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Office of the Environmental Monitor

Report for Channel Deepening Independent Audit

Activity No.2

Targeted audit of EMP requirements for sand capping

August 2009

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Contents

Table Index

Figure Index

Executive Summary

The Channel Deepening Project is being implemented by the Port of Melbourne Corporation (PoMC). Its aim is to deepen shipping channels in Port Phillip Bay and the lower reaches of the Yarra River by dredging to enable ships up to 14 m draught to access the Port of Melbourne.

Victorian and Commonwealth Government environmental approvals for the Project set conditions that the PoMC must adhere to. These include arrangements set out in an Environmental Management Plan (EMP). The EMP sets out 58 "Project Delivery Standards", which are rules about where, when and how the Project must be delivered.

The Office of the Environmental Monitor (Office) has appointed Peter Nadebaum of GHD Pty Ltd (the Auditor) to undertake a series of independent audits of the implementation of the Environmental Management Plan for the Channel Deepening Project (Project). The audits are to meet the requirements of the Office and the Commonwealth for the audit of the Port of Melbourne's annual report on performance.

This report outlines the findings of one of these audits, comprising *a targeted audit of EMP requirements for sand capping.* The audit covered the period from 5 October 2008 to 24 July 2009.

The Project Delivery Standards

PDSs have been identified for the CDP to address key environmental risks, effects and legal requirements. The PDSs are a collation of the management and mitigation measures, environmental performance monitoring and contingency plans for the project. The CDP PDSs are:

- Construction management (all activities);
- Marine-based works (all areas);
- Land-based works;
- Dredging and plume;
- Dredging schedule;
- Dredged material management;
- Entrance dredging;
- Hydrohammer use and marine-based pile driving.

It should be noted that the EMP formally defines 8 PDSs, listed above. Within those 8 standards are 58 environmental rules. However, the general convention through the delivery of the CDP has been to refer to the environmental rules individually as PDSs. This convention is continued in these audits and any reference to the 58 PDSs will by definition include the 58 environmental rules.

Methodology for the Audit

The audit methodology was consistent with ISO 19011 and was implemented to meet the specific requirements of the Office and the Commonwealth.

The audit adopted a graded assessment of compliance, involving Full Compliance, “Critical”, “Major” and “Minor” Non-Compliance, Not Applicable and Undetermined.

The audit team included Peter Nadebaum of GHD Pty Ltd (GHD) as the lead auditor, and he was supported by a team of specialist staff from GHD.

Findings

The audit determined that PoMC has a well developed environmental management system and an excellent system for documenting information relating to the CDP that is relevant to confirming compliance with the EMP and the PDSs. PoMC responded to the many requests by the audit team for information and evidence, and a large body of information was made available to the audit team.

Table 1 presents an overview of the findings for the two EMP mechanisms identified as a being relevant to sand capping.

Table 1 Overview of compliance with EMP mechanisms for sand capping application

Mechanism	Full Compliance	Minor Non-Compliance	Undetermined	Not Applicable
SAND CAPPING APPLICATION				
1. Application using spreader	Yes	-	-	-
Relevant components of PDS 34	Yes	-	-	-
2. Prior to placement	Yes	-	-	-
Relevant components of PDS 37	Yes	-	-	-
3. Placement in accordance with design requirements	Yes	-	-	-
Relevant components of PDS 34 and 37	Yes	-	-	-
SAND CAPPING INTEGRITY				
4. Capping layer thickness	Yes	-	-	-
Relevant components of PDS 37	Yes	-	-	-
5. Piston coring	Yes	-	-	-
Relevant components of Work Method Statement PoM DMG	Yes	-	-	-

In summary, it was found that, of the five auditable requirements arising from the components of PDS 34 and 37 relevant to the two mechanisms:

» There were five requirements for which the audit concluded that full compliance was achieved;

» There were no major, critical or minor non-compliances;

» There were no requirements that were not applicable; and

» There were no requirements for which there was insufficient information available at the time of the audit to reach a conclusion regarding compliance.

Overall, the audit concluded that a high level of compliance has been achieved. A summary of the findings for each mechanism is provided below.

Sand Capping Application

The audit has concluded that the sand capping of the PoM DMG (Stage 1) is in accordance with PDS 34 and 37 and the Work Method Statement PoM DMG (WMS PoM DMG), in particular that:

» Sand capping was applied using a spreader attached to the TSHD Queen of the Netherlands;

» Bottom water velocity was measured prior to capping;

» Sand capping has achieved a minimum thickness of 0.5 metres; and

» Sand capping was applied in a minimum of two layers.

Sand Capping Integrity

The audit has concluded that the integrity of the sand capping of the PoM DMG (Stage 1) is in accordance with PDS 37 and the WMS PoM DMG, in particular that:

» There were process controls in place to ensure capping occurred in at least two layers and that regular hydrographic surveys were conducted to confirm capping thickness; and

» A piston coring investigation was completed and confirmed that a clear and well-defined interface was present between the capping (sand) and the new dredge material (mud/clay).

Recommendations and Opportunities for Improvement

No recommendations[1] were made.

No opportunities for improvement [2] were noted.

[1] In the context of this report, “recommendations” refer to recommendations made by the auditor that relate to items of non-compliance and are intended to assist in avoiding future non-compliance. As such, it might be expected that recommendations will be carried out prior to the next audit.

[2] In the context of this report, “opportunities for improvement” are suggestions made by the auditor that relate to areas where full compliance has been achieved and that may offer improvement in management systems and audit program. As such, they are not mandatory.

1. Introduction

The Office of the Environmental Monitor (Office) has appointed Dr Peter Nadebaum of GHD Pty Ltd (the Auditor) to undertake a series of independent audits of the implementation of the Environmental Management Plan for the Channel Deepening Project (Project).

