNO 9.1A substance)			
			1,000 L or 1,000 kg (for a HSNO 8.3A, 9.1B or 9.1C substance)			
7 Fertiliser (Agpro slow release fertiliser tablet)	Fertilisers (Subsidiary Hazard) Group Standard 2006	HSR002571	10,000 L or 10,000 kg (for a HSNO 6.1D or 9.1D substance)	Signage	500 L all others classified as hazardous	1,000 L for class 6.1A, B or C and class 8
			100 L (for a HSNO 9.1A substance)			
			1,000 L (for a HSNO 6.1D, 6.5A, 6.5B, 9.1B, 9.1C substance)			
			10,000 L (for a HSNO 6.6A, 6.8A, 6.9A, 8.3A, 9.1D substance)			
			100 L or 100 kg (for a HSNO 9.1A, 9.2A, 9.3A, 9.4A substance)			
8 Glyphosate	6.1E, 6.4A, 9.1B, 9.1D	1071-83-6/ HSR003192	1,000 L or 1,000 kg (for a HSNO 8.3A, 9.1B, 9.1C, 9.2B, 9.2C, 9.3B, 9.4B, 9.4C substance)	Signage	500 L Class 9.1A	1,000 L for class 6.1A, B or C and class 8
			10,000 L or 10,000 kg (for a HSNO 6.1D, 9.1D, 9.2D, 9.3C substance)			
			10,000 L			
			Secondary containment			
			Signage			



7.0 HAZARDOUS SUBSTANCES MANAGEMENT

HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD	UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN TRIGGER QUANTITY	DISTRICT PLAN TRIGGER QUANTITY
9 Hydraulic oil Gear oil	Group Standards for Lubricants 2006 (Low Hazard)	HSR002605	10,000 L (for a HSNO 9.1D substance)	Secondary containment Signage	5,000 L if classified as hazardous	None
10 Kerosene/ Bitumen cutter	3.1C, 6.1E, 6.3B, 9.1B	1223/HSR001049	Any amount 100 L (closed) 25 L (decanting) 5 L (open occasionally) 1 L (open container) 250 L (open containers) 500 L (in closed containers >5L) 1,500 L (in closed containers <5L) 500 L 1,000 L	Storage incompatibilities with all Class 1, 2, 3.2, 4 and 5 substances Hazardous atmosphere zone Location test certificate 2 Fire extinguishers Secondary containment Signage	5,000 L	None
11 Oxygen (non-permanent gas for welding)	2.2, 5.1.2A	1072/HSR001029	10 kg 50 kg 50 kg (use) 100 kg (storage) 100 kg 250 kg 250 kg (3 m) > 250 kg (5 m) If package kept closed (3 m) Where substances are used (5 m)	1 fire extinguisher 2 Fire extinguishers Location test certificate Secondary containment Approved handler Signage Isolation substance from incompatible substances Isolation substance from ignition sources or other hazardous substances location	None	None



HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD	UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN		DISTRICT PLAN
					TRIGGER	QUANTITY	
12 Paints	Group Standards for Surface coatings and Colourants 2006 (24 standards)	HSR002657 (Combustible)	50 L (3.1A)	1 Fire extinguisher			
		HSR002658 (Corrosive)	200 L (3.1A)	2 Fire extinguishers			
			250 L (3.1B)				
			500 (3.1C, 3.1D)				
		HSR002659 (Corrosive, Combustible)	100 L (for a HSNO 3.1A, 6.1A, 6.1B, 6.1C, 8.2A, 9.1A substances)	Secondary containment			
			1,000 L (for a HSNO 3.1B, 6.1D, 6.5A, 6.5B, 6.7A, 8.2B, 9.1B, 9.1C substances)				
		HSR002664 (Flammable, Corrosive, Toxic)	10,000 L (for a HSNO 3.1C, 3.1D, 6.6A, 6.7B, 6.8A, 6.9A, 8.2C, 8.3A, 9.1D substances)				
			HSR002661 (Corrosive, Combustible, Toxic)	50 L (for a HSNO 3.1A, 6.1A, 8.2A substances)	500 L (9.1A)	5000 L (all other) if classified as hazardous	1,000 L for class 6.1A, B or C and class 8
		100 L (for a HSNO 9.1A, 9.2A, 9.3A, 9.4A substances)					
		HSR002662 (Flammable)	250 L (for a HSNO 3.1B, 6.1B, 8.2B substances)	Signage			
		HSR002663 (Flammable, Corrosive)	1,000 L (for a HSNO 3.1C, 6.1C, 8.1A, 8.2C, 8.3A, 9.1B, 9.1C, 9.2B, 9.2C, 9.3B, 9.4B, 9.4C substances)				
		HSR002668 (Flammable, Toxic, Corrosive)	1,000 L (for a HSNO 3.1D, 6.1D, 9.1D, 9.2D, 9.3C substances)				
		HSR002669 (Flammable, Toxic)	Any amount (3.1A)	Storage incompatibilities with all Class 1, 2, 3.2, 4 and 5 substances			
Any amount (9.1A, 9.2A, 9.3A, 9.4A)							
250 L (when in containers greater than 5 L) for 3.1B							
	500 L (when in containers up to and including 5 L) for 3.1B						
	Any amount (3.1)						



7.0 HAZARDOUS SUBSTANCES MANAGEMENT

HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD	UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN TRIGGER QUANTITY	DISTRICT PLAN TRIGGER QUANTITY
12 Paint... continued			20 L (open 3.1A) 50 L (open 3.1B) 250 L (open 3.1C)	Location test certificate		
			20 L (closed 3.1A) 100 L in containers greater than 5L (closed 3.1B) 250 L in containers up to and including 5L (closed 3.1B) 500 L in containers greater than 5L (closed 3.1C) 1,500 L in containers up to and including 5 L (closed 3.1C)	Location test certificate	500 L (9.1A) 5000 L (all other) if classified as hazardous	1,000 L for class 6.1A, B or C and class 8
			100 L (closed) 25 L (decanting) 5 L (open occasionally) 1 L (if in open container for continuous use) (for a HSNO 3.1A, 3.1B and 3.1C substances)	Hazardous atmosphere zone		
			Any amount	Tracking (if Class 6.1B)		
			Any amount	Storage incompatibilities with all Class 1, 2, 3.2, 4 and 5 substances		
13 Petrol	3.1A, 6.1E, 6.3B, 6.7B, 9.1B	1203/HSR001445	50 L	Location test certificate	200 L not fixed or towed by vehicle;	
			100 L	Approved handler		
			1 L (in open container for continuous use) 5 L (open occasionally) 25 L (decanting) 100 L (closed)	Hazardous atmosphere zone	2000 L if fixed or towed by vehicle used for refuelling	None
			250 L	Signage		
				2 Fire extinguishers		
			1000 L	Secondary containment and Emergency Response Plan		



HAZARDOUS SUBSTANCE	HSNO CLASSIFICATION /GROUP STANDARD	UN NUMBER/ERMA APPROVAL NUMBER	HSNO TRIGGER QUANTITY	CONTROLS TRIGGERED (You must comply with all controls triggered e.g., for 100 kg acetylene, the controls for any quantity, 50 kg and 100 kg)	REGIONAL PLAN		DISTRICT PLAN
					TRIGGER QUANTITY	TRIGGER QUANTITY	
14 Polyaluminium chloride (PAC) Note: PAC is not considered Dangerous Goods under NZS 5433:2007 Transport of Dangerous Goods on Land	6.1D, 6.3A, 6.4A Water Treatment Chemicals (Subsidiary Hazard) Group Standard 2006	1327-41-9	100 L or 100 kg (for a HSNO 9.1A substance)	Secondary containment	None	1,000 L	
			1,000 L or 1,000 kg (for a HSNO 6.1D, 6.5A, 6.5B, 9.1B or 9.1C substance)				
			10,000 L or 10,000 kg (for a HSNO 9.1D, 8.3A, 6.6A, 6.8A or 6.9A substance)				
			100 L or 100 kg (for a HSNO 9.1A substance)				
			1,000 L or 1,000 kg (for a HSNO 8.3A, 9.1B or 9.1C substance)				
15 Sulphuric acid, >10% aqueous solution	6.1D, 6.7A, 6.9A, 8.1A, 8.2B, 8.3A, 9.1D	1830/HSR001572	10 L	Approved handler	None	1,000 L	
			1,000 L	Secondary containment			
				Signage			
16 Sulphuric acid, >5-10% aqueous	6.1E, 6.9B, 8.1A, 8.2C, 8.3A, 9.1D	2796/HSR001573	1,000 L	Signage	None	1,000 L	
			10,000 L	Secondary containment			
17 solution Transformer oil	6.1D Group Standards for Lubricants 2006 (Subsidiary Hazard)	HSR002602	100 L or 100 kg (for a HSNO 9.1A substance)	Secondary containment	500 L (9.1A)	1,000 L for Class 6 and 8	
			1,000 L or 1,000 kg (for a HSNO 6.1D, 6.5A, 6.5B, 9.1B or 9.1C substance)				
			10,000 L or 10,000 kg (for a HSNO 9.1D, 8.3A, 6.6A, 6.8A or 6.9A substance)				
			100 L or 100 kg (for a HSNO 9.1A substance)				
			1,000 L or 1,000 kg (for a HSNO 8.3A, 9.1B or 9.1C substance)				
			10,000 L or 10,000 kg (for a HSNO 6.1D or 9.1D substance)	Signage	classified as hazardous		



7.6.3 HSNO CONTROLS

The Table starting on page 7-13 details the required HSNO controls for some typical hazardous substances used in construction projects. If your hazardous substances are all listed in this Table, you need to adopt the required controls for the volume/weight of the substance you will have on site.

You must comply with all controls for volumes/weights of hazardous substances triggered.

FOR EXAMPLE If you have 50 kg of acetylene you need to have a fire extinguisher and not store it with all class 1, class 2.1.2, all class 3, and all class 4, all class 5 substances. If you have 100 kg you need to have a fire extinguisher, meet hazardous atmosphere zone requirements, obtain a location test certificate, and have an

If any of the hazardous substances in your inventory are not in the Table starting on page 7-13 you need to undertake an assessment of the regulatory requirements.

The rest of Section 7.6.3 provides detail on the controls listed in the Table starting on page 7-13. This information must be included in the CEMP where relevant.

HAZARDOUS SUBSTANCE REGISTER (HSR)

A Hazardous Substance Register (HSR) for each hazardous substance storage location must be prepared and maintained throughout the construction project. The person in charge is responsible for preparing and maintaining the HSR for your site.

The HSR will form part of the hazardous substances section of the CEMP that must be provided to and approved by LPC prior to works commencing onsite. A HSR template is available at:

www.hazardoussubstances.govt.nz/media/14051/EPA_Inventory%20Form.pdf

The HSR must include hazardous substance names, HSNO classifications, location where stored, maximum quantities held, Approved Handler for that location, the name of the Person in Charge, and record of whether a Safety Data Sheet (SDS) is held for that substance.

The HSR must be current at all times and must be updated when new substances are introduced.

The HSR must also be located within ready access of emergency personnel and Environment Canterbury staff taking into account that they should not be in an area which may become inaccessible due to the associated risk.

SAFETY DATA SHEETS (SDS)

SDS are required for all hazardous substances present. The SDS should be provided by the supplier when the substances are ordered and upon delivery.

The SDS must be available to a person handling the substance, and be readily understandable by any fully trained worker required to have access to it.

Copies of the SDS do not need to be supplied to LPC, but the storage method and location should be outlined in the CEMP.

LOCATION PLAN

A hazardous substances location plan shall be prepared for each area that stores hazardous substances. The location plan provides information to staff and emergency services with information on where hazardous substances are stored, the location of fire fighting equipment and spill kits.

A copy of the location plan shall be held together with the CEMP and positioned at the storage facility where it is easily accessible to all staff (such as by the entrance to the storage facility).



LABELLING

All containers containing any hazardous substance shall be labelled appropriately. SDS will provide the information required for labelling. The label on a hazardous substance should draw the attention of an employee who is handling or using the substance to the significant hazards involved. It should take into account all the hazards which are likely to occur during the use of the substance.

Where substances are decanted into smaller containers or into a different container from which it was supplied in, the container must be labelled accordingly.

TRANSPORTATION

It is the responsibility of the supplier of the hazardous substance to comply with the relevant transportation rules when delivering the hazardous substance on site. Once delivered to the construction yards, some materials may be transported off site for use at specific locations.

Vehicles that exceed the quantities in the Table below will need to comply with the following Land Transport Rules:

Quantity Limits for Hazardous Substances Transported for Use as Tools-Of-Trade & Commercial Purpose by Contractors

HAZARD CLASS	MAXIMUM QUANTITY
Class 3 Petrol or diesel	250 L
Class 6 6.1 Toxic (II)	50 kg/50 L
6.1 Toxic (III)	250 kg/250 L
6.2 Portable toilet effluent	250 L
Class 8 (II)	50 kg/50 L
Class 8 (III), Batteries (wet/dry)	250 kg/250 L
Class 9 (I)	5 kg/5 L
Class 9 (II)	50 kg/50 L
Class 9 (III)	250 kg/250 L
Mixed load	500 kg/500 L

Note: This is not an exhaustive list of classifications, only hazard classifications considered most relevant to this project based on the substances identified in the Table starting on page 7-13 and Appendix 7C are presented.

- Be loaded, secured, segregated, transported and unloaded safely to ensure that the packaging remains fit for its purpose and the dangerous goods do not present a hazard to any person, to property or to the environment.
- Appropriately packaged for the nature and quantity of the substance.
- Must be labelled and marked to identify the hazard they present.
- Be accompanied by documentation identifying the hazardous substance the hazard they present to the environment.
- Segregated from incompatible dangerous goods.
- Segregated from food items.
- Display of placards on the vehicle.
- A dangerous goods endorsement on a driver licence.

Where a motor vehicle is transporting flammable substances, fire extinguishers must be present in or on the vehicles.

STORAGE

Depending on the volume of hazardous substances stored, there will be specific requirements for the storage and containment of hazardous substances which are detailed in the following sections. The CEMP shall outline the storage requirements for the site based on the HSR prepared and how each of the following aspects are met (further information on storage requirements is provided in Appendix 7D).

Regardless of the volume stored or used, all hazardous substances must be handled in such a manner that there are no spills or leaks that could contaminate land, surface water or the Harbour.

Positioning

The location of hazardous substances storage area within the construction areas must consider the following:

- Whether the location meets the minimum separation distance requirements (see Appendix 7D).
- Proximity to the Harbour.
- Proximity to the stormwater drains.



- Proximity to the construction site boundary.
- Proximity to areas where people will congregate or (e.g., offices, smoko room).
- Proximity to other operational areas at the Port.
- Proximity to other hazardous substance locations.
- Positioned so that if there is a spill it will not come into contact with any heated surface.
- Positioned so that if there is a spill it will not contaminate the Harbour.
- Positioned so that if there is a spill it can be contained before entering any stormwater drains.
- Positioned so as to avoid accidental collision by vehicles.

Wherever practicable, the storage and use of the chemicals must be in an area which can contain or restrict the flow from a spill site. On benches, this can be assisted by a raised lip at the front of the bench, or by the use of spill trays.

Secondary Containment

Secondary containment needs to comply with requirements under HSNO and the NRRP.

All hazardous substances above domestic quantities that have pooling potential must be stored in a secondary containment device or system. Secondary containment includes double walled tanks, drip trays, bunds and sumps. Having containers and drums on drip trays or similar will aid in good housekeeping of the storage facility.

The secondary containment device or system shall be:

- i. Constructed of impervious materials that are resistant to chemical attack from the substances contained therein.
- ii. Designed, constructed and managed so that uncontaminated stormwater runoff is prevented from flowing into the contained area.

The capacity of secondary containment systems (bunding) required for hazardous substances held in containers are outlined in Appendix 7D.

Signage

Substances and quantities that trigger the requirement for signage are presented in the Table starting on page 7-13 for common substances on construction sites.

Where the hazardous substance is stored within a building, signage must be placed at every vehicular access and pedestrian access to the building and to the construction yard. Where hazardous substances are located within a room, signage must be placed at each entrance to the room. If hazardous substances are stored at an outdoor area, signage must be positioned immediately next to that area.

Signage must:

- advise that the location contains hazardous substances;
- describe the hazardous property and nature of the hazard(s) of the substance;
- describe the precautions needed to safely manage the substance;
- describe the precautions needed to avoid ignition of the substance;
- identify appropriate emergency response agency(s) or personnel and the means of contacting them;
- provide sufficient information to advise any of the trained persons and the emergency service provider(s) of the immediate emergency response actions for the hazardous substances present;
- be easily understood; and
- be able to be easily read at a distance under varying conditions.

Location Test Certificates

If you are storing highly flammable or oxidising substances at quantities that exceed the limits set down in the HSNO regulations within the construction area, Location Test Certificates (which are similar in intent to the previous Dangerous Goods Licence) must be obtained. A Location Test Certificate is issued by an EPA approved test certifier. A Location Test Certificate is only required if the substance is stored for more than 18 hours at that location (if tracking of that substance is not required).



Segregation

Chemical reactions can occur when certain chemicals are mixed together. In uncontrolled circumstances (i.e., spills), chemicals that are not compatible with each other (such as flammable (Class 3) and oxidising substances (Class 5)) may react with one another and produce any of the following hazards:

- Heat or pressure.
- Fire or explosion.
- Violent reaction.
- Toxic dusts, mists, fumes or gases.
- Flammable fumes or gases.

Chemicals which, when mixed with each other, can react to produce these hazards are termed "incompatible". Incompatible chemicals will be stored separately in order to prevent uncontrolled chemical reactivity hazards.

Segregation must be carried out by the following means:

- Distance – separate by a distance of at least 3 metres. More detail on separation distances for above ground tanks and storage buildings are detailed in Appendix 7D.
- Partition – isolate using partitions, berms, bunds or spill pallets.
- Cabinets.

The safety data sheets (SDS) for a substance should provide information on any incompatibilities. The Table starting on page 7-13 lists the classes of incompatible substances for common substances on construction sites.

Security

The level of security required for storage of hazardous substances should be identified to prevent vandalism and theft.

HAZARDOUS ATMOSPHERE ZONES

Hazardous atmosphere zones will need to be established at locations that store flammable chemicals above the specified thresholds presented in for common substances outlined in the Table starting on page 7-13. The purpose of establishing hazardous atmosphere zones is to ensure that the likelihood of unintended ignition is reduced within the areas. Where hazardous atmosphere zones need to be established, the CEMP must outline the extent of any zones and how compliance with the requirements is achieved.

The means by which areas are classified as hazardous are specified in AS/NZS 60079.10.1:2009, Explosive atmospheres – Classification of areas – Explosive gas atmospheres.

Electrical installations in hazardous zones will comply with:

- AS/NZS 60079.14-2009 Explosive atmospheres – electrical installations design, selection and erection; and
- AS/NZS 60079.17-2009 Explosive atmospheres – electrical installations inspection and maintenance.

APPROVED HANDLER

An Approved Handler will be responsible for handling of certain classes of hazardous substances. This person will have an Approved Handler Certificate that indicates that the person meets the competency requirements laid down in the HSN0 regulations for handling that hazardous substance.

A substance may be handled by a person who is not an approved handler if:

- An approved handler is present at the place where the substance is being handled;
- The approved handler has provided guidance to the person in respect of the handling; and
- The approved handler is available at all times to provide assistance, if necessary, to the person while the substance is being handled by the person.

In a case of transporting packaged substances on land, the approved handler requirement is deemed



complied with if the person who drives, loads, and unloads the vehicle that is transporting the substance has a current dangerous goods endorsement on their driver's licence and the Land Transport Rule is complied with.

FIRE EXTINGUISHERS

The Table in Appendix 7C provides guidance for common substances on the number of fire extinguishers that will be utilised at the appropriate locations. Fire extinguishers must be placed no further than 30 m from where the substances are stored and will be serviced regularly. Extinguishers should have a minimum 30B rating.

The fire extinguisher may be substituted by a hydrant system incorporating a 20 mm diameter hose, fitted with a spray nozzle and of sufficient length to enable water to be directed to all sides of the storage facility or storage tanks.

The site location plan included in the CEMP shall show the location and type of all fire extinguishers to be used on-site.

ABOVE GROUND STATIONARY CONTAINERS

Some construction yards may have above ground tanks for refuelling purposes. Tanks of certain capacity require a stationary container test certificate issued by a test certifier. If you are considering installing or bringing an above ground container to the site, you should discuss this with LPC Project Manager first as there are some significant certificate and design requirements that would have to be addressed.

In particular, the following above ground tank capacities will trigger the requirement for certification:

- 2,500 L and contain class 3.1A (e.g., petrol) or 3.1B (e.g., acetone, solvents).
- 5,000 L and contains a hazardous liquid of any other classification (e.g., diesel, toxic, corrosive or ecotoxic substance).
- 500 L water capacity containing a hazardous gas (e.g., LPG).

All above ground process containers will require certification if they are:

- over 250 L water capacity and contain a hazardous gas; and
- over 1000 L capacity and contain a hazardous liquid.

DISPOSAL

You need to make sure you consider management of the disposal of empty hazardous substance containers and hazardous materials such as waste oil. The SDS has information which should be referred to and considered when determining the most appropriate means of disposal. All substances no longer required during the construction phase of the Project will be:

- removed and stored at another suitable storage facility for hazardous substances; or
- removed by a licensed operator and treated so that it is no longer a hazardous substance.

Treatment of the substance includes depositing the substance in a licensed landfill, incinerator or sewage treatment facility so that the substance is rendered non-hazardous by means other than dilution.

DISPOSAL OF PACKAGING

Packaging that contained (directly in contact with) a hazardous substance, will be disposed of in a manner that is consistent with that of the substance it contained, taking into account the nature and type of packaging.

If any residue of the hazardous substance has been removed, or treated so it is non-hazardous, the package may be reused or recycled.



EMERGENCY MANAGEMENT

There are three levels of emergency management requirements under HSNO and these depend on the quantities of hazardous substances that are held. The levels are as follows:

Level one: Requirements for the provision of information (e.g., first aid instructions or spill response procedures see Section 7.6.3 – Labelling, page 7-21, for labelling requirements and the Spill Management Procedure section below for spill response plan).

Level two: Further documentation (see Safety Data Sheets (SD) section, page 7-20 and Fire Extinguishers section, page 7-24).

Level three: Emergency response plans.

A separate overarching Emergency Response Plan will be prepared by LPC for the Port but Contractors will need to prepare a specific emergency response plan if the trigger quantities specific to the Contractor's activities are exceeded.

An appropriate template can be found at the EPA website, that can be used to develop your emergency response plan www.epa.govt.nz/Publications/Emergency-procedures-stop,-think,-act.pdf.

The emergency response plan will form part of the hazardous substances section of the CEMP that must be provided to and approved by LPC prior to works commencing onsite.

SPILL MANAGEMENT PROCEDURE

It is important that construction workers are trained in the management of chemical spills and that the procedures are regularly tested. The basis of the spill response plan is that any spills will be contained within the site boundary, and there will be no discharge of contaminants to the wider receiving environment. To ensure the response to any spills is effective, there needs to be provision of all equipment required to manage a spill and training of staff.

In the event of a chemical spill the following immediate actions are required to be taken:

1. Check for any persons involved.
2. Contact emergency services if injuries are serious and administer first aid (if possible).

3. Identify the source and stop source if safe to do so.
4. Isolate the spill (if safe to do so). Protect stormwater – confine the spill and block off access to the stormwater system through drain covers.
5. Contact the Site Manager and the Environmental Manager for high risk spill.
6. Site manager to notify the Environment Canterbury 24 hour emergency response service in the event of a spill that results in contamination to stormwater system, waterbody or onto land.
7. Gather any information possible, i.e., identify the material and quantity, gather relevant SDS and assess any immediate risks.
8. Clean up.
9. Document the incident and review.

Staff that use or manage chemical substances must have an understanding of the SDS including the special requirements for spill control such as the type of fire extinguisher required, incompatible substances, and reactivity with substances such as water or air.

SPILL KITS

Spill kits must be available for use and placed at each storage area within the yard. Commercial spill kits are available that contain personal protective equipment (PPE), spill-handling equipment, containment equipment, absorbent materials and a disposal container.

It is the contractor's responsibility to:

- ensure that the spill kit is clearly labelled and located in an easily accessible position for all staff;
- ensure that all staff are aware of and can access the chemical spill management and chemical spill guidelines, and know how to use the spill kit in case of an emergency; and
- ensure spill kits are restocked following use and the contents checked on a monthly basis.





7.7 APPENDICES



APPENDIX 7A REGULATORY SETTING

HSNO Act

The use, storage, and disposal of hazardous substances are managed under HSNO Act. The HSNO Act deals with the safe management of all hazardous substances including those that are explosive, flammable, oxidising, toxic, corrosive, or harmful to the environment. The HSNO regime requires substances to be controlled throughout their lifecycle and prescribes regulations covering packaging, identification, emergency management, disposal, tracking, storage and handling.

Broadly speaking, the term hazardous substance includes any substance that can damage the environment or harm human health and safety. Substances deemed hazardous are classified into six hazardous property areas. It follows as closely as possible the globally harmonised system (GHS) for hazard classification. The six broad classes of hazard are:

- explosiveness (Class 1);
- flammability (Class 2, 3, 4);
- oxidising ability (Class 5);
- corrosiveness (Class 8);
- toxicity (Class 6); and
- ecotoxicity (Class 9).

The types of hazardous substances likely to be present during construction activities are listed in the Table starting on page 7-13 and Appendix 7C. This list of hazardous substances will be reviewed and amended to reflect hazardous substances used over time. The classifications or group standards and controls that apply under HSNO based on the substances identified are also outlined the Table starting on page 7-13.

Resource Management Act 1991

The regulatory requirements under the Resource Management Act 1991 (RMA 1991) are based on the relevant requirements in the following legislative documents:

- Canterbury Natural Resources Regional Plan (NRRP).
- Proposed Canterbury Land & Water Regional Plan (PCLWRP).
- Canterbury Coastal Plan (CCP).
- Banks Peninsula District Plan (BPDP).

Natural Resources Regional Plan

Environment Canterbury requires the storage and use of hazardous substances at the construction sites to be properly managed to ensure that no hazardous substance enters stormwater or waterways nor contaminates the land. The use and storage of hazardous substances on land is controlled under Rule WQL38A of the Canterbury Natural Resources Regional Plan (11 June 2011). This establishes a range of controls and requirements based on the volume of hazardous substances stored and the location. The controls relate only to the following hazardous substances:

- Petroleum hydrocarbons, including those used for cooling purposes, but excluding liquefied petroleum gas.
- Chlorinated hydrocarbons.
- Pesticide.
- Timber preservative.
- Substance containing any one or more of the following: arsenic, cadmium, chromium, cyanide, lead, mercury, nickel or selenium.



Proposed Canterbury Land & Water Regional Plan: Decisions Version

The Proposed Canterbury Land and Water Regional Plan decisions version (PCLWRP) took effect on 18 January 2014. The use and storage of hazardous substances on land is controlled under Rules 5.179, 5.180 and 5.181 of the PCLWRP Plan. This establishes a range of controls and requirements based on the volume of hazardous substances stored and the location. The controls relate to substances classified as hazardous substances under the HSNO regulations.

The use of land for the storage in a portable container and use of a hazardous substance is a permitted activity provided the following conditions relevant to operations at the Port are met:

- The requirements under HSNO are met for the substance.
- The container(s) are not located within 20 m of a surface water body.

The use of land for the storage other than in a portable container and use of a hazardous substance is a permitted activity provided the following conditions relevant to operations at the Port are met:

- The requirements under HSNO are met for the substance.
- A current inventory of all hazardous substances on the site is maintained and a copy of the inventory shall be made available to Environment Canterbury or emergency services on request.
- All areas used to store or hold hazardous substances shall be inspected at least once per month.

For in-ground or underground storage containers:

- If there has been any physical loss of product the Environment Canterbury shall be notified within 24 hours of confirmation of the loss.
- Records of stock reconciliations over the past 12 months shall be held and made available on request.

Canterbury Coastal Plan

The Regional Coastal Plan (20 September 2012) provides for the storage and use of hazardous substances within the operational area of a port as a permitted activity under Rule 8.33. The permitted activity rule does not have any standards, therefore, there are no additional requirements.

Banks Peninsula District Plan

The Banks Peninsula District Plan sets out rules for the storage and use of Hazardous Substances. The Plan sets thresholds for hazardous substances as to whether land use consent is required based on the volumes and classifications of the hazardous substances stored.

The minimum requirements for the storage and use of substances, below the permitted activity maximum volume limits, are as follows:

- The storage should be designed to ensure there is no contamination of any land and/or water by release or spillage of the hazardous substances.
- There is no discharge of hazardous substances into any stormwater drain or sewerage system.
- Any stormwater originating from or collected on the site does not contaminate any land unless permitted by a resource consent.

The maximum permitted volume limits are outlined in the Table in Appendix 7C.

Land Transport Act 1998

The requirements for transporting hazardous substances on land is covered by the Land Transport Act 1998 (LTA). Under Section 152 of the LTA, the Minister has made rules for the transport of dangerous goods under the Land Transport Rule 45001/1, 45001/2 and 45001/3: Dangerous Goods 2005.

These Rules set out the requirements for the safe transport of dangerous goods on land in New Zealand. The Rules cover the packaging, identification and documentation of dangerous goods; the segregation of incompatible goods; transport procedures; and the training and responsibilities of those involved in the transport of dangerous goods. The Rules' requirements are applied according to the nature, quantity and use of the goods. The specific requirements are outlined in Section 7.6.3 – Transportation, page 7-21.



APPENDIX 7B DEFINITIONS

Cement – means a building material which can be mixed with water and poured to set as a solid mass or used as an ingredient in making mortar or concrete.

Concrete admixture – means a material other than cement, water and aggregate that is added to a concrete mixture to change the properties of the concrete such as colour, curing temperature range and setting time.

Concrete etching agent – means any material that is used to etch or change the surface of concrete.

Construction product – means any cement, mortar, concrete admixture or etching agent, plaster, grout, putty, filler, or roading product intended for use in construction or repair.

Container – a receptacle that is able to hold the substance e.g., tank, drum, can, bottle.

Filler – means a composition, especially a semisolid that hardens on drying, used to fill pores, cracks, or holes in wood, plaster, metal or other construction surfaces before finishing and includes filler materials used in automotive repair.

Fire resistance rating – Fire systems are rated to withstand a fire under test conditions for a certain period of time. For example, a fire resistance rating of 60/60/60 means that during a fire test, the system did not fail for 60 minutes for structural integrity, integrity and insulation.

Grout – means thin mortar or plaster typically used to fill cracks and crevices in masonry or for finishing walls and ceilings.

Hazardous substance – any substance that has one or more of the following intrinsic hazardous properties: explosiveness; flammability; ability to oxidise (accelerate a fire); human toxicity (acute or chronic); corrosiveness (to human tissue or metal); ecotoxicity (with or without bioaccumulation); and capacity, on contact with air or water, to develop one or more of the above properties.

High intensity land use – includes: area of regular habitation; a structure made of or containing combustible materials that would sustain a significant fire; and high density traffic. It does not include a small office constructed of non-combustible materials associated with a hazardous substance location.

Label – is a set of information on a container which identifies the substance in the container and identifies whether the substance is hazardous and provides basic information about the safe use and handling of the substance.

Low intensity land use – includes: an area where any person may be legally present occasionally; a public park or reserve; and a traffic route of low or medium traffic density; but does not include an area of regular habitation.

Mortar – means a bonding material used in masonry, surfacing, and plastering, especially a plastic mixture of cement or lime, sand, and water that hardens in place and is used to bind together bricks or stones.

Paint – includes but is not limited to any material used or intended to be used for application as a colouring or protective coating to any surface, including lacquers, varnishes, stains, all parts of a multi component paint, tinters and thinners.

Pooling substance – a hazardous substance that is a liquid or is likely to liquefy in a fire.