This report outlines the findings of one of these audits:

> **Activity 2: a focussed audit of selected EMP requirements to target specific Project features or processes. This audit includes a detailed analysis of those Project Delivery Standards and monitoring programs relevant to sand capping to contain contaminated sediments.**

1.1 Background

The Office was established by the Victorian Government in December 2007 as a requirement for the Project.

The Office's objectives are to:

» Be accessible to all stakeholders and the community;

» Scrutinise, report and advise on the Project's environmental performance in an independent and transparent way; and

» Communicate all available information on the Project's environmental performance in a meaningful and timely way to stakeholders and the community.

The Channel Deepening Project (CDP) is being implemented by the Port of Melbourne Corporation (PoMC). Its aim is to deepen shipping channels in Port Phillip Bay and the lower reaches of the Yarra River by dredging to enable ships up to 14 m draught to access the Port of Melbourne. Dredging operations commenced in February 2008. The operational stage of the project, which includes dredging and ancillary works, is scheduled for completion in late 2009. Some of the monitoring programs will continue for a further two years.

Victorian and Commonwealth Government environmental approvals for the Project set conditions that the PoMC must adhere to, including arrangements set out in an Environmental Management Plan (EMP), approved ancillary documents covering Turbidity, Underwater Noise and Airborne Noise detailed designs, approved EMP Work Method Statements, and EMP and Environment Protection and Biodiversity Conservation (EPBC) Act approval requirements for independent and external audits. The principal environmental approvals are approvals under Victoria's Coastal Management Act and the Commonwealth's EPBC Act.

The EMP sets out 58 "Project Delivery Standards", which are rules about where, when and how the Project must be delivered. It established four monitoring mechanisms to inform compliance and performance against these standards. It also sets out quarterly, annual and other reporting obligations for the four-year period 2008 to 2012.

This audit is one of a series of independent audits of the implementation of the Environmental Management Plan and is focussed on EMP requirements for sand capping of contaminated sediments.

1.2 Scope of the Independent audits - Overview

The independent audits form an element of the Project's governance, in terms of environmental assurance mechanisms and provide an independent and transparent assessment for use by the Office. The audit reports will also form part of the public documentation on PoMC's compliance with the EMP and the environmental performance of the Project. Should the need for an investigation emerge from an audit, the Office will consider the audit findings and determine the need, scope and means by which such an investigation would be conducted.

The purposes of the independent audits are:

» To undertake an audit(s) that meets the provision for the external audit contained in the EMP and which:
  – independently assesses the implementation of the EMP.
  – independently gathers such information necessary to verify the veracity of information arising from the monitoring program commissioned by PoMC – this may include field verification, sampling and measurement.
» To advise the Office of any non-conformances with the EMP; and
» To provide regular reports to the Office.

The audit program is divided into two stages, with audit activities as follows:

1.2.1 Stage 1: Operational Stage – early 2008 to early 2010

Activity 1:

Undertake four (4) independent audits to assess the implementation of the EMP and compliance with each of the 58 Project Delivery Standards (PDSs). It is anticipated that such audits will occur twice annually, with a final audit occurring at completion of the operational stage of the project.

Timing of the audits is to be as follows:

» 1st audit to commence immediately on signing of the contract.
» 2nd audit to be completed by 31 January 2009 (this is to comply with Commonwealth reporting requirements), and will focus on an audit of the PoMC annual report.
» 3rd audit to commence around April/May 2009, but could be subject to change. Timing of this audit to occur within three (3) weeks of the commencement in 2009 of dredging in the South Channel and Port Melbourne Channel.
» 4th audit to commence in late 2009 or early in 2010 based on completion of operational stage of the project. This audit will include auditing of the 58 PDSs and the PoMC annual report.

Activity 2:

Undertake focussed audits of selected EMP requirements to target significant Project features or processes. Timing of these audits is independent of the audits undertaken in Activity 1, but their results should feed into the analysis and assessment of compliance done for Activity 1 audits.

These audits are to include a detailed analysis of those Project Delivery Standards and monitoring programs relevant to:

1. The Entrance:

» The width and depth of dredging

» Work methods to reduce rock spill

2. The management of contaminated sediment:

» Bund and stub wall construction

» Methods to remove and place contaminated sediment

» Placement of sand capping

3. South Channel:

» Mechanisms to protect seagrass

4. Mechanisms to monitor environmental performance:

» Environmental monitoring

» Process monitoring and inspections

» Management performance monitoring

» Bay wide monitoring

It is recognised that work done in the audits for Activity 2 may overlap audits undertaken in Activity 1.

This audit is a targeted audit of EMP requirements for sand capping to contain contaminated sediment.

1.2.2 Stage 2: Post Operational Phase – early 2010 to early 2012

A series of independent audits are to be taken in the post operational phase. These are a separately commissioned activity, and will be reported on separately from this series of audits.

1.3 Deliverables

As part of the project the auditor is required to provide:

» Immediate reports (within 24 h) of any non-conformances that may be identified by the audit;

» Reports of independent audits of the implementation of the EMP and the 58 Project Delivery Standards;

» Report on the audit of PoMC's annual report against EMP requirements and Commonwealth project approval conditions; and

» Reports of focussed audits on selected EMP requirements.