Roading product – means any product used in the preparation, construction, or repair of roads, driveways, or pavements (e.g., bitumen, excludes aggregate).

Safety Data Sheet (SDS) – information sheets that provide technical information in relation to substances. These sheets are obtained directly from the manufacturer/supplier.

Secondary containment system – means a system in which substances (in liquid form) will be contained if they escape from the container where they are being held. The most common form of secondary containment system for above ground stationary containers is a compound (bund).

Tank – means an enclosed receptacle that is stationary (stationary container) used for the storage of hazardous substances.

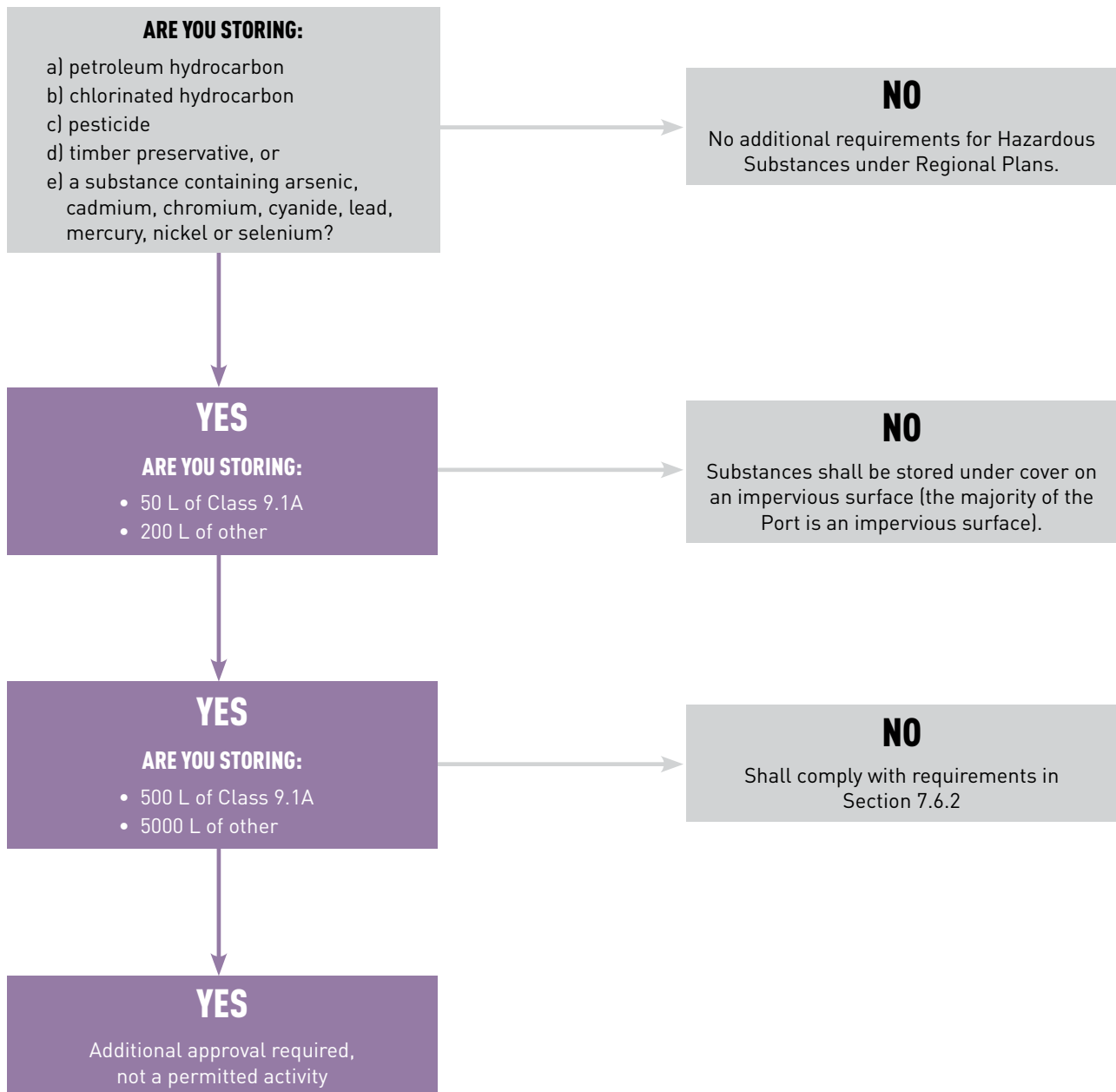
Transportation container – a container that is not fixed to a chassis and can be unloaded at a destination or transferred to another transport mode (e.g., intermediate bulk container, IBC).



APPENDIX 7C

RESOURCE CONSENT TRIGGERS

Outlines the Circumstances at which Controls Under Rule WQL38A (Canterbury Natural Resources Regional Plan Chapter 4: Water Quality) Apply





Maximum Volume to Meet Permitted Activity Criteria Under the Banks Peninsula District Plan

DISTRICT PLAN HAZARDOUS SUBSTANCE CLASS		HSNO CLASSES	EXAMPLE SUBSTANCES	MAXIMUM VOLUME TO MEET PERMITTED ACTIVITY CRITERIA
1a	Explosives	Class 1	Nitrate mixtures, ammunition	25 kg storage only
1b	Explosives (HSNO Class 1) for use in manufacture or reloading of small arms cartridges, or for the storage of flares.	Class 1	Gunpowder, flares	50 kg storage only
2.1a, 2.1b, 2.2, 2.3, 3a, 3b, 3c, 3u	Flammables gases, Toxic Gases, Non-flammable Gases, Non-toxic gases, Flammable Liquids,	Classes 2 and 3	LPG, Acetylene, methyl bromide, oxygen, argon, petrol, kerosene, diesel	No limit
4.1	Flammable Solids	Class 4.1	Phosphorus	1,000 kg
4.2, 4.3	Flammable Solids that may spontaneous combust Substances which in contact with water emit flammable gases.	Classes 4.2 and 4.3	Zinc dusts	5,000 kg
5.1	Oxidising substances	Class 5.1	Sulphuric acid	1,000 kg
5.2	Organic Peroxides	Class 5.2	Percarbonates	25 kg
6	Toxic substances	Class 6.1	Ethylene Glycol, Monobutyl ether	6,000 L
8	Corrosives	Class 8	Sulphuric acid	5,000 L
9.1	Timber preservatives	Various	Copper, chromium, arsenic, boron, LOSP	20 L
9.2	Chlorinated solvents	Various	Trichloroethane	5,000 L



APPENDIX 7D STORAGE REQUIREMENTS

Fire Resistance Rating

Depending on the quantity of flammable substances stored, there are varying degrees of fire resistance for the walls and ceiling of the room within which the substance should be stored. The fire resistance requirements are set out in the Table below.

Fire resistance rating of stores within a building:

QUANTITY OF CLASS 3.1 SUBSTANCE	FIRE RESISTANCE RATING
<450 L in containers <20 L capacity	60/60/60
<2,000 L in containers <60 L + one 250 L container	Reinforced concrete or 120/120/120
<5,000 L in containers >60 L (Class 3.1A, 3.1B)	Brick, block concrete or reinforced concrete
<10,000 L in containers <60 L (Class 3.1A, 3.1B)	concrete, 240/240/240

Separation Distances

Above ground tanks and buildings in which flammable substances are stored should be located in accordance with the separation distances presented in the Tables below. These Tables have been partly reproduced from the December 2008 Gazette Notice. Not all volumes presented in the Gazette Notice have been included in the Tables; however they provide a good indication of the level of separation distance required.

Separation distances for above ground tanks:

CAPACITY (L)	DISTANCE TO HIGH INTENSITY LAND USE (m)		DISTANCE TO LOW INTENSITY LAND USE (m)
	3.1A-C	3.1D	3.1A-C
Up to 600	2	0	0
5,000	4	3	2
50,000	6	5	4
100,000	7	6	4
1,000,000	11	9	7

Separation distances for building storing flammable substances (Class 3.1A, 3.1B, 3.1C) in packages <60 L:

CAPACITY (L)			DISTANCE TO HIGH INTENSITY LAND USE (m)
Type A or B building	Type C building	Type D building	
250	1,000	20,000	0
2,000	-	50,000	3
10,000	100,000	-	10
25,000	400,000 or more	-	15
60,000 or more	-	-	20



Separation distances for building storing flammable substances (Class 3.1A, 3.1B, 3.1C) in packages <60 L:

CAPACITY (L)			DISTANCE TO HIGH INTENSITY LAND USE (m)
Type A or B building	Type C building	Type D building	
-	-	10,000	0
-	500	-	2
1,000	-	100,000	6
-	10,000	400,000 or more	10
20,000	60,000	-	20
60,000 or more	-	-	30

Type A building – a platform that is secured and made of non-combustible material.

Type B building – a framed building with non-combustible cladding.

Type C building – fire rating of 120/120/120 minutes, roof of wood or iron.

Type D building – fire rating of 240/240/240 minutes, reinforced concrete roof with fire rating 240/240/240.

Secondary Containment

The capacity of secondary containment systems (bundings) required under HSN0 for hazardous substances held in containers are as follows:

Capacity of bunding for areas storing hazardous substances in containers:

EACH CONTAINER SIZE (L)	TOTAL POOLING POTENTIAL (L)	CAPACITY OF BUND
60	<5,000	≥50% total pooling potential or an effective storage height of 100 mm whichever is the greater
60	>5,000	Greater of 2,500 L, 25% of total pooling potential or an effective storage height of 100 mm
60–450	<5,000	Total pooling potential
60–450	>5,000	Greater of 5,000 L, 50% of total pooling potential or an effective storage height of 100 mm whichever is the greater
>45	-	110% of the largest container

Containers stored below ground must have secondary containment system that will collect at least the total pooling potential.

All above ground stationary containers (i.e., tanks) will require a bund capacity that is at least 110% of the largest tank it contains. Depending on the size and placement of the tank (for example if the tank is placed on a stand), the layout of the bund should consider projectile leaks from the tank should a puncture occur. Filling points for tank must be located within the bund.

Incompatible substances will require separate secondary containment systems.



7.0 HAZARDOUS SUBSTANCES MANAGEMENT







8.0

TECHNICAL SECTION

WILDLIFE



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Hector's dolphins

(image © Shelley McMurtrie/EOS Ecology)



8.1

INTRODUCTION

This Section provides technical guidance for Contractors on how wildlife effects must be managed during construction, and helps them to prepare the wildlife management sections of their CEMP.

Please note, throughout this Section, any references to 'you' or 'your' are directed at the Contractor.

As part of Banks Peninsula, the Port and Lyttelton Harbour/Whakaraupō are part of a regionally distinct incised coastline that supports a wide variety of marine life. The topography of the steep slopes and hills surrounding the Port have also given rise to a diverse range of environments for terrestrial wildlife.

As people have modified the environment surrounding the Port, many of the distinctive wildlife and vegetation types have disappeared, been changed or become more localised in their distribution. Despite these changes over the past 200 or more years, there is still a substantial variety of threatened, rare or locally important wildlife – both on land and in the sea.

LPC takes its corporate environmental responsibilities seriously, and that extends to being a leader in the stewardship of wildlife. In concert with Tangata Whenua Waitaha, Ngāti Mamōe and Ngāi Tahu, LPC seeks to identify and manage risks and, where appropriate, protect and enhance indigenous biodiversity on the land and in the water.

As part of that legal and ethical responsibility, Contractors must do the right thing. Works associated with the reinstatement and redevelopment of the Port has the potential to generate impacts on wildlife during construction.

You will need to manage these potential effects from your activities to avoid undue impacts on species and habitats of special importance. Part of this also includes maintaining positive relationships with organisations that have a responsibility or interest to ensure the welfare of such wildlife, such as the Department of Conservation (DOC), Tangata Whenua and the Regional and District Councils.

Wildlife included in this CEMP are species, communities or habitats that are of conservation significance having been identified through the resource consent process, or being of local or cultural importance. In most cases 'conservation significance' equates to its classification in DOC's species threat classification system which categorises species risk of extinction based on population size, existing threats and rate of decline over time¹.

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

¹ Townsend, A.J.; de Lange, P.J.; Norton, D.A.; Molloy, J.; Miskelly, C.; Duffy, C. 2008. New Zealand Threat Classification manual. Department of Conservation, Wellington. 30 p.



ASSESSMENT

i

8.2 ROLES & RESPONSIBILITIES

Outlines the responsibilities of the Contractor, Wildlife Specialist and the LPC Project Manager.

8.3 SETTING

Provides a description of the context for wildlife at the Port.

8.4 RISK ASSESSMENT

Steps you through deciding if risk of impacting on wildlife is high/medium/low for your project.



DESIGN

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8.5 PERFORMANCE STANDARDS

What wildlife criteria your project has to achieve.

8.6 CONTROL MEASURES

What to do for high/medium/low risk projects. For high risk projects additional mitigation is specified by the Wildlife Specialist as required.



OPERATION

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8.7 MONITORING & REPORTING REQUIREMENTS

Requires monitoring throughout the project and may trigger the need for additional involvement of the Wildlife Specialist.

Wildlife monitoring results to be reported to the LPC Project Manager when required. Reporting may also be required to DOC under specified permits or Authorities for wildlife work.

8.8 CONTINGENCY MEASURES

References the procedure for involving further Wildlife Specialist expertise where situations of wildlife handling may be required.



8.2 ROLES & RESPONSIBILITIES

Port development activities are generally undertaken by third party Contractors, which are managed directly by LPC or a consultant on behalf of LPC.

8.2.1 CONTRACTOR

- Preparing and implementing the wildlife content of the CEMP in accordance with this Technical Section.
- Engaging with a Wildlife Specialist for day to day observations if the project has a high risk rating.
- Monitoring wildlife at the beginning of project and notifying the LPC Project Manager as soon as possible if wildlife is found within the project area where it has not been recorded in this Technical Section.
- Implement the control measures at all times. All Contractors and sub-contractors have an obligation to stop work and inform the project Wildlife Specialist if the Wildlife Accidental Discovery Protocol (WADP, Section 8.9) is triggered by work in the project area.
- Liaison with the LPC Project Manager on any complaints received, wildlife investigations undertaken and any instance where DOC's assistance is sought.

8.2.2 WILDLIFE SPECIALIST

- Providing advice on wildlife values as part of project planning, especially in areas of high risk for wildlife.
- Undertaking pre-works checks for wildlife in accordance with the Performance Standards as set out in this Technical Section.
- Undertaking wildlife recovery and relocation works (if permitted under the appropriate legislation) or liaising with DOC or other appropriately qualified specialists to undertake such wildlife recovery and relocation as may be required by the controls or WADP.
- Providing advice to Contractor on additional mitigation measures appropriate for high risk projects.



8.2.3

LPC PROJECT MANAGER

- Direct the Contractor to undertake investigations, monitoring and methodology changes if required in light of wildlife monitoring results, and in accordance with the advice of the Wildlife Specialist.
- Where permits or Authorities to undertake work on wildlife are deemed by the Contractor to be absent, incomplete or not fit for purpose, the LPC Project Manager shall review those materials in conjunction with the Wildlife Specialist and liaise with DOC.



8.3 SETTING

8.3.1 LAND ENVIRONMENTS

Areas of land owned by LPC include the Inner Harbour, Te Awaparahi Bay, and margins and inland areas around Gollans Bay.

The highly developed nature of the Inner Harbour and Te Awaparahi Bay for Port operations has resulted in the removal of most habitat that would have originally supported native wildlife. Areas of habitat remaining are edge strips of planted or regenerating amenity gardens, or shrubland communities along the inland boundaries of the facilities areas (for example, between Godley Quay, Simeon Quay and the Port facilities). These habitats are likely to support mostly exotic (introduced) birds and plants, however they may provide habitat for native skinks, particularly Canterbury grass skink (*Oligosoma aff. polychroma* Clade 5).

To the east of the Port, Gollans Bay and inland areas owned by LPC offer more natural habitats for wildlife. Grassland areas support thick, ungrazed grass swards that are preferred habitat for the Canterbury grass skink and native McCann's skink (*Oligosoma maccanni*). Rocky outcrops scattered across slopes are known to support the native Waitaha gecko (*Woodworthia cf. brunnea*) and remnant shrubland areas behind parts of Gollans Bay Quarry may support the threatened jewelled gecko (*Naultinus gemmeus*).