1.4 Reference Documents

In addition to Victorian and Commonwealth approvals, the key reference documents for the project are:

» **Environmental Management Plan**
http://www.channelproject.com/environment/management.asp

» **EMP Dredging Schedule**
http://www.channelproject.com/schedulelocation/dredging_schedule.asp

» **Approved ancillary documents covering Turbidity, Underwater Noise and Airborne Noise detailed designs**
http://www.channelproject.com/global/docs/EMON_080205_Turbidity.pdf

http://www.channelproject.com/global/docs/EMON_080205_Monitoring_Underwater_Noise.pdf

http://www.channelproject.com/global/docs/EMON_080205_Monitoring_Airborne_Noise.pdf

» **Approved EMP Work Method Statements**

http://www.channelproject.com/global/docs/WMS_080205_Material_Placement_PMDMG.pdf

http://www.channelproject.com/global/docs/WMS_080205_Method_Statement_EMP_Contaminated.pdf

http://www.channelproject.com/global/docs/WMS_080205_Method_Statement_EMP_Entrance.pdf

Note that these documents are subject to periodic review and revisions may be issued during the course of the project.

2. The Channel Deepening Project

2.1 Project description

2.1.1 Overview

The Channel Deepening Project (CDP) includes:

» Capital dredging works associated with the channels, swing basins and berth pockets;

» Management of dredged material; and

» Modifications to existing infrastructure, including the protection of services, berth upgrades and upgrading and installation of new navigation aids.

The dredging and associated works are expected to take between 18 months to two years to complete.

The CDP components are as follows.

2.1.2 Capital dredging works

The dredging works will be undertaken largely within the existing channels in the north and south of the bay. The exceptions are the turning area at Hovell Pile, which will be enlarged to accommodate larger vessels and the entrances to the Port Melbourne and Great Ship Channels. The middle of the bay (north of Hovell Pile to south of Fawkner Beacon) is naturally deeper and does not require dredging.

2.1.3 Management of dredged material

Dredged material is to be placed within the Port of Melbourne dredged material ground (PoM DMG) located near the middle of the bay, both within the existing area and in a southern extension to it, as well as in a new DMG in the south east of the bay.

All of the dredged material sourced from the Port Melbourne, Williamstown and Yarra River Channels and associated berth pockets will be placed in the PoM DMG. The PoM DMG will be extended to the south to provide capacity for material from future maintenance dredging. Part of the PoM DMG will be bunded and capped with uncontaminated sediments to contain contaminated sediments from the Yarra River and Williamstown and Port Melbourne Channels and berth pockets.

Most of the material dredged from the south of the bay is to be stored in the new south east DMG (SE DMG). Sand dredged from the south of the bay will be used as capping material for the PoM DMG.

2.1.4 Berth works

As a consequence of deepening the shipping channels, a program of structural upgrades to berths is planned at Appleton Dock, Swanson Dock (East and West), Holden Dock and Gellibrand Pier to stabilise the docks beside the deepened channels.

This will ensure the berths will accommodate larger vessels and the lowered riverbed. The swing basins at Swanson Dock and Gellibrand Pier are being enlarged to accommodate turning movements of larger vessels.

2.1.5 Services

Several utility services crossing the Yarra River and Port Phillip Bay are to be protected from shipping movements. The following services are being protected in their current location:

» The Melbourne Water Hobsons Bay Main Sewer, the Westernport-Altona-Geelong (WAG) oil pipeline, and the GasNet high pressure gas pipeline which all cross the Yarra River downstream of the West Gate Bridge; and

» The Esso ethane pipeline that crosses Port Phillip Bay south of Fawkner Beacon.

The Telstra telecommunications cables and the CitiPower electrical power cables that currently cross the Yarra River downstream of the West Gate Bridge are being decommissioned and the services rerouted by the respective utility service providers.

2.1.6 Navigation Aids

To ensure ongoing safe navigation of vessels in the deepened shipping channels, some existing navigation aids are being upgraded or replaced and in some locations new navigation aids are being installed. The navigation aids include:

» New marine-based piled structures for lateral and lead lights adjacent to the northern channels and South Channel; and

» New land-based lead lights and sector lights at Queenscliff, Port Melbourne and alongside docks within the port.

2.2 Environmental Management

A comprehensive program determines PoMC's management of the environmental aspects of the project. Important elements of this include:

» An Environmental Policy;

» An Environmental Management System (EMS), consistent with the requirements of *ISO 14001:2004 Environmental management systems – Requirements with guidance for use* developed for the CDP. The EMS consists of the policies, plans, procedures and activities that together form a systematic method of managing the environmental aspects of the project;

» An Environmental Management Plan (EMP). The EMP is a key component of the EMS and describes the main elements of the EMS and provides direction to detailed procedures and inter-relationships between different processes. The EMP is the focus of this audit.

2.3 The Environmental Management Plan

2.3.1 Scope

The EMP details the environmental management requirements to be followed for the CDP. The EMP includes:

» Arrangements to integrate the EMP with PoMC's environmental policy and EMS;

» The requirements for environmental management during the planning, implementation, evaluation and review of CDP construction activities;

» The responsibilities for implementing the EMP;

» The Project Delivery Standards (PDS) including environmental controls and limits to ensure that project objectives and targets are achieved;

» An overview of the environmental monitoring programs and contingency plans and associated management action;

» Post construction requirements including monitoring and inspections; and

» The transition arrangements from construction phase to operations.

The EMP generally applies to the works described in Section 2.1 and environmental monitoring programs. PoMC has overall responsibility for the implementation of the CDP in accordance with the requirements of the EMP.

This audit was conducted against the approved EMP. For the period covered by this audit to 24 July 2009, the approved EMP was:

» 5 February 2008 CDP_IMS_PL_004 Revision 1

» 11 April 2008 CDP_IMS_PL_004 Revision 2

» 22 July 2008 CDP_IMS_PL_004 Revision 3

» 2 September 2008 CDP_IMS_PL_004 Revision 4

» 3 November 2008 CDP_IMS_PL_004 Revision 5

» 23 January 2009 CDP_IMS_PL_004 Revision 6

» 27 May 2009 CDP_IMS_PL_004 Revision 7

» 5 June 2009 CDP_IMS_PL_004 Revision 8

» 14 July 2009 CDP_IMS_PL_004 Revision 9.