8.3.2 MARINE & COASTAL EDGE ENVIRONMENTS

Lyttelton Harbour/Whakaraupō, including the harbour entrance, is home to three species of whales, four species of dolphins and one seal species. The harbour areas, including coastlines, are used or visited by at least 42 species of birds that use the marine area. Some of these species use the inner harbour and are known to frequent the Port for parts of their life cycle such as foraging, resting, breeding and moulting. Many of these species are rare or endangered and are therefore of particular interest to manage appropriately, including ensuring that Port activities do not adversely affect them.

Built structures such as wharves, piles and rock or block seawalls offer habitat for seabirds and resting places for marine mammals. Removal of built structures and works within the marine environment are activities that will be undertaken under this CEMP. Therefore, there is a need to minimise potential disturbance, injury or mortality to wildlife.

The seawalls around the Port offer nesting crevices used by White-flippered penguins (*Eudyptula minor albosignata*), a penguin that is only found in the Banks Peninsula area. Seawalls also offer habitat for New Zealand fur seals (*Arctocephalus forsteri*) as haul-out areas, and as roosting or resting sites for



seabirds such as Pied shag (*Phalacrocorax varius*), White-fronted tern (*Sterna striata*) and Black-billed gulls (*Larus bulleri*). Parts of the Port that have less foot and vehicle traffic are favoured by some birds for nesting and roosting, such as Z Pier for Pied shag, White-fronted tern, Black-billed gull and Variable oystercatcher (*Haematopus unicolor*).

The waters around the Port, including within the inner operations area and within the harbour waters near wharf complexes, is habitat for New Zealand fur seals, Hector's dolphin (*Cephalorhynchus hectori*), and foraging shags.

8.3.3

SPECIES & HABITATS OF CONSERVATION SIGNIFICANCE

Locations shown in the risk analysis in the next section have been identified based on the availability of habitat within an area and the likelihood of wildlife using it.

Wildlife of most interest to LPC are species that are of conservation significance or that have particular local importance to the community. A summary of the species for which risk assessments have been included in this Technical Section is provided in Appendix 8A.



8.4 RISK ASSESSMENT

8.4.1 THREATS & RISKS FROM PORT ACTIVITIES

The types of activities and potential causes of effects on wildlife include:

1. **Physical removal of habitat** – such as the removal of vegetation supporting lizards, or the removal or upgrade of seawalls containing nesting or moulting White-flipped penguin (WFP). By adhering to the controls outlined in this Technical Section, injury or mortality of wildlife can be avoided.
2. **Piling activities** – which generate underwater noise with potential effects on whales and dolphins, particularly Hector's dolphin. In order to minimise the potential for injury, LPC adopts a 'stop' protocol if marine mammals are observed within 300 m of piling activities, and a 'soft-start' technique whereby piling force is started low in order to deter any nearby dolphins (and other marine life that may be equally susceptible).
3. **Vehicle and foot traffic movements** – in the vicinity of known nesting areas for seabirds which may cause nest abandonment by adults or injury or death to chicks that have wandered from nests. Nesting areas are few and are located at Z Berth and Gladstone Pier. Avoidance of these nesting areas, and appropriate caution when driving or walking in the vicinity of nesting areas over the summer breeding season is recommended.

4. **Movement of vessels within the Port** – which can disturb roosting seabirds or injure birds such as shags that may be foraging around Port structures; and vessel strikes with marine mammals (mostly whales). General awareness of wildlife presence will minimise potential effects.

You need to rank risk of potential adverse effect on wildlife as high, medium or low for your project. The ranking will be translated into your CEMP as a **high (red)**, **medium (orange)** or **low (green)** box where specified in the template. Areas that are not coloured are of negligible risk to wildlife. Generally, the higher the risk the more control measures will be required.

To make this assessment you need to rank your project against each of the criteria in the table on the next page. The following sections will help you decide which criteria your project meets. All piling activities are considered high risk.

Your project's risk rating is determined by your highest risk criteria. For example, if an effects assessment predicts potential impacts on New Zealand fur seal basking areas within your project site, the relevant performance standard is low risk, but if the project also involves potential impacts on nesting penguins along the same length of seawall (high risk), your project's overall wildlife risk rating is high.

Note that the risk for the project should be determined based on the highest risk type of work. The risk categories are used to define the minimum mitigation measures required as outlined in Section 8.6 of this Technical Section.



The following table illustrates the risks to wildlife associated with various activities within LPC land and surrounding waters.

Risk Assessment Evaluation Tool

ACTIVITY	RISK RATING		
	HIGH	MEDIUM	LOW
Piling	Hector's dolphin any time	n/a	Seabirds, WFP & New Zealand fur seal any time
Seawall or wharf disturbance (foot and vehicle traffic, deconstruction)	WFP Jul–Feb – during nesting/ moulting season in areas of known occurrence Seabirds Sep–Mar – during nesting season, or in close proximity to Z berth, western end of Cashin Quay and Gladstone Pier, and southern end of Cashin Quay adjacent to the breakwater	WFP at all seawalls or under piers not included as high risk areas Seabirds in areas not addressed by high risk areas	New Zealand fur seal haul out areas
Disturbance within unmodified coastlines east of Port operations area (Gollans Bay and surrounds)	WFP Aug–Feb – during nesting/moulting season	New Zealand fur seal haul out areas WFP & Seabirds	n/a
Vessel movement around Port operations area and surrounds	Hector's dolphin summer – when more abundant	n/a	New Zealand fur seal in water Seabirds especially shags
Vegetation clearance	Native lizards within established grassland, shrubland or rock outcrops	Native lizards within amenity plantings and regenerating shrublands	n/a
Large scale construction using potentially dusty construction materials, lime use for soil stabilisation, on site concrete batching plant	Native lizards within established grassland, shrubland or rock outcrops	Native lizards within amenity plantings and regenerating shrublands	n/a



For some species, the risk rating will change during the year, and are listed in the below table.

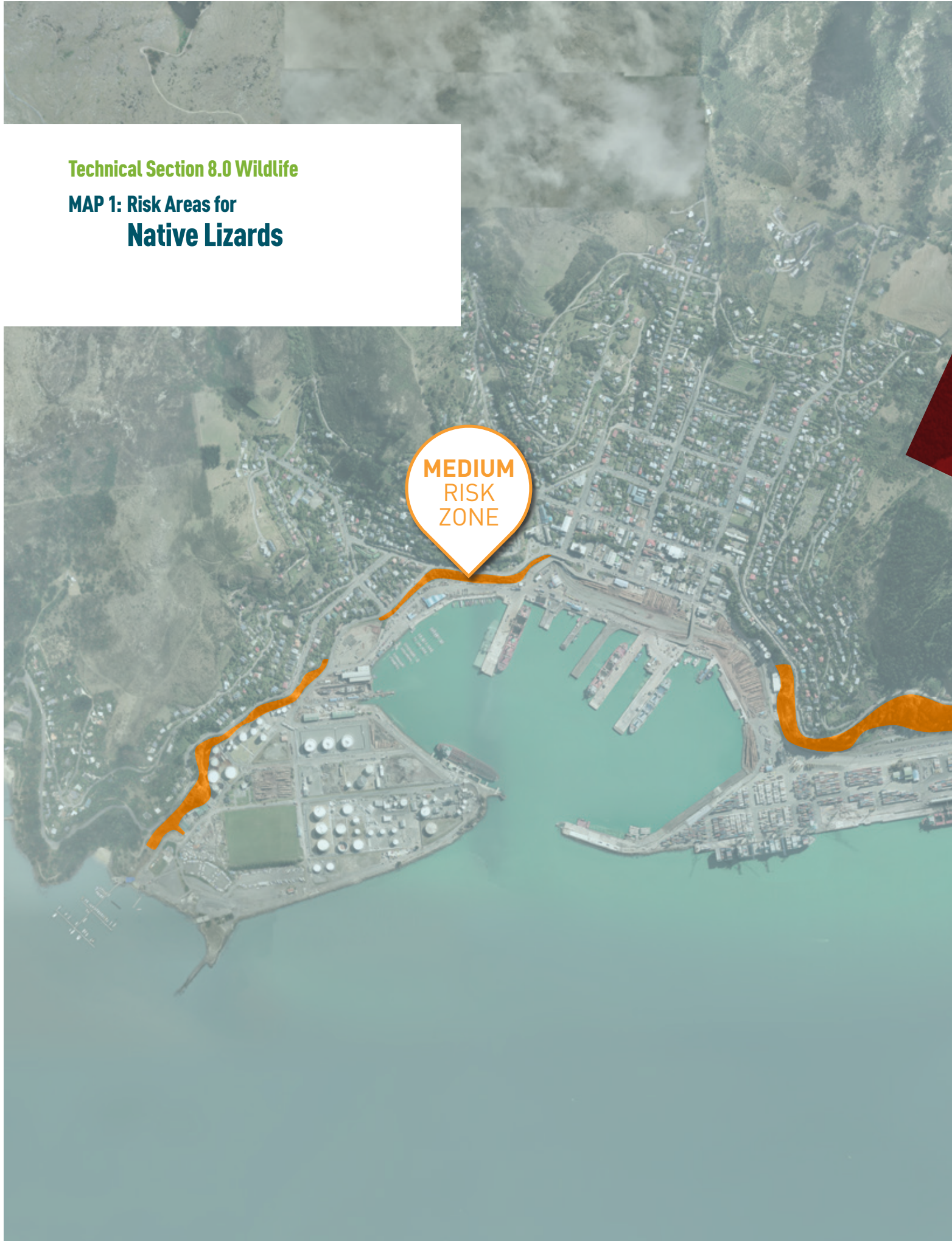
If your project duration includes periods of different risk ratings during the year, the highest risk rating must be used in your CEMP.

Risk Assessment Evaluation Tool

SPECIES	LOCATION	SEASONALITY RISK RATING	
		HIGH	MEDIUM
White-flippered penguin	Within seawalls	Aug–Feb when birds nest and moult	Other times as only adults should be present, although adults may come ashore for refuge during periods of bad weather at sea
Seabirds	Z Berth, western end of Cashin Quay and Gladstone Pier	Sep–Mar when birds are nesting and raising chicks	Other times as only adults should be present
Hector's dolphin	Surrounding waters	Oct–Mar when dolphins move into Lyttelton Harbour, and calves are born	Other times when animals are located further offshore

Technical Section 8.0 Wildlife

**MAP 1: Risk Areas for
Native Lizards**

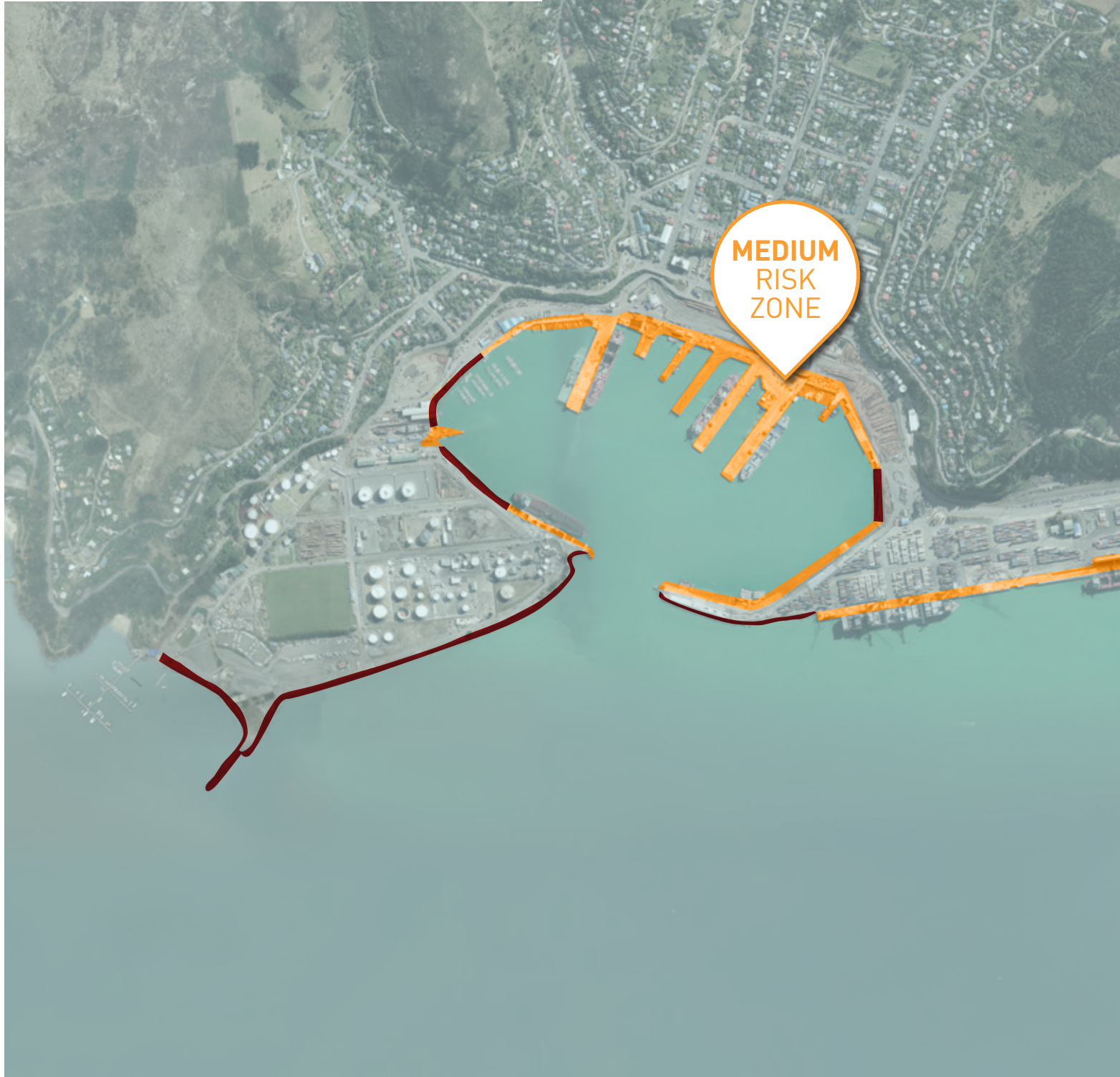






Technical Section 8.0 Wildlife

MAP 2: Risk Areas for
White-flipped Penguins





**HIGH
RISK ZONE**
High chance of
finding nesting
penguins



Technical Section 8.0 Wildlife

**MAP 3: Risk Areas for
Hector's Dolphins**







Technical Section 8.0 Wildlife

**MAP 4: Risk Areas for
New Zealand Fur Seals**







Technical Section 8.0 Wildlife

**MAP 5: Risk Areas for
Seabirds**

**LOW
RISK
ZONE**





8.5 PERFORMANCE STANDARDS

The management of wildlife and effects on wildlife at the Port is subject to the provisions of the Resource Management Act 1991 (RMA), Regional and District plans and resource consents (where required). It is anticipated that the activities requiring resource consent as part of this CEMP will also be required to adhere to the conditions of resource consents as they relate to wildlife (if any).

Apart from matters under the RMA and resource consents, legislation that governs how wildlife are managed in New Zealand include the following Acts. These are relevant considerations for your CEMP, as these Acts enable handling or relocation of wildlife from areas, with the appropriate permits or Authorisations held by LPC.

8.5.1 MARINE MAMMALS PROTECTION ACT 1978

The Department of Conservation administers the Marine Mammals Protection Act 1978, which provides for the conservation, protection and management of marine mammals. A permit is required under the Act for anyone to 'take' a marine mammal. The definition of 'take' includes actions that harm, harass, injure or attract.

It is an offence to kill or injure marine mammals without the appropriate authorisations.

8.5.2 WILDLIFE ACT 1953

The Wildlife Act 1953 deals with the protection and control of wild animals and birds and the management of game. Permits are necessary to deal with certain wildlife.