2.4 Project Delivery Standards

PDSs have been identified for the CDP to address key environmental risks, effects and legal requirements. The PDSs are a collation of the management and mitigation measures, environmental performance monitoring and contingency plans for the project. The CDP PDSs are:

» Construction management (all activities);

» Marine-based works (all areas);

- Land-based works;
- Dredging and plume;
- Dredging schedule;
- Dredged material management;
- Entrance dredging;
- Hydrohammer use and marine-based pile driving.

PDSs generally include the following:

- An objective – the performance goal;
- A target – performance level at which the objective is demonstrated as being achieved;
- Application – the project activities and project areas to which the PDS applies (refer to drawing CDP-Env-50228 in Annexure 7 of the EMP for the location of the project areas);
- Environmental controls – management and mitigation measures required to support achievement of the objective during the implementation of the project. These include process controls and associated monitoring;
- Environmental limits – numerical performance standards, which the project must comply with;
- Reference to environmental monitoring programs – the environmental monitoring programs applicable to the PDS; and
- Reference to contingencies – the relevant contingency plans containing management actions, which may be taken in the event of potential exceedence of the environmental limit or response level.

It should be noted that the EMP formally defines 8 PDSs, listed above. Within those 8 standards are 58 environmental rules. However, the general convention through the delivery of the CDP has been to refer to the environmental rules individually as PDSs. This convention is continued in these audits and any reference to the 58 PDSs will by definition include the 58 environmental rules.

3. Audit Methodology

3.1 Standards

This audit was undertaken adopting a methodology consistent with ISO 19011 to meet the specific requirements of the Office of the Environmental Monitor (the Office) for the audit of PoMC's implementation of the EMP.

ISO 19011 *"Guidelines for Environmental Auditing"* provides a systematic approach to defining the requirements of the audit, planning, interpreting the elements of the EMP, collecting audit evidence, objectively assessing the evidence, and reporting in a clear and accurate manner. It also ensures that the audit has been conducted in accordance with an established and recognised audit methodology.

3.2 Audit Preparation

3.2.1 Overview

The audit methodology used in the preparation of this audit is presented schematically in Figure 1. Brief descriptions of key activities are described in greater detail below.

Prior to the audit the Office had identified those elements that it considered were particularly significant, and specified these in the tender brief as requiring focused audits, these are the subject of what are described as Activity 2 audits. This audit report is an Activity 2 targeted audit of EMP requirements for sand capping.

3.2.2 Audit Plan and Scope

The requirements of the audit were outlined in a brief that the Office issued for this work (http://www.oem.vic.gov.au/Independentaudits), and a draft audit plan and a preliminary methodology for the audit were outlined in the tender submission. To ensure that the audit requirements and the brief were addressed, the scope of the audit was confirmed with the Office and the audit plan and methodology was further refined in subsequent meetings with the Office, Victorian regulators and the Commonwealth.

The audit plan extended to the series of audits that are required under this commission; the methodology outlined in this report is common to all of the audits, but the details of meetings and interviews outlined in the following sections of this report is pertinent to the audit of the requirements of the EMP and the PDSs.

The scope of this audit was to assess the implementation of the EMP requirements for sand capping of the bund, based on the information available to the 24 July 2009. Two mechanisms have been identified to ensure that sand capping has been applied as required by the EMP, and are shown in Table 2.

Table 2 EMP mechanisms for sand capping

Mechanism	EMP Requirements
1. Sand Capping Application	PDS 34 and 37 Work Method Statement PoM DMG (WMS PoM DMG)
2. Sand Capping Integrity	PDS 37 WMS PoM DMG

Within these two mechanisms, five auditable items were identified from within the EMP and Work Method Statement PoM DMG (WMS PoM DMG).

This audit is based on information available for the audit period from 5 October 2008 to 24 July 2009. Items that have been fully assessed in previous audits and which contain no further requirements are considered to be closed out and have not been reassessed as part of this audit.

The audit was focused on aspects of the EMP that relate to environmental management and protection of the environment; this audit did not seek to review and confirm compliance with aspects of the PDSs that relate to other aspects such as on-ship or on-shore occupational health and safety, or structural or geotechnical considerations.

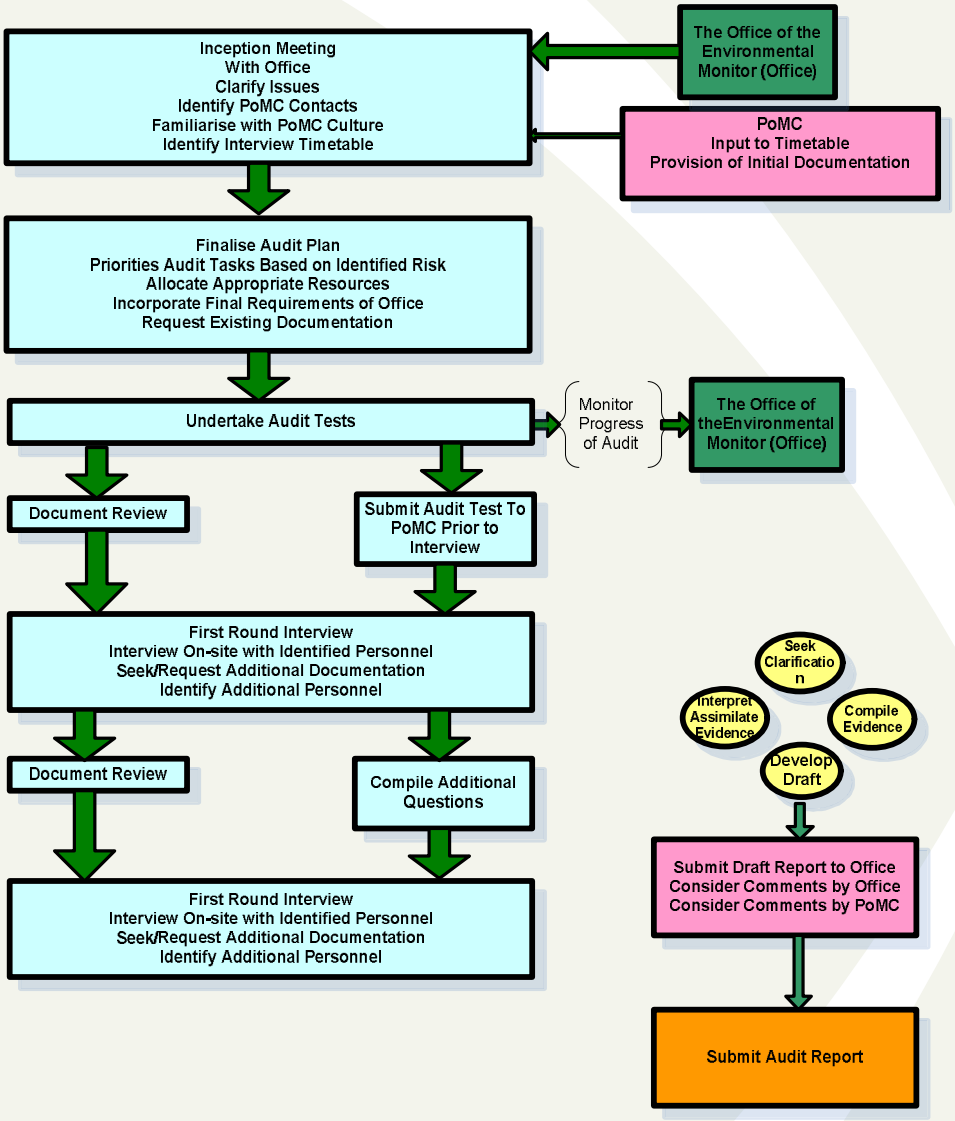
In assessing compliance of CDP activities and procedures with requirements of the EMP and the PDSs, check sheets were prepared by GHD and used to assist in identifying and obtaining evidence relevant to assessing compliance. The audit team met with PoMC nominated environmental representatives and sought relevant evidence; if requested evidence was deemed by PoMC to be not available or not relevant to the audit at that stage, the auditor sought evidence from PoMC to support that claim.

In general the audit comprised a desk review of documentation provided by PoMC and other information available from the Office, Victorian regulators, the Commonwealth and media reports. This review was supported by an inspection by the audit team of the main dredge vessels and berths.

3.3 Independence

In conducting the audit the independence requirements outlined in the Auditor's Declaration of Independence were complied with.

Figure 1 : Summary of Audit Methodology



3.3.1 Inception Meetings

As part of the preparation of the audit plan, the requirements of the brief were reviewed and discussed in a meeting with the Office, Victorian regulators and the Commonwealth on 9 September 2008.

Later the same day a meeting was also held with the Office and PoMC to ascertain the form of the information held by PoMC. A comprehensive listing of all elements of the EMP, audit questions and a preliminary set of requirements for evidence were prepared and submitted to the Office and PoMC.

A primary objective of these meetings was for the auditor and audit team to develop working relationships, mutual understandings and expectations with the Office and PoMC relating to the requirements and process of the audit and to provide an opportunity for the PoMC to present an overview of the dredging works, the organisational background, overview of compliance, and to arrange inductions for inspecting the dredge vessels.

3.3.2 Audit Tests and Ranking of Compliance

The requirements for determining compliance were discussed with the Office, Victorian regulators and the Commonwealth, and it was agreed that compliance would be graded in terms of full compliance, critical non-compliance, major non-compliance, minor non-compliance, not applicable and undetermined. The definition of these terms is outlined in Table 3. This grading was drawn from the method of grading compliance outlined in guidelines to auditors[3] under the Victorian Government *Safe Drinking Water Act 2003*.

Table 3 Summary Compliance Grades

Compliance Grade	Description
Full compliance	There is sufficient evidence to confirm that actions have been undertaken, prepared and/or implemented in full compliance with the requirements of the auditable element.
Critical non-compliance	The evidence shows that actions are not in full compliance with the requirements of the auditable element and this gives rise to a serious or imminent risk to the environment.
Major non-compliance	The evidence shows that actions are not in full compliance with the requirements of the auditable element and this gives rise to a high potential that the environment will be seriously affected if the non-compliance is not rectified.
Minor non-compliance	The evidence shows that actions are not in full compliance with the requirements of the auditable element but it is unlikely that this will cause the environment to be seriously affected.

[3] Victorian Government Department of Human Services, Water Regulatory Audit Guidance Note November 2007

Compliance Grade	Description
Not applicable	The auditable element falls outside the scope of the audit, e.g. work relevant to the project delivery standard has not yet commenced.
Undetermined	There is insufficient evidence to make a judgement on compliance.

Audit tests were developed for all requirements within the scope of the audit. These tests were designed to establish compliance with each element of the EMP. Evidence was sought from PoMC to establish whether the element has been complied with.

In order to maximise the efficiency with which the audit was carried out and to ensure the audit effort was directed to the most important issues, an assessment of the risk to the environment associated with each element of the EMP was determined and used to target issues and the level of effort put into each element.

3.3.3 Inspection of sites and vessels

PoMC provided an induction to the auditor and his team on 23 September 2008. The auditor and his team held a land-based inspection of the berths and the dredging vessels, The Queen of the Netherlands and the Cornelis Zanen on 25 and 26 September 2008.

The auditor's assistant also attended the piston coring investigation on the Alert on 4 and 5 June 2009.