Most native bird, bat, lizard and frog species, and some native invertebrates (such as giant weta) are absolutely protected under the Act, while many common introduced bird and animal species are not protected. Some native and some introduced bird species have limited protection to maintain their numbers while allowing for some harvest or control.

To catch, hold, release or kill most wildlife species you must have permission (a permit or Authority) from DOC. This includes the following activities (amongst others):

- Catching, handling and releasing wildlife at one site.
- Disturbing or killing wildlife or their eggs.
- Catching and/or holding wildlife for rehabilitation.
- Holding dead specimen (e.g., any part of the wildlife).
- Catching wildlife in the wild and moving them to another wild location into which they are released.



8.6 CONTROL MEASURES



Gull on nest, Lyttelton Harbour
(image © EOS Ecology/Shelley McMurtrie)

8.6.1 OVERVIEW

Control measures that are acceptable to LPC for each potential effect on wildlife are listed over page, first on a generic basis for each of the risk zones, and secondly, as more specific controls for each species mapped in the risk layers.

Overall, and on a 'first principles' basis, it is good practice to apply the full range of controls in a given situation in a step-wise manner, so that risk to wildlife is minimised or mitigated where avoidance of effect on habitats and species is not practicable.



8.6.2

GENERIC CONTROL MEASURES

Risk Assessment Evaluation Tool

RISK LEVEL	ACTIVITY	CONTROL MEASURE
HIGH	Works in areas where wildlife has been recorded and is likely to be present, or where the nature of your activity is likely to cause disturbance or injury to wildlife if present.	<ul style="list-style-type: none">• Avoid area during times of greatest risk to wildlife (e.g., nesting WFP or seabirds).• If avoidance is not practicable, Wildlife Specialist to undertake a site survey and assessment as part of completing the Wildlife CEMP.• Wildlife Specialist (or nominated equivalent expert) to be involved in early stages of the project, give briefing to site staff and advise on specific procedures during works (such as observation requirements, etc.)• Implement standard procedures (e.g., Marine Piling Management Plan, WFP protocols).
MEDIUM	Works in areas where wildlife may be present, or where suitable habitat exists.	<ul style="list-style-type: none">• Seek advice from Wildlife Specialist as to likelihood of presence, including site assessment where necessary.• Undertake caution in site works where deconstruction or modification is required.• If accidental discovery of wildlife occurs, initiate WADP protocol.
LOW	Works in areas where wildlife have a low likelihood of being present, or where wildlife is already used to these or similar activities and is known to not be adversely affected.	Exercise caution in the operation of plant and equipment, vessel movements and stay alert for possible sightings and potential for harm to wildlife. If accidental discovery of wildlife occurs, initiate WADP protocol.
NEGLIGIBLE	Work in areas where wildlife is very unlikely to be present.	<ul style="list-style-type: none">• No controls for wildlife.• If accidental discovery of wildlife occurs, initiate WADP protocol.



8.6.3

WORKS AROUND WHITE-FLIPPED PENGUINS

LPC has been granted a Wildlife Permit (56584-FAU) from DOC under the Wildlife Act that enables LPC to manage any construction-associated risks to the penguins and keep them safe.

White-flipped penguins are most likely to be encountered within seawalls in the areas shown on Map 2, within cavities above mean high water springs.

The principal means of preventing effects on WFP is to avoid undertaking works within known WFP habitat (shown as high risk areas) during the breeding and moulting seasons which are August to February inclusive.

For all LPC construction works, this Wildlife Permit must be implemented during the project planning, pre-construction and construction phases of the project, as outlined within the documentation prepared by LPC for Contractors, including:

- 'Implementation of LPC's WFP DOC Permit (56584-FAU)' flow diagrams;
- '1. White-flipped penguin habitat infilling procedure';
- '2. White-flipped penguin capture, handling and relocation procedure'; and
- '3. White-flipped penguin zone construction procedure'.

Failure to comply with the Wildlife Permit can result in prosecution.

8.6.4

MARINE BASE PILING

If you are piling in the Harbour you also need to adopt the LPC Marine Piling Management Plan to protect noise sensitive marine species. This is included in Technical Section 6.0 – Noise & Vibration, as Appendix 6A, and must be included in your CEMP.

In summary, the Marine Piling Management Plan requires:

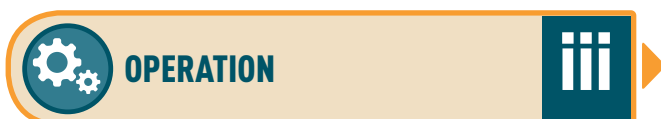
- 'all clear' for marine life within a specified radius (developed through site specific modelling), termed the 'exclusion zone' of the pile driving unit to be confirmed before the commencement of pile driving operations;
- marine based pile driving operations to take place during daylight only (daylight is defined as where there is adequate light to see a minimum distance of 300 m from the piling location);
- the start procedure for the pile driving unit will comprise a soft-start approach or use an acoustic deterrent; and
- if marine life is spotted within the exclusion zone, pile driving unit to suspend operations immediately.



8.6.5 SPECIES-SPECIFIC CONTROLS

Species-specific controls are intended to provide a targeted response to the discovery or management required of particular species in a way that minimises the risk of harm to wildlife and which complies with permits or Authorities granted to LPC for managing wildlife within works areas of the Port.

SPECIES	RISK RATING		
	HIGH	MEDIUM	LOW
Native lizards	Assess potential effects using Wildlife Specialist. Obtain Wildlife Permit from DOC if lizards are present.	Proceed with caution when removing potential habitat. Implement WADP protocol if lizards detected at the site.	Implement WADP protocol if lizards are detected at the site.
White-flipped penguin (WFP)	<ul style="list-style-type: none"> Avoid works Jul–Feb where practicable or assess potential effects using Wildlife Specialist. Implement requirements of Wildlife Act permit 56584-FAU, including keeping a min. 12.5 m radius around the WFP if encountered, and protocols for habitat modification as described in Section 8.6.3. 	<p>Assess potential effects using Wildlife Specialist.</p> <p>Implement WADP protocol if penguins are detected at the site.</p>	Implement WADP protocol if penguins detected at the site.
Hector's dolphin	Adhere to Marine Piling Management Plan. Include Wildlife Specialist as part of piling works. Adhere to DOC interaction with marine mammal protocols for high speed vessel movements (>15 knots).	There are no medium risk areas within LPC.	There are no low risk areas within LPC.
New Zealand fur seal	There are no high risk areas within LPC.	<ul style="list-style-type: none"> Consult with Wildlife Specialist as part of preparing your CEMP to review current records within the works area. Proceed using caution. If seals are present within 300 m of works area, stop works and implement WADP protocol. 	Visually assess habitat prior to commencing works. If seals are present within 300 m of works area, stop works and implement WADP protocol.
Seabirds – shags	There are no high risk areas for shags within marine environments at LPC.	There are no medium risk areas for shags within marine environments at LPC.	<ul style="list-style-type: none"> Waters around the Port support foraging adult or juvenile shags. Exercise caution for vessel movements.
Seabirds – all others	<ul style="list-style-type: none"> Avoid activities at Z Berth, Gladstone Pier and western part of Cashin Quay Sep–Mar (inclusive), or put measures in place prior to prevent birds returning to the area. Assess potential effects using Wildlife Specialist. A Wildlife Permit may be required if disturbance or relocation of nests/chicks is proposed. 	Visually assess habitat prior to commencing works. If seabird nests or chicks are present within 50 m of the works area, stop works and implement WADP protocol.	Visually assess habitat prior to commencing works.



8.7 MONITORING & REPORTING

The minimum monitoring requirements for wildlife are outlined as follows. Some of these actions are requirements by law as they are part of Authorities issued by DOC; others are best practice to ensure that the likelihood of potential adverse effects on wildlife is minimised.

The monitoring provisions in the table below are assumed to be in place at all times during the undertaking of work in areas where interaction with wildlife may be possible. A summary of the monitoring results in the table below shall be provided to your LPC Project Manager at the weekly meeting.

SPECIES	ACTIVITY	RISK ZONE	MONITORING
Hector's dolphin	Piling in marine environment	HIGH	<ul style="list-style-type: none"> Location and number of times Hector's dolphins are spotted, including number of times spotted within exclusion zone. The number of times work ceased due to the presence of Hector's dolphin.
NZ Fur seal	Piling in marine environment/ works around seawalls	ANY	<ul style="list-style-type: none"> Location and number of times fur seals observed within 300 m of piling activities (in water) or observed on seawalls or other structures (basking). The number of times fur seals are required to be relocated.
Native lizards	Vegetation clearance	HIGH OR MEDIUM	<p>HIGH risk zones – monitoring as per conditions of Wildlife Authority.</p> <p>MEDIUM risk zones – number of lizards seen during general works.</p>
WFP	Work around seawalls and known/ suspected nesting or moulting areas	HIGH OR MEDIUM	Number of times WFP nests uncovered, and location, and what was the response (cease works, relocate penguins).
Seabirds	Work around known nesting areas	HIGH	Number and species of seabirds nesting or with chicks, and location.



Monitoring the location and nature of wildlife incidents and reporting these in a timely manner to your LPC Project Manager is important as it ensures that LPC can:

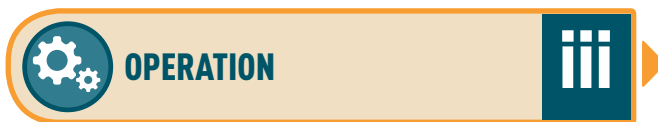
- respond to wildlife issues (such as the need for relocation or issues involving animal welfare) in a timely manner;
- comply with the requirements of any Authority or direction issued by DOC, including reporting by LPC on matters involving specific wildlife;
- comply with matters of resource consent involving wildlife;
- refine areas of known wildlife presence and revise the size and/or location of risk zones in response; and

- review and revise control measures as appropriate in response to the nature, frequency and effectiveness of existing controls and contingency measures.

The inspection of control measures and monitoring of environmental effects are required on a regular basis to ensure they continue to work and that performance standards are not breached.

Suggested frequency of inspections and monitoring of wildlife are outlined below.

ACTION	FREQUENCY	PURPOSE
A summary of monitoring results must be completed and provided to your LPC Project Manager.	once a week	To keep LPC up to date with how wildlife management is being addressed on the site.
The LPC Project Manager should accompany the Contractor during a site inspection.	once a month	To ensure compliance with the CEMP and to identify areas where improvements can be made, and to follow up on previous actions/ improvements.
Meetings on site to discuss the results of the weekly monitoring results and monthly site inspection.	once a month	Keep staff and contractors up to date with wildlife and general environmental management on site and provide an opportunity for them to raise issues/ areas for improvement.



8.8 CONTINGENCY

The risk zones mapped for wildlife reflects the current knowledge of wildlife habitat and use of habitat across LPC land.

It is likely that in some places, wildlife will choose to occupy areas outside of the risk zones indicated on maps and hence works in those areas that uncover those species will make an unexpected discovery.

In the case of an accidental discovery of wildlife, the following Wildlife Accidental Discovery Protocol (WADP) shall be followed:

- if it involves a species listed in this Wildlife Technical Section; or
 - is a species known to be or suspected to be new to the LPC site; and
 - is present within a proposed work site and may be subject to potential harm if works proceed, then;
1. **stop work** and cone off or otherwise prevent others from accessing the site; and
 2. **contact the Project Wildlife Specialist**, your LPC Project Manager or staff at LPC's Environmental Team. They will assess the situation, including the potential for harm, the effectiveness of existing controls, or the need for additional controls. Where necessary, they may contact DOC for advice or specialist expertise where wildlife relocation is necessary but is not covered under existing permits held by LPC.



Red-billed gull preening
(image © EOS Ecology/Shelley McMurtrie)



8.9 APPENDICES



APPENDIX 8A NATIVE LIZARDS

Native lizards are typically small (less than 150 mm length from snout to tail tip) and comprise skinks and geckos. The risk status of native lizards on LPC land are:

- Waitaha gecko (At Risk–Declining)
- Jewelled gecko (At Risk–Declining)
- Canterbury grass skink (At Risk–Declining)
- McCann's skink (Not Threatened)

Within LPC land, geckos are most likely to be found in undisturbed areas of rock bluffs or tor, and within native shrubland behind Gollans Bay Quarry. Skinks are most likely to be found within dense grassland areas and within the edges of landscaped gardens and bush patches along Godley and Simeon Quays.

Skinks and geckos are most active during spring, summer and autumn and go into a 'torpor' or less-active phase during winter. Both skinks within

LPC's land are day-active, while the Waitaha gecko and jewelled gecko are dusk or night-active. All native lizards are coloured to blend with their local environment, and so are difficult to see, even if habitat under which they are hiding is disturbed. The lizards live within very small areas during their lives, so many can be found in a small area where the habitat is good quality.

The main risk to lizards at LPC is the removal of habitat (vegetation and grassland) and dumped materials such as concrete, tires or building materials within bush areas. Where lizards are considered likely to be present (high risk areas), at a minimum, you should seek advice from the Wildlife Specialist with regard to undertaking a survey of the area. Work with native lizards must be undertaken by a suitably qualified and experienced herpetologist (lizard expert).



Canterbury grass skink

(image supplied by Department of Conservation)



Waitaha gecko

(image supplied by Carey Knox)



McCann's skink

(image © Arnaud Badiane)



Jewelled Gecko

(image supplied by Department of Conservation © James Reardon)



APPENDIX 8A

WHITE-FLIPPED PENGUIN

The White-flipped penguin (WFP) is only found in Canterbury and breeds around Banks Peninsula, including within Lyttelton Harbour.

It is one of the world's smallest penguins, growing up to 30 cm tall and weighing 1.5 kg. They have an overall blue-grey appearance and have an obvious white trim on the flipper and a white belly.

They are nocturnal animals when on land and will come to shore to nest during the day and leave to hunt during the night. WFP are known to nest in rock seawalls above mean high water springs across the Port and have been spotted at the Port during the

breeding and moulting season. As of the last penguin survey in 2017, 55 penguins were estimated to be living within the Port operations areas. The penguins are at their most vulnerable time when they come to land to reproduce, rear chicks and moult (August to February). Moulting is an especially vulnerable time for the penguins as they are land-bound until their new layer of feathers develop and it becomes water resistant again.

White-flipped penguins are listed as an At Risk–Declining species and they are protected under the Wildlife Act 1953.



White-flipped penguin on land

(image supplied by Duncan Watson)



White-flipped penguin at sea

(image supplied by Phillip Griffin)



White-flipped penguin at sea

(image CC © Ben www.flickr.com/photos/seabirdnz/34113052886/)



APPENDIX 8A

HECTOR'S DOLPHIN

Hector's dolphins are one of the smallest dolphins in the world, growing to a maximum of 1.5 m in length. It is the only dolphin in New Zealand to have a round dorsal fin. Their bodies are a distinctive grey with white and black markings, and a short snout.

Hector's dolphin is the only dolphin species endemic solely to New Zealand waters, and is listed as nationally endangered. This species occurs around the South Island, with approximately 2,000–4,000 dolphins out of the estimated total population (ca. 15,000 animals) found within Banks Peninsula waters.

During the warmer summer and autumn months, dolphins move close to the shore and spread into the Peninsula's bays and harbours, including Lyttelton Harbour. It is over this time period that most calves are born (October–March). While calves have been regularly sighted within particular areas of Akaroa and Lyttelton Harbours and some southern bays, no distinct calving and/or nursery areas have been clearly identified. Over the colder months animals generally move further offshore and mainly out of the bays and inner harbour regions, with only a few animals continuing to remain in mid-harbour and entrance waters.