3.4 Report on findings

The findings of the audit are presented in Section 4 of this report. Section 4.1 presents a discussion of the findings as they relate to each of the conditions for sand capping application. The findings of the report are presented in tabular form for each of the conditions, as listed in Table 2. The listing and findings are not presented in a "prioritised order" or "order of significance". Reference numbers assigned to audit requirements are arbitrary numbers and do not refer to sections in the EMP or other CDP documents.

4. Audit Findings

4.1 Summary of Findings

The audit determined that PoMC has a well developed environmental management system and an excellent system for documenting information relating to the CDP that is relevant to confirming compliance with the EMP and the PDSs. PoMC responded to the many requests by the audit team for information and evidence, and a large body of information was made available to the audit team.

Table 4 presents an overview of the findings for the two EMP mechanisms identified as a being relevant to sand capping.

Table 4 Overview of compliance with EMP mechanisms for sand capping application

Mechanism	Full Compliance	Minor Non-Compliance	Undetermined	Not Applicable
SAND CAPPING APPLICATION				
1. Application using spreader	Yes	-	-	-
Relevant components of PDS 34	Yes	-	-	-
2. Prior to placement	Yes	-	-	-
Relevant components of PDS 37	Yes	-	-	-
3. Placement in accordance with design requirements	Yes	-	-	-
Relevant components of PDS 34 and 37	Yes	-	-	-
SAND CAPPING INTEGRITY				
4. Capping layer thickness	Yes	-	-	-
Relevant components of PDS 37	Yes	-	-	-
5. Piston coring	Yes	-	-	-
Relevant components of Work Method Statement PoM DMG	Yes	-	-	-

In summary, it was found that, of the five auditable requirements arising from the components of PDS 34 and37 relevant to the two mechanisms:

» There were five requirements for which the audit concluded that full compliance was achieved;

» There were no major, critical or minor non-compliances;

» There were no requirements that were not applicable; and

» There were no requirements for which there was insufficient information available at the time of the audit to reach a conclusion regarding compliance.

Overall, the audit concluded that a high level of compliance has been achieved. A summary of the findings for each mechanism is provided below.

Sand Capping Application

The audit has concluded that the sand capping of the PoM DMG (Stage 1) is in accordance with PDS 37 and the Work Method Statement PoM DMG (WMS PoM DMG), in particular that:

» Sand capping was applied using a spreader attached to the TSHD Queen of the Netherlands;

» Bottom water velocity was measured prior to capping;

» Sand capping has achieved a minimum thickness of 0.5 metres; and

» Sand capping was applied in a minimum of two layers.

Sand Capping Integrity

The audit has concluded that the integrity of the sand capping of the PoM DMG (Stage 1) is in accordance with PDS 37 and the WMS PoM DMG, in particular that:

» There were process controls in place to ensure capping occurred in at least two layers and that regular hydrographic surveys were conducted to confirm capping thickness; and

» A piston coring investigation was completed and confirmed that a clear and well-defined interface was present between the capping (sand) and the new dredge material (mud/clay).

Recommendations and Opportunities for Improvement

No recommendations[4] were made.

No opportunities for improvement [5] were noted.

4.2 Acknowledgement

The auditor wishes to acknowledge that PoMC responded to the many requests by the audit team for information and evidence, and a large body of information was made available to the audit team for the purposes of the audit.

[4] In the context of this report, “recommendations” refer to recommendations made by the auditor that relate to items of non-compliance and are intended to assist in avoiding future non-compliance. As such, it might be expected that recommendations will be carried out prior to the next audit.

[5] In the context of this report, “opportunities for improvement” are suggestions made by the auditor that relate to areas where full compliance has been achieved and that may offer improvement in management systems and audit program. As such, they are not mandatory.

4.3 Details of Compliance

Details pertaining to the requirements, evidence and compliance for each of the audit requirements are provided in Table 5.

Table 5 Summary of Requirements, Evidence and Compliance

Item	Requirement	Audit Findings (to 24 July 2009)	Compliance	Supporting Evidence
SAND CAPPING APPLICATION				
1	**Application using spreader** The contaminated materials will be capped with sand from the South Channel. This sand will be placed with a special designed spreader device, which will be connected to the TSHD. (Ref WMS PoM DMG)	The Dredge Schedule Final Rev 2 Upd 7 (17 July 2009) indicated that capping occurred between 2 May 2009 and 9 June 2009. Two photos were sighted showing the spreader device attached to the TSHD, Queen of the Netherlands. The auditor also sighted a sample of four Daily Trip Reports dated 8, 9, 20 and 21 May 2009, for the Queen of the Netherlands. These logs include an item "Spreader in use (Y/N)". On each of the daily logs, this item was completed as Y. While observing the piston coring related to Item 5, the auditor's observer saw the Queen of the Netherlands moving over the area of the bund. A PoMC staff member advised that the vessel was spreading sand to form the capping. The vessel appeared to have the spreader device engaged and was moving at a rate that was conducive to spreading. The observer also noted that sand was clearly present in all cores taken during observations made for piston coring. Inspection of the Daily Trip Reports dated 8, 9, 20 and 21 May 2009 for the Queen of the Netherlands, together with scheduling information from the Dredge Schedule Final Rev 2 Upd 7 (17 July 2009), indicated that the sand was sourced from the South Channel. Each Daily Trip Report indicated the 'Dredge Area' as 'SCW' (South Channel) and 'Disposal Area' as 'POM DMG'. The auditor concludes that compliance has been achieved with this requirement.	Full compliance	Photos showing spreader attached to the Queen of the Netherlands (20090429 Capping spreader installed on Queen.pdf) Queen of the Netherlands Daily Trip Reports for 8, 9, 20 and 21 May 2009 Dredge Schedule Final Rev 2 Upd 7 (17 July 2009)