Hector's dolphin adult and calf

(image supplied by Whale and Dolphin Trust NZ)



Adult Hector's dolphins

(image supplied by Whale and Dolphin Trust NZ)



Hector's dolphin

(image Tomas Sobek [CC BY-SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>)], from Wikimedia Commons)



APPENDIX 8A

NEW ZEALAND FUR SEAL

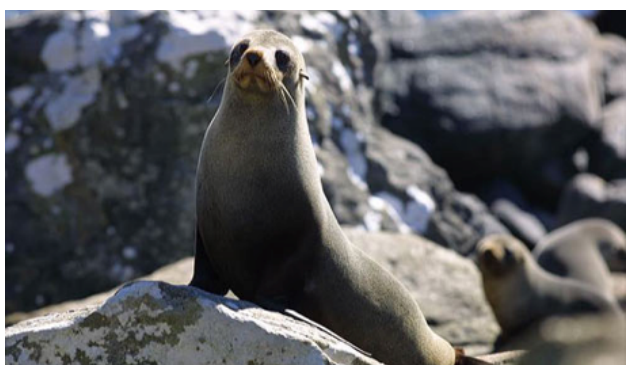
The New Zealand fur seal is well established along the South Island's eastern coastline with breeding colonies located in the southern bays of Banks Peninsula, rather than in Lyttelton Harbour. Seals aggregate at these colonies to breed from late spring to summer. Fur seals travel long distances to find food, and as their population continues to grow, it is more likely that individuals will use Lyttelton Harbour. Seals are inquisitive by nature and are known elsewhere in New Zealand to haul ashore, even in areas that are frequented by people.

Habitats around LPC that may be used by seals are the seawalls and accessible coastal areas where

they can haul ashore to bask, and waters within and around the Port where fish as prey may be present.

Threats to seals are entanglement in nets, ropes or other equipment in the water, disturbance from people and domestic animals such as dogs, and collision with vehicles on land or boats in water where space is crowded.

Fur seals are considered abundant throughout most of New Zealand and not currently threatened; therefore their current conservation status is of 'least concern'. An Authority from DOC is required to catch or move New Zealand fur seals.



New Zealand fur seal adult
(image supplied by Department of Conservation)



New Zealand fur seal adult basking
(image supplied by Department of Conservation)



New Zealand fur seal pup
(image CC © Ben www.flickr.com/photos/seabirdnz/44497629112/)



APPENDIX 8A

SEABIRDS

Seven species of native seabirds have been recorded on or around Port facilities, including two species of shag, three species of gull, White-fronted tern and Variable oystercatcher.

Each of these species is briefly described below. Collectively, these species use the Port and surrounding area when nesting and raising young on land, roosting and resting on Port structures, and foraging in the waters in and around the Port operations areas.

BIRD SPECIES	THREAT STATUS	ACTIVITY WITHIN PORT	HABITAT USE	
 <small>image © EOS Ecology/Shelley McMurtrie</small>	Variable oystercatcher	At Risk –Recovering	Nesting	Western end of Cashin Quay/Z Berth / Reclamation
 <small>image © EOS Ecology/Shelley McMurtrie</small>	Pied shag	Threatened –Nationally Vulnerable	Roosting & Foraging	Western end of Cashin Quay/Z Berth/In waters around Port facilities
 <small>image © Jenny Atkins</small>	Spotted shag	Not Threatened	Roosting & Foraging	Western end of Cashin Quay/Z Berth/In waters around Port facilities
 <small>image © EOS Ecology/Shelley McMurtrie</small>	Red-billed gull	At Risk –Declining	Roosting	Western end of Cashin Quay/Z Berth
 <small>image © Duncan Watson</small>	Black-billed gull	Threatened –Nationally Critical	Nesting	Western end of Cashin Quay/Z Berth
 <small>image © Tony Whitehead</small>	Black-backed gull	Not Threatened	Nesting	Gladstone Pier/ Reclamation/Breastwork
	White-fronted tern	At Risk –Declining	Nesting	Western end of Cashin Quay/Z Berth

image © Brian Ralphs from Berkhamsted, Hertfordshire, UK [CC BY 2.0 (<https://creativecommons.org/licenses/by/2.0/>)], via Wikimedia Commons



Variable oystercatcher

Variable oystercatchers are distinctive seabirds with black bodies and bright orange bills. They breed from October onwards and lay 2–3 eggs. Incubation period is approximately 28 days and it takes chicks at least 6–7 weeks to fly. Late chicks may not fledge until March.

Use of the Port includes breeding and roosting on Z Berth in the seawall. Seawalls elsewhere and natural coastline is also likely to provide habitat, provided disturbance by people and vehicles is low. Key threats at LPC are disturbance of nests by people during October–March which may harm eggs or chicks, and interactions between chicks and moving plant (especially vehicles) in the vicinity of Z Berth and the western end of Cashin Quay.



Variable oystercatcher with chicks

(image © Anja Kohler)



Variable oystercatchers flying

(image © Steve Attwood)

Pied shag

Adult and juvenile Pied shags can be found swimming around the harbour, including around and under piers, or roosting on piles or piers. Adults have a clear white belly and black back plumage. Juveniles are identified by the moulting brown and white underparts and pale brown upper parts. Juvenile Pied shags can be found at the end of Z Berth; adults can

be found throughout the waters around the Port and roosting on structures on the edge of piers. Juvenile shags are more vulnerable during the moulting phase. Adults become quickly habituated to noise, machinery, and movement, and are usually aware of human activity (and move out of the way).



Pied shag adult

(image © EOS Ecology/Shelley McMurtrie)



Pied shag juvenile moulting

(image © Albert Aanensen)



Spotted shag

The Spotted shag is a slim, medium-sized, grey-blue marine shag with a long, slender bill and yellow-orange feet. Adult breeding birds have black spots on the back and upperwings, and two curved broad, white stripes that run from each eye down each side of the neck.



Spotted shags adult

(image © Jenny Atkins)

The Spotted shag has a similar habitat to the pied shag and has been recorded roosting on Z Berth and active in the waters around the Port. Adults and juveniles are both likely to be present year-round within the vicinity of the Port area.



Spotted shag juvenile

(image © Steve Attwood)

Red-billed gull

A medium-sized white gull with pale grey back, back and wing edges, the Red-billed gull is characterised by its bright red bill, eyelids and legs. Juveniles are similar to adults but with brown patches on the back, brownish primary feathers, and dark brown iris, bill and legs.



Red-billed gull adult

(image © Ormond Torr)

Red-billed gulls breed from September to January with pairs laying two eggs. Incubation is approximately 23–26 days and the chicks fledge at approximately 55 days. Key threats at LPC are disturbance of nests by people during the breeding season which may harm eggs or chicks, and interactions between chicks and moving plant (especially vehicles) in the vicinity of Z Berth.



Red-billed gull egg and chick

(image © Rebecca Bowater)



Black-backed gull

Black-backed gulls are a large black-and-white gull with a white head and underparts, black back, yellow bill with a red spot near the tip, and pale green legs. Juveniles are dark mottled brown with black bill and legs; their plumage lightens with age until they moult into adult plumage at 3 years old.

The nest is a bulky collection of grass, small sticks or seaweed, or a simple scrape in sand or shingle. Adults lay 2–3 large grey-green eggs with dark brown spots and blotches from October–January. Incubation lasts for 23–26 days; chicks fledge at about 7–8

weeks old and are fed by adults for at least another month.

The Black-backed gull is not afforded any level of protection under the Wildlife Act. Black-backed gulls are often considered pests, and in places are controlled to reduce their predatory impacts on populations of threatened shorebirds. Key threats at LPC are disturbance of nests by people during the breeding season which may harm eggs or chicks, and interactions between chicks and moving plant (especially vehicles) in the vicinity of Gladstone Pier.



Black-billed gull adults

(image © Ormond Torr)



Black-billed gull adult & chick

(image © Tony Whitehead)

White-fronted tern

The White-fronted tern is a medium sized bird with a long white forked tail, a distinctive bill and a black or grey-capped head separated from the long pointed black bill by a white band. Breeding normally occurs in large colonies with the terns arriving to a nesting site just days before laying the eggs. Eggs are laid on

bare ground without any nesting material. At LPC, eggs are laid on bare surfaces of Z Berth.

Key threats at LPC are disturbance of nests by people during October–January which may harm eggs or chicks, and interactions between chicks and moving plant (especially vehicles) in the vicinity of Z Berth and the western end of Cashin Quay.



White-fronted tern flying

(image © EOS Ecology/Shelley McMurtrie)



White-fronted tern chick

(image © Josie Galbraith)







9.0

TECHNICAL SECTION

MARINE WORKS





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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 Advisors¹.

The requirements in this Section are accurate as of February 2109. 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.



ASSESSMENT



9.2 ROLES & RESPONSIBILITIES

Highlights your responsibilities as the Contractor and the LPC Project Manager.

9.3 SETTING

Provides a brief description of the marine environment at the Port, as it relates to construction projects.

9.4 RISK ASSESSMENT

How to decide if your work is low, medium, or high risk.



DESIGN



9.5 PERFORMANCE STANDARDS

What your control measures have to achieve.

9.6 CONTROL MEASURES

What to do for low, medium, and high risk projects.



OPERATION



9.7 MONITORING & REPORTING REQUIREMENTS

What you must record and who you must report incidents to throughout the project.

9.8 CONTINGENCY MEASURES

What to do during adverse weather to manage unexpected but not unforeseen conditions.



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.





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 assessments¹ 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





Technical Section 9.0 Marine Works

MAP 2: Inner Harbour & Low Current Zone

Source: Mulgor 2016

COLOURS indicate
SPEED m/s



WHITE LINES indicate
trajectories of neutrally
buoyant particles released
at various locations within
the Inner Harbour to
track current movement.
Dots indicate the point of
release.



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.





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

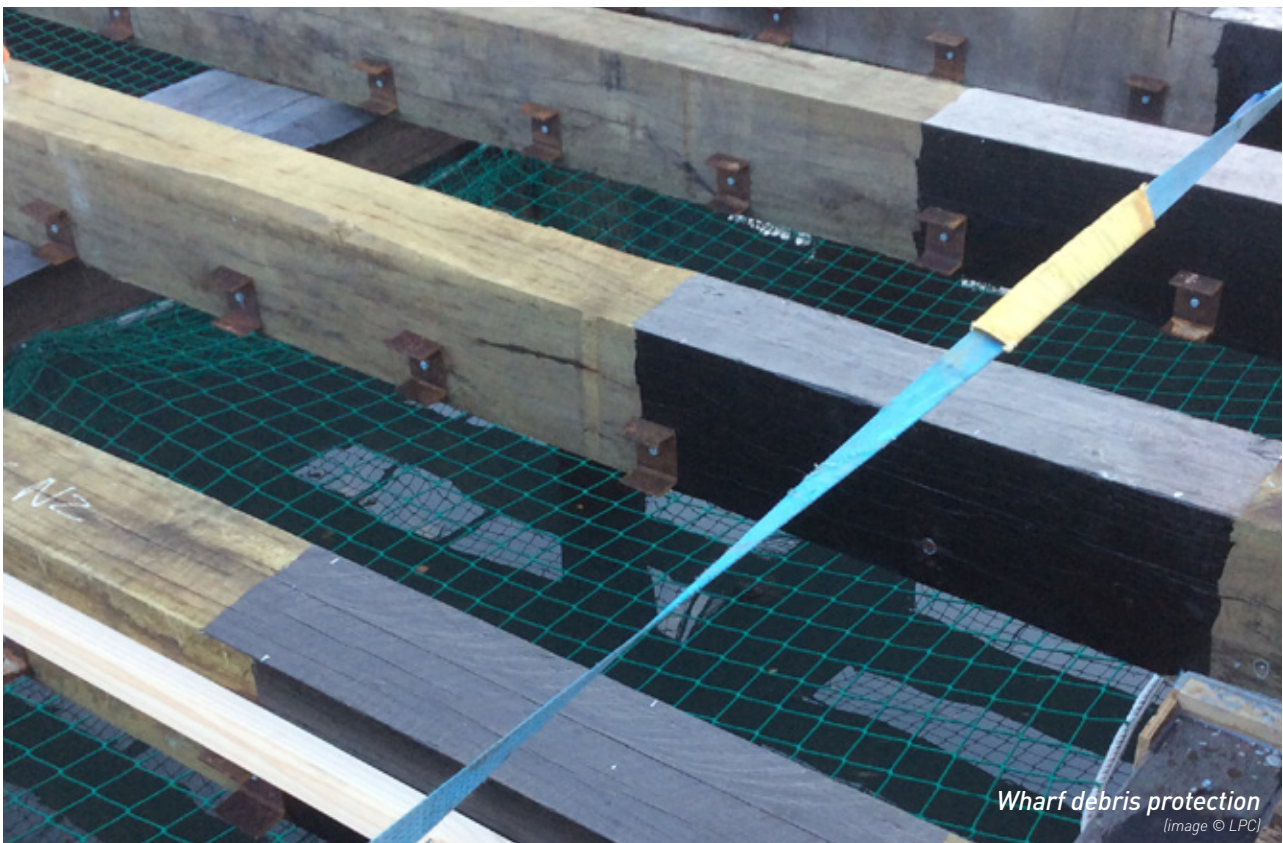






9.5 PERFORMANCE STANDARDS

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.





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:

- 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 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. <i>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.</i>			
	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.	✓	✓	✓



		RISK CATEGORY WHERE CONTROL MEASURES APPLY			
ACTIVITY	CONTROL MEASURES	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. <i>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.</i>				
	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.	✓	✓	✓	
The design, materials used and construction method is crucial to managing environmental effects. <i>Controls around white flippered penguins and other wildlife will be required; refer to the Wildlife Technical Section of the CEMP.</i>					
RECLAMATION & SEAWALL CONSTRUCTION & REPAIR	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)	✓		



		RISK CATEGORY WHERE CONTROL MEASURES APPLY		
ACTIVITY	CONTROL MEASURES	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	✓	✓	✓
CONCRETE WORKS	Use concrete cutting method to contain/control concrete discharges.	✓	✓	✓
	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.	✓	✓	✓
GROUTING	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.	✓	✓	✓
ACCESS PLATFORMS	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.	✓	✓	✓
ACCESS PLATFORMS	Ensure appropriate spill kits and spill response plans are in place to respond to grout spills.	✓	✓	✓
	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.	✓	✓	✓
ACCESS PLATFORMS	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.

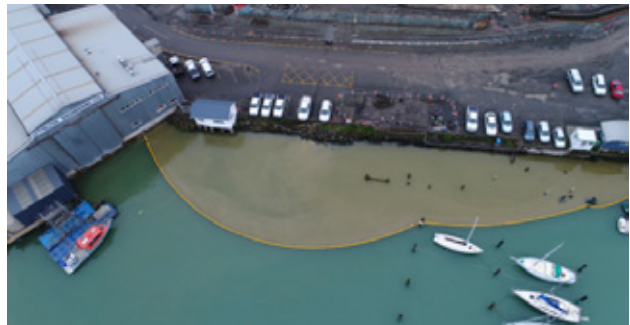
Silt Curtain

Silt curtains provide a physical barrier to slow the flow of water to allow suspended sediment to settle and drop out of 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.



Debris 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

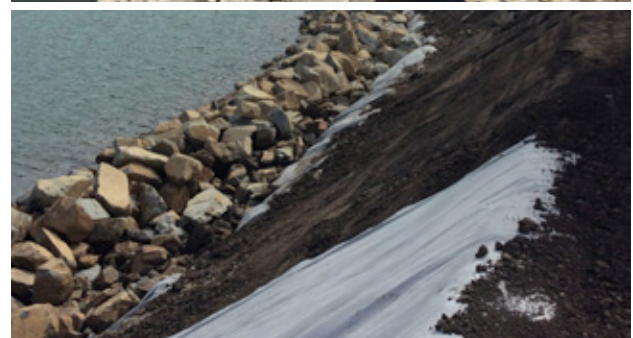
Seawall construction

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.