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2	**Prior to placement** Bottom water velocity will be measured adjacent to the PoM DMG at -15 m CD. This and other data will be used to inform the placement of the capping layer around 140 days after completion of the hydraulic placement of contaminated sediment, in accordance with EMP Method Statement for material placement in PoM DMG. (Ref PDS 37)	The Alliance memo CDP_ALL_MEM_064 provides a summary of the water velocity measurements adjacent the PoM DMG, confirming that water velocity measurements have been completed using a S4 current meter. The PoMC Matter for Decision document states that measurement occurred at two locations north of the PoM DMG Stage 1 bund for a total of six months. The Matter for Decision document states that between 27 September 2008 to 25 November 2008 the current meter was located at approximately –17.10 m CD and between 25 November 2008 to 23 March 2009 the current meter was located at approximately –15.30 m CD. The auditor was advised that the bottom water velocity is to be measured at the approximate level of the new dredge material surface to confirm that current speeds at the dredge material surface will not result in resuspension of contaminated material. Water velocities are greater further away from the seabed. The auditor considers the location of the current meter at -15.30m is acceptable, as the new dredge material surface is lower than -15.30 m, and hence the current meter would provide a conservative estimate of water velocity at the new dredge material surface. The Matter for Decision states that monitoring data showed that bottom water velocity at both locations was within SEES predictions and that currents were therefore below critical speeds for resuspension. The Matter for Decision document concludes that the requirements of PDS 37 have been met. The Dredge Schedule Final Rev 2 Upd 7 (17 July 2009) indicates that hydraulic placement of contaminated sediments was completed on 5 October 2008 and the sand capping commenced on 2 May 2009. Therefore a total of 211 days passed between hydraulic placement of contaminated sediments and the commencement of capping, more than the required 140 days. In addition, it is noted that the PoMC Targeted Audit Report PoM DMG (Stage 1) Capping also states that capping commenced more than 140 days after completion of hydraulic placement of contaminated sediment was completed on 5 October 2008. The auditor concludes that full compliance has been achieved with this requirement.	Full compliance	PoMC Matter for Decision – Bottom water velocity measurement, 30 April 2009 CDP_ALL_MEM_064 – Summary of the S4 current measurements, 30 April 2009 PoMC Targeted Audit Report PoM DMG (Stage 1) Capping, 24 July 2009 PoMC Targeted Audit Report PoM DMG Bund Completion (Stage 1), 1 May 2009 Dredge Schedule Final Rev 2 Upd 7 (17 July 2009) GHD 2009, Activity No. 2 Audit No. 2 – Targeted audit of the EMP requirements for management of contaminated sediments. GHD 2009, Activity No. 2 Targeted audit of EMP requirements for construction of the bund.

Item	Requirement	Audit Findings (to 24 July 2009)	Compliance	Supporting Evidence
3	**Placement in accordance with design requirements** By moving slowly over the PoM DMG, a thin layer of sand is applied. The cap shall have a minimum thickness of 0.5 m and will be placed in a minimum of two layers. (Ref WMS PoM DMG)	The Dredge Schedule Final Rev 2 Upd 7 (17 July 2009) indicates that sand capping of the bund commenced on 2 May 2009 and concluded on 9 June 2009, as verified by the piston coring report (CDP_ALL_MEM_071). A statement from the Alliance Engineering Manager dated 30 July 2009 states that: the cap was placed by "following strictly defined tracks running east-west and west-east over the DMG". The auditor sighted a map showing east west transects marked at 12-metre intervals across the PoM DMG and numbered sequentially. Field data sheets dated from 4 May 2009 to 24 May 2009 were also sighted. The field data sheets show the transect line numbers for the first capping layer marked at 12-metre intervals and the planned sequence for sailing these. The field data sheet also contains a table listing the sequence number and corresponding transect number, along with the time and date that each transect was sailed and the load number. This sheet shows that each transect was sailed twice. The field data sheet then shows that for the second capping layer the transects were offset by six metres and each transect again sailed twice. This indicates that the cap was placed in at least 2 layers. The Alliance Drawing (CDP-ALL-DWG-220203) maps the difference between the pre and post capping placement surveys and indicates that the capping layer has a minimum thickness of 0.5 metres. A drawing showing the barge dump locations and diffuser position for placement of contaminated material (CDP-ALL-DWG-220172) confirms that all contaminated sediment has been located within the area covered by 0.5 m of sand capping. SKM, in a letter to PoMC dated 23 June 2009, has certified the pre and post capping bathymetric surveys, with the former being conducted on 29 April 2009 and the latter being conducted on 2, 3, 5, 6, 8 and 11 June 2009. The SKM letter also stated that the survey results show that the post capping layer thickness is not less than 0.5 metres and in accordance with the requirement of the CDP Environmental Management Plan. In a second letter to PoMC dated 3 August 2009, SKM outlined the survey methodology and factors considered when assessing the surveys to determine if the required sand capping coverage had been achieved. PoMC provided a Drawing (CDP-Env-51147v0) of the capping thickness showing that the post capping layer thickness was at least 0.50 metres, with the vast majority exceeding 0.55 m and the Alliance Drawing (CDP-ALL-DWG-220203) showing substantial areas exceeding 0.75 m. Email advice from PoMC states the percentage of capping thickness between 0.50 and 0.55 m is 0.0035%. Further evidence supporting the conclusion that the cap is at least 0.5 m thick was observed by the auditor's assistant during piston coring. The piston coring is designed to assess the nature of the interface between the sand capping material and new dredge material. It is not an accurate method to measure cap thickness, as it does not take into account effects relating to any compression or material losses incurred during the process of obtaining and recovering the cores. However, the auditor's observer noted, while witnessing the piston coring on 4 and 5 June 2009, that all samples observed on these days were approximately 0.50 m cap thickness or greater. It should also be noted that capping continued until 9 June 2009. The auditor concludes that full compliance has been achieved with this requirement.	Full compliance	Dredge Schedule Final Rev 2 Upd 7 (17 July 2009) CDP_ALL_MEM_071 Rev 01 Core samples of cap interface – PoM DMG, 6 July 2009 Email advice from Alliance Engineering Manager, dated 30 July 2009 Survey dates whilst capping (text document and email dated 14 August 2009) PoMC DMG Capping Lines (090429c01 and 090429c02) Field data sheets for capping (dated 4 May 2009 to 24 May 2009) CDP-ALL-DWG-220203.pdf CDP-ALL-DWG-220172.pdf SKM 2009, Letter to PoMC titled: *Acceptance Survey – Port of Melbourne Dredged Material Ground (DMG) Certification of Acceptance Surveys – Pre and Post Capping Placement*, 23 June 2009 PoMC Targeted Audit Report PoM DMG (Stage 1) Capping, 24 July 2009 SKM 2009, Letter to PoMC titled: *Port of Melbourne Dredge Material Ground (PoMDMG) – Survey Tolerance*, 3 August 2009 Bathymetric map titled Port of Melbourne Dredged Material Ground (DMG) – Bund; Capping Thickness – focussed on 0.5m to 0.55m thickness (CDP-Env-51147v0) and PoMC email advice stating percentages dated 17 August 2009

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SAND CAPPING INTEGRITY				
4	**Capping layer thickness – hydrographic survey** The thickness of the placed layer will be recorded via process control, based on sailing speed, mixture density, mixture flow, and width of spreader. This data will be used to update the survey fill matrix on board of the vessel. The calculated layer thickness will be shown on the screen. This method ensures a full coverage of the bunded area. In addition, regular hydrographic surveys will be undertaken. When both process control and the surveys indicate the minimum of 0.5 m thickness is achieved, capping will be suspended. (Ref PDS 37 and WMS PoM DMG)	A statement from the Alliance Engineering Manager dated 30 July 2009 states that process controls including sailing speed, mixture density, mixture flow, and the width of the spreader were used to predict the thickness of the cap and that regular hydrographic surveys were used to improve and confirm predictions of cap thickness. PoMC has advised that survey dates during capping activities were 2, 4, 6, 8, 12, 13, 17, 19, 21, 23, 26, 31 May 2009 and 2, 3, 5, 6, 7, 8, 10, 11 June 2009, indicating that regular hydrographic surveys were undertaken. Surveys undertaken on 2, 3, 5, 6, 8, 11 June 2009 were used for out surveys. Audit item 3 in this audit has found that the cap has a minimum thickness of 0.5 m. The auditor concludes that compliance has been achieved with this requirement.	Full compliance	Email advice from Alliance Engineering Manager, dated 30 July 2009 Survey dates whilst capping (text document and email dated 14 August 2009) PoMC Targeted Audit Report PoM DMG (Stage 1) Capping, 24 July 2009 PoMC Matter for Decision – Post-construction bund and cap inspections, 24 July 2009 CDP-ALL-DWG-220203.pdf SKM 2009, Letter to PoMC titled: *Acceptance Survey – Port of Melbourne Dredged Material Ground (DMG) Certification of Acceptance Surveys – Pre and Post Capping Placement*, 23 June 2009 SKM 2009, Letter to PoMC titled: *Port of Melbourne Dredge Material Ground (PoMDMG) – Survey Tolerance*, 3 August 2009 Bathymetric map titled Port of Melbourne Dredged Material Ground (DMG) – Bund; Capping Thickness – focussed on 0.5m to 0.55m thickness and email advice stating percentages dated 17 August 2009

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5	**Piston coring** An additional investigation with a diver operated piston corer will be undertaken. The piston core positions are defined on a grid of 200 x 200 m over the entire bunded area. The results from the piston coring investigation will be used solely to demonstrate the interface between sand and contaminated sediment. The piston corer results will be compiled in a report.	CDP_ALL_MEM_071 Rev 01 outlines the piston coring investigations. The document states that 23 sites were investigated on a 200-metre grid within the bunded area of the PoM DMG. The investigation was conducted over a three-day period between 3 and 5 June 2009. The auditor's assistant and OEM observed the investigations conducted on the 4 and 5 June 2009. These observations confirmed that a diver operated piston corer was used and that there was a clearly visible interface between sand and contaminated sediment (new dredge material) deposited in the bund. Capping was still occurring at the time of the investigation. The CDP_ALL_MEM_071 states that the piston coring investigation revealed a clear and well-defined interface between the capping material (sand) and the bunded material (mud/clay) at all locations. The auditor's assistant's observations and photographic evidence collected during the field investigation confirmed this interface. The CDP_ALL_MEM_071 details the methodology and results from the piston coring in the form of a report, including sampling on a grid of 200 x 200 m over the entire bunded area. SKM have reviewed the piston coring report (CDP_ALL_MEM_071) and agree with the report's conclusions that the sand / new dredge material interface is sharp and that the capping layer forms a homogeneous layer of sand that does not penetrate into the new dredge material. The auditor concludes that full compliance has been achieved with this requirement.	Full compliance	CDP_ALL_MEM_071 Rev 01 Core samples of cap interface – PoM DMG, 6 July 2009 PoMC Targeted Audit Report PoM DMG (Stage 1) Capping, 24 July 2009 PoMC Matter for Decision – Post-construction bund and cap inspections, 24 July 2009 SKM 2009, Letter to PoMC titled *Review of Piston Core Sampling of Port of Melbourne Dredge Material Ground (PoMDMG) Capping*, 23 July 2009

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