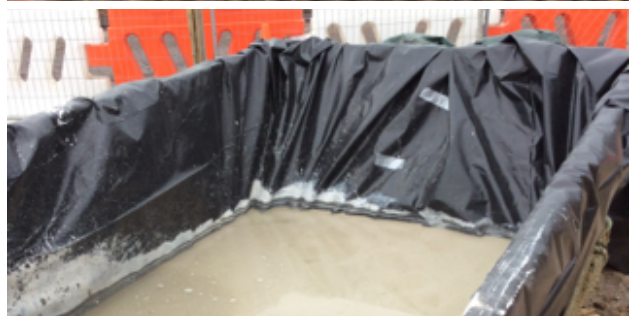
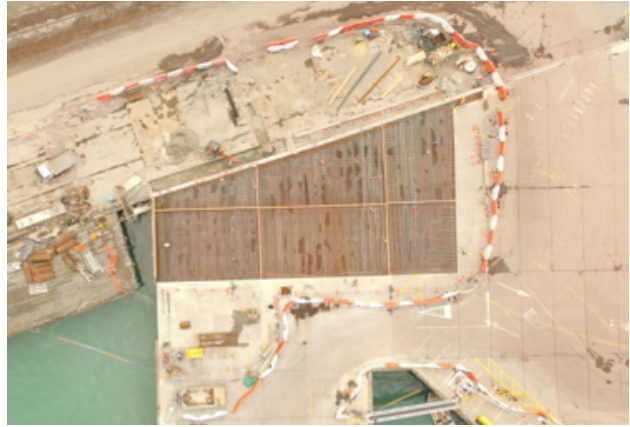
An effective method of managing concrete discharges is to ensure sealed boxing is used to contain any concrete runoff.

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 appropriate location.



Cofferdam

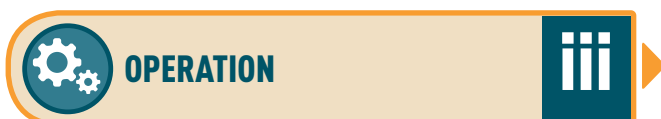
Cofferdams can be useful if you need to isolate an inflow of water to your works area. They can be used on the seaward side to allow works on the harbour edge or seabed to be carried out without ingress of water or discharges to the marine environment. Cofferdams will usually be driven from land-based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



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:

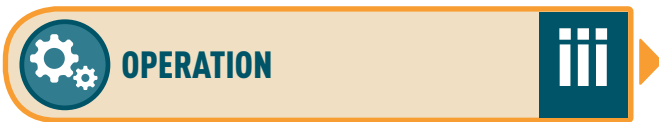
- visual monitoring (photographs) of sediment plumes for all works that disturb sediment (Appendix 9A sediment plume monitoring form);
- debris monitoring must be completed for demolition works or works where debris may fall into the harbour (Appendix 9B debris monitoring and inspection form);
- inspections 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.



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





MAJOR

PROJECT TEMPLATE GUIDE



PROJECT NAME:

[CLICK HERE AND TYPE PROJECT NAME]

This must describe the project.

Lead Contractor:

[Click here and type Lead Contractor Name]

Project Timeframe:

[Click here and type Project Timeframe]



Circle on the aerial photo location of the project. For smaller projects please insert a zoomed in aerial photo.

Environmental effect	Risk
Dust	
Erosion and Sediment Generations	
Noise	
Archaeology	
Hazardous Substances	
Contaminated Land	
Wildlife	
Marine Works	
Other	

Use the Construction Environmental Management Manual to complete a project specific risk assessment for each environmental effect.



Version #	Prepared By	Reviewed By	Approved By	Date

Role	Name	Signature	Date
Author			
Lead Contractors			
LPC Project Managers			



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Please update the table of contents for your specific CEMP.



Please update the table of contents for your specific CEMP.

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Please update the table of contents for your specific CEMP.



Please update the table of contents for your specific CEMP.

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INTRODUCTION



1.0 INTRODUCTION

This section should outline the purpose of the CEMP and outline the contractual obligations the CEMP fulfills.

1.1 PURPOSE OF THE CEMP

[Click here and type]

EXAMPLE CONTENT:

This CEMP is prepared to fulfil clause *[insert number]* of the agreement between Lyttelton Port Company (LPC) and Contractor to repair piles on Z Wharf (referred to as the site, Figure 1), signed 12 January 2014;

The purpose of the CEMP is to put in place practices for the duration of the project which will reduce the negative environmental impact of the works. Ongoing monitoring and review of environmental effects throughout the works will enable any adverse effects are identified and dealt with in a timely manner.

NOTE: The CEMP includes:

- **Environmental Risk Assessment** – required to understand the likelihood and magnitude of adverse environmental effects the project may have on the environment.
- **Performance Standards** – what the environmental management actions (controls, inspections and reporting) need to achieve.
- **Controls** – the methods to manage environmental effects. These are determined by the risk rating for the project, which is determined by the highest risk type of work in the project.
- **Monitoring & Reporting** – required to verify compliance with the CEMP and document whether the performance standards are reached. Additionally, monitoring and reporting allow early detection of issues, so contingency measures can be employed as early as possible to minimise any impacts.
- **Contingency Measures** – what to do if the controls fail.



1.2 ROLES AND RESPONSIBILITIES

[Click here and type]

Table 1: Roles and Responsibilities

Role	Company Name	Person Responsible	
		Person Responsible	Contact Details
LPC Project Manager			
Contractor – lead			
Foreman			
Subcontractor			
Technical experts			
Contaminated land specialists			
Archaeologist			
Noise expert			
Hazardous substances specialists			
Approved handler (hazardous substance)			
Erosion and sediment control expert			
Wildlife specialist			
Person responsible for monitoring and reporting and onsite referral of complaints			
Dust			
Erosion and sediment generation			
Noise			
Archaeology			
Contaminated land			
Wildlife			
Marine Works			

1.2.1 Training

[Click here and type]

Throughout the CEMP template there are various actions which require someone to be nominated as the responsible person (e.g., monitoring of noise levels). These responsibilities must be documented in the Table.

Fill in the Technical Experts fields after completing the CEMP Major Project Template – Sections 2.0–9.0. Technical experts may not be required for all environmental effects. In this case mark the Person Responsible column as 'technical expert not required'.

Write N/A if no monitoring and reporting is required for any of the environmental effects below. It maybe also be the same person for several effects.

This section needs to address what training is required to ensure Contractors and sub-contractors working on site understand the CEMP and what is required to implement the CEMP. This can include details around site inductions, hazard boards and the expected environmental behaviors on site.

Management of some environmental effects requires a technical briefing prior to works commencing. For example a contaminated land specialist will be required to undertake a contaminated land briefing prior to works commencing.

Include details around any specific technical briefing requirements.



Insert a detailed description of where the projects works are to be undertaken, include details such as:

- site conditions and its current use;
- description of the surrounding landuse, including adjacent Port Operations; and
- distance to the nearest property outside the port boundary and any surrounding sensitive sites or sites of value.

Insert a site map showing where works will be undertaken (could be a zoomed in version of the cover aerial photograph).

The map needs a north arrow, a scale bar and a title.

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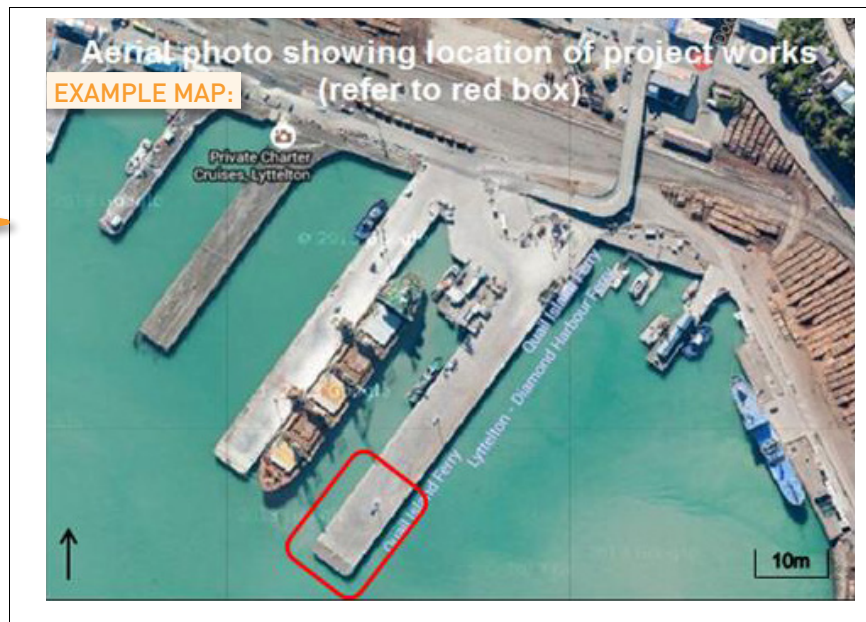


1.3 SITE DESCRIPTION

EXAMPLE CONTENT:

The site is located at the south entrance to the Port. It is a wooden piled wharf approximately 500 m long which has sustained significant damage as a result of the Canterbury earthquakes. The wharf is currently inoperative. North of the wharf is a storage area for logs awaiting transport and the Diamond Harbour ferry terminal. Adjacent to this is the township of Lyttelton; south is Lyttelton Harbour, and east is the main container terminal.

Image of Construction Location





1.4 PROJECT DESCRIPTION

[Click here and type]

A description of the project which should include details such as:

- types of work that are being done and why;
- method and equipment used to do the works;
- project programme;
- hours and days of operation – this is particularly important for the noise section as it will determine what your noise limits are;
- area of site;
- number of staff on site;
- sub-contractors used to completed project works.

As you write this section keep in mind the environmental effects your works may have and update this section with relevant information as you work through your risk assessment.

The project description needs to include enough detail to accurately describe how the project works are to be completed. This information is used to identify what the environmental risks are and what controls are required.



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1.6 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

The environmental risk assessment is required to understand the likelihood and magnitude of adverse environmental effects the project may have on the environment.

Please include a summary of the main environmental risks and construction activities.

Table 2: Risk Ratings for Each Type of Work and the Project as a Whole

Environmental Effect	Risk				
	Type of Works 1	Type of Works 2	Type of Works 3	Type of Works 4	Type of Works 5
Dust					
Erosion & Sediment Generations					
Noise					
Archaeology					
Hazardous Substances					
Contaminated Land					
Wildlife					
Marine Works					
Other					

Populate the risk assessments Table using Technical Sections 2.0–9.0.

EXAMPLE CONTENT:

Environmental effect	Risk				
	Excavation of pavement area	Stockpiling excavated material	Removing existing piles	Installing new wharf piles	Installing new wharf deck
Dust					
Erosion & sediment generations					
Noise					
Archaeology					
Hazardous substances					
Contaminated land					

1.6.1 Other Effects (e.g., odour, light)

[Click here and type]

If there are any other effects you think pose a risk for your types of work, describe the effect and outline any controls and monitoring in the CEMP Major Project Template.



Insert a brief description of the project works and any construction activities which have the potential to generate dust.

EXAMPLE CONTENT:

- excavation works & material movements
- stockpiles & material storage
- haul road construction
- demolition works
- concrete batching
- crushing & screening
- piling works

Enter the work types for your project (from the bulleted list above) into Table 2-1. Refer to Technical Section 2.0 – Dust Management and work through the risk assessment process for dust. The dust risk for your project is the highest of the risk ratings for the types of work that make up your project. For example, if your project involves a high risk type of work and a medium risk type of work, the overall dust risk rating will be high.

Outline a contingency plan if the dust controls as listed above fail.

Dust



2.0 DUST

2.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Table 2-1 Environmental Risk Assessment, Dust

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Dust Risk					

2.2 PERFORMANCE STANDARDS

[Click here and type]

2.3 CONTROL MEASURES

[Click here and type]

Type of Work	Dust Risk	Control

For each type of work (as listed above) identify how you are going to control or manage the risk of dust.

2.4 MONITORING AND REPORTING

[Click here and type]

2.4.1 Monitoring

[Click here and type]

2.4.1.1 Meteorological Forecasts

[Click here and type]

2.4.1.2 Dust Monitoring

[Click here and type]

2.4.2 Reporting


[Click here and type]

2.5 CONTINGENCY

[Click here and type]

Under each heading below provide detail on how you propose to monitor the dust risk for the duration of the project and report back to LPC how this risk has been mitigated.

This can include using metrological forecasting, daily logs and the use of dust suppressants.



3.0 CONTAMINATED LAND

3.1 ENVIRONMENTAL RISK ASSESSMENT


[Click here and type]

Table 3-1 Environmental risk assessment, contaminated land.

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Contaminated Land Risk					

3.2 CONTAMINATED SITE MANAGEMENT PLAN

[Click here and type]

Contaminated Land 

Insert a brief description of the project works and what construction activities have the potential to disturb contaminated soil.

For each construction activity as identified above use the Technical Section 3.0 – Contaminated Soil to highlight the level of risk for each activity.

Identify which Contaminated Soil Management Plan (CSMP) applies to the project works. The appropriate CSMP must be incorporated into the CEMP as Appendix A. The CSMP includes performance standards, controls, monitoring and reporting requirements and contingency measures. The CSMP must be implemented.

11



4.0 ARCHAEOLOGY

4.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Table 4-1 Environmental Risk Assessment, Archaeology

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Archaeology Risk					

4.2 PERFORMANCE STANDARDS

[Click here and type]

4.3 CONTROL MEASURES

Type of Work	Archaeology Risk	Control

4.4 MONITORING AND REPORTING

[Click here and type]

4.5 CONTINGENCY

[Click here and type]

Insert a brief description of the project works and what construction activities have the potential to impact archaeological sites.

For each construction activity as identified above use Technical Section 4.0 – Archaeology to highlight the level of risk for each activity.

Include details of any archaeological authority the project is operating under.

Include details on accidental discovery protocols the project is operating under.

For each construction activity identified above outline what control measures you proposed to put in place.

For example this could include the accidental discovery protocol, ensuring the archaeologist is on site when undertaking works in high risk zones.

Include detail around archaeologist monitoring requirements.

For example when excavating in area x the nominated archaeologist must be on site monitoring the excavated material.

Outline contingency plan if the controls as listed above fail.



Erosion & Sediment Control



5.0 EROSION & SEDIMENT CONTROL

5.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Table 5-1 Environmental Risk Assessment, Erosion and Sediment Generation

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Erosion and Sediment Generation Risk					

5.2 PERFORMANCE STANDARDS

[Click here and type]

5.3 CONTROL MEASURES

[Click here and type]

5.3.1 Controls

Table 5-2 Summary of Controls

Type of Work	Sediment and Erosion Risk	Control

5.3.2 Decommissioning of Controls

[Click here and type]

5.4 MONITORING AND REPORTING

[Click here and type]

5.4.1 Monitoring Compliance with Performance Standards

[Click here and type]

Insert a brief description of the project works and what construction activities have the potential to generate sediment and erosion.

For each construction activity listed above use Technical Section 5.0 – Erosion & Sediment Control to identify the risk rating for each construction activity.

Include details around any performance standards around sediment and erosion control.

The exact performance standards for your project will be set either in resource consent conditions or the permitted activity standards in the relevant planning document. If the requirements are not clear from your tender documents, contact the LPC Project Manager.

This section must describe what testing is to be done to ensure the performance standards are complied with. This will depend on the performance standards, the discharge point and the controls put in place.

For each construction activity listed above identify control measures (using Technical Section 5.0 – Erosion & Sediment Control) proposed to reduce the effects of erosion and sedimentation. Include design criteria and implementation instructions for each activity.

List what is required to decommission the sediment and erosion controls. This will vary depending on the controls used. Refer to Technical Section 5.0 – Erosion & Sediment Control for more detail.



5.4.2 Maintenance, Inspections and Monitoring

[Click here and type]

Table 5-3 Inspection and Monitoring Requirements

Work Phase	Frequency	Monitoring Actions
Surface is exposed and site is changing frequently	<ul style="list-style-type: none">• Daily• Before expected rainfall event• After rainfall event greater than 20 mm/24hr	<ul style="list-style-type: none">• Inspect all structures (culverts clear of debris, structural integrity of control measures is sound, all weather access to measures is maintained)• Check discharge points meet performance standards• Once a week – fill in inspection sheet
Surface is exposed but not changing	<ul style="list-style-type: none">• Weekly• Before expected rainfall event• After rainfall event greater than 20 mm	<ul style="list-style-type: none">• Inspect all structures and fill in inspection sheet (culverts clear of debris, structural integrity of control measures is sound, all weather access to measures is maintained)• Check discharge points meet performance standards
After stabilisation if vegetation has been used	<ul style="list-style-type: none">• Weekly• After rainfall event greater than 20 mm• After vegetation has been established, 3 monthly	<ul style="list-style-type: none">• Inspect whether surface remains stabilised (80% coverage is maintained if vegetated).

5.4.3 Reporting

[Click here and type]

5.5 CONTINGENCY

[Click here and type]

Describe the inspection and monitoring regime which is required to ensure the performance standards are not breached.

Provide details around project specific reporting requirements – this includes reporting of inspection sheets as detailed above through to the the LPC Project Manager.

Identify what you will do if the control measures listed above fail and the performances standards cannot be met.



6.0 NOISE & VIBRATION

Noise & Vibration 

6.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Insert a brief description of the project works and what construction activities have the potential to create excessive noise and vibration.

Table 6-1 Environmental Risk Assessment, Noise and Vibration

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Noise & Vibration Risk					

For each construction activity listed above use Technical Section 6.0 – Noise & Vibration to identify the risk rating for each construction activity.

Table 6-2 Predicted Noise Levels for Significant Types of Work

Type of Work	Nearest Receiver	Predicted Noise Level	Criteria	Comment on Compliance

Using the screening assessment in Technical Section 6.0 – Noise & Vibration for each type of construction complete Table 6-2.

6.2 PERFORMANCE STANDARDS

Table 6-3 Guideline Construction Noise Limits

Building Type	Days	Times	Noise Limit	
			L _{Aeq(t)}	L _{AFmax}
Residential	Weekdays	0630-0730	55 dB	75 dB
		0730-1800	70 dB	85 dB
		1800-2000	65 dB	80 dB
		2000-0630	45 dB	75 dB
	Saturdays	0630-0730	45 dB	75 dB
		0730-1800	70 dB	85 dB
		1800-2000	45 dB	75 dB
		2000-0630	45 dB	75 dB
	Sundays & public holidays	0630-0730	45 dB	75 dB
		0730-1800	55 dB	85 dB
		1800-2000	45 dB	75 dB
		2000-0630	45 dB	75 dB
Industrial & commercial	All days	0730-1800	70 dB	-
		1800-0730	75 dB	-



Use Technical Section 6.0 – Noise & Vibration and the prompts below to select appropriate controls for each type of work that make up the project. These controls should be described here, along with design criteria, and instructions on how to implement these controls. All controls will still need to be set out in the summary Table in this section.

Provide detail around the relevant engineering controls used to reduce noise and vibration effects – these can include details around noise reducing equipment, reversing alarms, operating procedures to reduce noise.

6.3 CONTROL MEASURES

[Click here and type]

6.3.1 Administrative Controls

[Click here and type]

6.3.2 Engineering Controls

[Click here and type]

Table 6-4 Summary of Controls

Type of work	Noise and Vibration risk	Control

6.3.3 Ongoing Assessment

[Click here and type]

6.4 MONITORING AND REPORTING

[Click here and type]

6.4.1 Monitoring

[Click here and type]

Table 6-5 Noise Monitoring Equipment

Equipment	Make	Model	Serial Number	Verification Date
Sound level meter and microphone				

6.4.2 Reporting

Table 6-6 Information Reporting Requirements

Information	Timeframe
Noise survey reports	Within one week of monitoring
Noise complaint initial report	Within twenty-four hours
Noise complaint closed	Within one week of closing complaint

6.5 CONTINGENCY

[Click here and type]

Noise & Vibration



Provide detail around the relevant administrative controls to reduce noise and vibration effects – these can include communication around the proposed works and management of the noisy activity.

While a preliminary assessment has been performed as part of the risk assessment for each significant type of work, noise will be assessed prior to construction, which will identify any controls specific to the type of work. Include a schedule documenting the ongoing assessment. Use Technical Section 6.0 – Noise & Vibration to assist.

Identify what you will do if the control measures listed above fail.



7.0 HAZARDOUS SUBSTANCES MANAGEMENT

7.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Table 7-1 Environmental Risk Assessment, Hazardous Substances

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Hazardous Substances Risk					

7.2 PERFORMANCE STANDARDS

[Click here and type]

7.3 CONTROL MEASURES

[Click here and type]

Table 7-2 Summary of Controls

Type of Work	Hazardous Substance Risk	Control

7.3.1 Waste Management

[Click here and type]

Include detail around the management of waste during project works.

7.4 MONITORING AND REPORTING

[Click here and type]

7.5 CONTINGENCY

[Click here and type]

The emergency response plan requirements outlined in Technical Section 7.0 – Hazardous Substances should identify any necessary contingency measures based on the substances to be stored and used on-site. List applicable requirements in this Section.

Insert a brief description of the project works and what construction activities require the storage of hazardous substances.

For each construction activity listed above use Technical Section 7.0 – Hazardous Substances to identify the risk rating for each construction activity. Note any type of work which triggers hazardous substance related regulatory requirements is automatically high risk.

Any project that does not have a hazardous substances regulatory requirement is assumed to have no hazardous substances risk associated with it and the remaining subsections of Technical Section 7.0 – Hazardous Substances can be filled in with 'no hazardous substance specific requirements'.

Refer to Technical Section 7.0 – Hazardous Substances to determine whether you have any regulatory requirements for hazardous substances, and therefore whether the type of work has a high or low hazardous substance risk.

The exact performance standards depend on the specific hazardous substances and volumes intended to be used and stored as part of the works. These are provided in Technical Section 7.0 – Hazardous Substances.

Identify waste management practises used to maintain a tidy site and avoid waste material entering the Harbour.

Individual hazardous substances used during the project may require different controls. This section needs to detail controls used to manage each hazardous substance. Specific control measures are detailed in Technical Section 7.0 – Hazardous Substances.

There are no specific reporting or monitoring requirements for hazardous substances. It is up to the Contractor to ensure they plan and controls are still appropriate for the substances stored, and should identify what monitoring reporting is appropriate.



8.0 WILDLIFE

8.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Table 8-1 Environmental Risk Assessment, Other Effects

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Wildlife Risk					

8.2 PERFORMANCE STANDARDS

[Click here and type]

8.3 CONTROL MEASURES

[Click here and type]

Table 8-2 Summary of Controls

Type of Work	Other Risk	Control

8.4 MONITORING AND REPORTING

[Click here and type]

8.5 CONTINGENCY

[Click here and type]

Wildlife

Insert a brief description of the project works and what construction activities have the potential to impact wildlife.

For each construction activity listed above identify control measures (generic and/or species specific) proposed to reduce the effect on Wildlife.

Provide details around species specific monitoring and reporting requirements.

Identify what you will do if the control measures listed above fail and the performance standards cannot be met.

For each construction activity listed above use Technical Section 8.0 – Wildlife to identify the level of risk for each activity.

Include any performance standards around Wildlife. The exact performance standards for your project will be set either in resource consent conditions or provisions set out in the Marine Mammals and Wildlife Acts. If the requirements are not clear from your tender documents, contact the LPC Project Manager.



Insert a brief description of the project works and what construction activities have the potential to harm the marine environment.

For each construction activity listed above identify control measures (generic and activity specific) proposed to reduce the effect on the marine environment. Include descriptions of control devices and implementation for each activity.

Provide details around project specific monitoring and reporting requirements – this includes reporting of monitoring forms through to the LPC Project Manager.

Identify what you will do if the control measures listed above fail and the performance standards cannot be met.



9.0 MARINE WORKS

Marine Works 

9.1 ENVIRONMENTAL RISK ASSESSMENT

[Click here and type]

Table 9-1 Environmental Risk Assessment, Other Effects

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Wildlife Risk					

9.2 PERFORMANCE STANDARDS

[Click here and type]

9.3 CONTROL MEASURES

[Click here and type]

Table 9-2 Summary of Controls

Type of Work	Other Risk	Control

9.4 MONITORING AND REPORTING

[Click here and type]

9.5 CONTINGENCY

[Click here and type]

For each construction activity listed above use Technical Section 9.0 – Marine Works to identify the level of risk for each activity.

Other Effects 

10.0 OTHER EFFECTS

10.1 ENVIRONMENTAL RISK ASSESSMENT

Table 10-1 Environmental Risk Assessment, Other Effects

	Type of Work				
	Type of Work 1	Type of Work 2	Type of Work 3	Type of Work 4
Other Effects					

Provide detail around any other relevant environmental effects which may result from the construction works. If none please write N/A.

10.2 PERFORMANCE STANDARDS

[Click here and type]

10.3 CONTROL MEASURES

[Click here and type]

Table 10-2 Summary of Controls

Type of Work	Other Risk	Control

10.4 MONITORING AND REPORTING

[Click here and type]

10.5 CONTINGENCY

[Click here and type]



This section outlines the Contractor's communication processes for the project, including within the project team, complaints procedure and what documentation is required.

Provide detail on briefing people working on the site, including sub-contractors. It also needs to detail how the Contractor will provide information to the LPC Project Manager, and how they will interact with Council staff undertaking audits. Please provide detail on all reporting requirements as detailed in the CEMP and the frequency of the reporting.

Communication



11.0 COMMUNICATION

11.1 WITHIN THE PROJECT TEAM

Table 11.1: Reporting Requirements to the LPC Project Manager

Frequency	Requirements
Weekly	
As required	

11.2 COMPLAINTS PROCEDURE

The following procedure shall be followed for all complaints:

- All complaints should be immediately directed to the person listed in the Section 2 or the LPC Project Manager. Their contact details are listed in Section 2
- It is important that any interaction with the complainant is polite and does not belittle their concern
- As soon as the complaint is received it will be recorded on the project complaints register (Appendix C). Note there are specific requirements for what is to be recorded for dust in the Dust Management Technical Chapter
- An initial response will be made and recorded. Depending on the nature of the complaint the initial response could be to immediately cease the type of work pending investigation, replace an item of equipment, apply additional control (e.g. water sprayer for dust), or reinstate a damaged control device. However, in some cases it might not be practicable to provide immediate relief. LPC and the complainant will be informed of actions taken
- Where the initial response does not address the complaint, the LPC Manager will be informed and will undertake (either themselves or delegated to the Contractor) further investigation, corrective action and follow-up monitoring as appropriate. The complainant will be advised of the outcome of this process
- All actions will be recorded on the project complaints register and the complaint will then be closed.

11.3 DOCUMENTATION

All paper/electronic files relating to the CEMP will be kept in the Site Office. This will include:

- The CEMP and associated documentation (e.g. Safety Data Sheets for hazardous substances; type of work-specific noise schedules etc.);
- Consultation and complaints registers
- Monitoring data
- Signed induction records which show that people inducted onto site understand what is required of them under the CEMP.



12.0 UPDATING THE CEMP

To maintain relevance, the CEMP must be reviewed when any changes to the methodology are made and updated accordingly.

This CEMP must be amended if:

- The scope of your works or methodology is going to change;
- The mitigation measures are not working sufficiently;
- Responsible parties change;
- The season or time of day in which the works need to take place changes;
- The area of works increases or changes;
- You have identified improvements to the process or mitigation measures;
- The duration of your works changes;

Anything else changes that alters the effectiveness of your CEMP to manage the negative environmental effects of your works.



13.0 APPROVAL CHECKLIST

The approval checklist must be completed by the Contractor prior to submitting it to LPC. The LPC Project Manager must complete the checklist while undertaking their review of the CEMP, prior to signing it off.

COVER SHEET CHECKLIST FOR MAJOR CEMP - MUST BE COMPLETED BY CONTRACTOR PRIOR TO SUBMISSION														
EMP component	Contractor						LPC Project Manager							
Purpose of the environmental management plan (EMP)														
Contractual obligation the EMP fulfils are listed														
Responsibilities are assigned in front table and signatures of assignees are present for the following:														
Controls actions														
Monitoring actions														
Reporting actions														
Site description contains:														
Location map showing the location of the site within the Port and the extent of the area where works will be undertaken, a north arrow, a scale bar and a title														
A description of the site condition and current use														
A description of the surrounding land use														
Project description contains:														
Description of what works are being done and why														
Method and equipment to do the works														
Project duration - including hours and days of operation														
Regulatory requirements contains:														
Whether resource consent is needed														
If it is needed, whether a resource consent has been obtained														
Resource consent reference and a description of what it is for														
Relevant consent conditions, how they will be achieved and who is responsible (in Table 1 of CEMP template)														
The contractor has discussed the regulatory requirements with the LPC PM before EMP is submitted														
Environmental effects and mitigation:														
For each environmental effect tick whether the following is provided (all except 'Other' must be completed):	Dust	Contaminated land	Archaeology	Erosion & sediment	Noise and vibration	Hazardous substances	Other (specify)	Dust	Contaminated land	Archaeology	Erosion & sediment	Noise and vibration	Hazardous substances	Other (specify)
Description of the effect and risk category														
Environmental risk assessment undertaken														
Who/what will be impacted by the effect														
Performance criteria (e.g. noise level limits)														
Mitigation:														
Describe the mitigation measures for the effect described above														
Monitoring requirements:														
The monitoring method (e.g. measuring total suspended solids 10 m downstream of the site)														
How often monitoring will be done														
Monitoring actions are assigned to specific people														
Reporting requirements:														
States how regularly reporting is required														
States what is going to be reported														
States who the report must be submitted to														
Reporting actions are assigned to specific people														
Contingency:														
Describes actions to be taken in the event of non-compliance or if non-compliance is likely														
Information sharing:														
Describes adequate processes to share information with Contractor's staff and sub-contractors to enable the EMP to be implemented														
Approval:														
EMP is signed by the Contractor														



APPENDIX A

CONTAMINATED SITE MANAGEMENT PLAN

IF REQUIRED

If applicable to your project works insert the appropriate contaminated soil management plan.



APPENDIX B

INSPECTION CHECKLISTS

[INSERT FROM TECHNICAL CHAPTERS AS RELEVANT]

Insert the inspection checklists from each Technical Section.

For example:

- Daily Dust Log
- Sediment & Erosion Control Monitoring & Inspection Sheets



APPENDIX C

COMPLAINTS REGISTER TEMPLATE

Please insert a register to record and report on any complaints around the project construction works.

APPENDIX D

Please insert noise
schedules if required.

NOISE SCHEDULES
[AS REQUIRED]



APPENDIX E

MATERIAL SAFETY DATA SHEETS

[AS REQUIRED]

Include any material safety data sheets for all hazardous substances to be stored on site.











MINOR

PROJECT TEMPLATE GUIDE



Insert the project description including detail on:

- construction methodology;
- description of the surrounding environment;
- construction equipment/ machinery to be used;
- number of people involved
- expected project duration; and
- construction hours.


Insert an aerial photograph of the Port highlighting where the project works is to be undertaken.

Insert name of the project as referenced in Tender documents.

Use the CEMP Manual to complete a project specific risk assessment for each environmental effect.

Insert details of any resource consents the project is operating under. Detail any other relevant environmental regulatory approvals the project is operating under. For example, are you working under any LPC global consents? Does your project have any specific project approvals?

For each environmental effect you have listed in the environmental risk assessment describe what controls you have put in place to manage the effect. If applicable draw them on a site location diagram.

PROJECT NAME: [CLICK HERE AND TYPE PROJECT NAME]				
Principal Contractor:	[type principal contractor]	Project Site Manager/Engineer:	[type site manger/engineer]	
Sub-contractors:	[type sub-contractors]	Project Start Date:	[type project start date]	
Project Description:	[type project description]	Environmental Approvals (i.e., Resource Consents):	[type rules]	
Project Location (circle project location)		Envrionmental Risk Assessement		Controls
Insert map/image identifying project location		Environmental Effect	Risk	Comments
		Dust		[type here]
		Contaminated land		[type here]
		Erosion and Sediment		[type here]
		Archaeology		[type here]
		Noise		[type here]
		Hazardous Substances		[type here]
		Wildlife		[type here]
Marine Works			[type here]	[type controls]
Monitoring and Reporting		Responsibilites (including sub-contractors)		Contingency
[type here]		[type here]		[type here]

MONITORING – Specify what the project is going to do to show that construction works will meet the regulatory requirements and your environmental controls are working.
REPORTING – Detail how this is to be reported back to LPC.

For each of the environmental effects listed above, list the person responsible for managing effects that may arise. For example:
DUST – Construction Manager, James White
CONTAMINATED LAND – Construction Manager, James White

List what to do if the environmental controls fail. This may be specific things for different environmental effects and may include contacting the LPC Project Manager.

