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## **Department of Transport**

Report for Esperance Clean up  
and Recovery Project

Esperance Port - Compliance  
and Performance Audit Report



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## Executive Summary

The Department of Transport commissioned Mr Andrew Kohlrusch, a Western Australia Department of Environment and Conservation (DEC) accredited contaminated site auditor, to undertake a compliance and performance audit of the sampling, cleaning and validation of Esperance Port following the deposition of lead carbonate dust throughout the town on 11 December 2006. The deposition of lead dust was associated with the transport and storage of lead carbonate from the Magellan mine site to the port of Esperance. The audit formed one of the objectives of the Esperance Clean Up and Recovery Program (ECRP).

This audit report provides a critical and independent review of those works undertaken by the Esperance Ports Sea and Land EPSL since this time.

### ***Purpose of the Audit***

The audit was commissioned to assess whether the project:

- ▶ met the objectives of the ECRP;
- ▶ met the requirements of the Deed of Settlement; and
- ▶ met the desired outcome of the Premier that the cleanup was “thorough and comprehensive”.

The key objectives of the ECRP were as follows:

- 1(a) To assess/audit levels of lead and nickel in homes, premises and public places in Esperance and determine the need for cleaning by reference to agreed standards and guidelines;
- 1(b) To remove lead and nickel residues in homes, premises and in public places to acceptable standards such that these contaminants do not pose a risk to the health of the Esperance community;
- 1(c) To validate the cleaning process;
- 1(d) To work with the Esperance community in this project and provide ongoing progress reporting; and
- 1(e) To undertake sentinel monitoring to ensure no re-contamination of the Esperance townsite.

This report includes an assessment of the Esperance Port site only. The audit of the Esperance townsite is provided under separate cover.

The audit has been undertaken with reference to the Western Australia, Department of Environment and Conservation guideline *Contaminated Sites Auditors: Guidelines for Accreditation, Conduct and Reporting* (2009). It is however recognised that the ECRP is a unique project, for which specific sampling, cleanup and validation methodologies have been developed and as such standards and guidelines may not exist for all facets of the project. Where this was the case, the auditor has used professional judgment and experience with similar projects to make conclusions and recommendations in relation to the ECRP objectives.

### ***Scope of Work***

The audit included a review of:

- ▶ EPSL sampling, cleanup and validation;
- ▶ community consultation program;



- ▶ sentinel monitoring reports.

### **Conclusions**

The auditor provides the following conclusions on the works undertaken by the EPSL in the Esperance Port in relation to the objectives of the ECRP:

- ▶ **Objective 1 (a) To assess/audit levels of lead and nickel in homes, premises and public places in Esperance and determine the need for cleaning by reference to agreed standards and guidelines;**
  - Lead levels across the site have been assessed in general accordance with relevant guidelines, the Environmental Protection Notice and legislation. The sampling and validation procedures were in general adequately defined in the reporting. Where information was not readily available to the auditor, this information was not considered to materially affect the assessment of the need for cleaning. The procedures were considered generally adequate to document the works completed. It is the auditor's opinion that the sampling and validation works were sufficient to determine the levels of lead present within the Esperance Port site for the purposes of determining where cleanup was required.
  - The assessment of nickel concentrations (as required for homes, premises and public spaces) was not undertaken of the port soil, ground surfaces or building surfaces. The auditor notes however that the Environmental Protection Notice related to the port cleanup and validation works did not require that nickel was tested or cleaned up at the port. Furthermore, as cleanup for lead was conducted and validated, it would be expected that a commensurate reduction in nickel concentrations would also have transpired.
- ▶ **Objective 1 (b) To remove lead and nickel residues in homes, premises and in public places to acceptable standards such that these contaminants do not pose a risk to the health of the Esperance community;**
  - Validation testing conducted by the EPSL provided assurance to the auditor that cleaning works were thorough and comprehensive.
  - Although not tested, it is considered that some cleanup of nickel at the port (though not including any contamination hot spots) would have occurred during the removal of lead at the Port. As previously stated, the Environmental Protection Notice related to the port clean up and validation works and did not require that nickel was tested or cleaned up.
- ▶ **Objective 1 (c) To validate the cleaning process;**
  - The auditor notes that limited information has been provided on the cleanup methodologies adopted and no information has been provided on the additional cleanup works undertaken following DEC independent sampling. Therefore, the auditor was unable to verify the suitability of the cleanup methodologies and must rely solely on the validation test results to confirm the effectiveness of the cleanup.
  - As stated against objective 1 (b) the validation testing data conducted by EPSL provided assurance to the auditor that the cleaning works were effective.
- ▶ **Objective 1 (d) To work with the Esperance community in this project and provide ongoing progress reporting; and**



- The auditor considers the community consultation undertaken by ECRP was more than adequate to meet the project objectives of providing ongoing progress reporting throughout the project.
- ▶ **Objective 1 (e) To undertake sentinel monitoring to ensure no re-contamination of the Esperance townsite.**
  - Sentinel monitoring is ongoing and therefore a conclusion on the completeness of the sentinel monitoring cannot be undertaken at this stage.
- ▶ **Objective 2 To meet the requirements of the Deed of Settlement.**
  - The Esperance Port cleanup and validation program was based on adopting either standard procedures or developing methods through consultation with health professionals and/or environmental consultants. The cleanup and validation and environmental monitoring were also based upon Environmental Protection Notices and Licencing conditions to which EPSL is compliant. The auditor considers that based on the review of the sampling, cleanup and validation testing at the Esperance Port, the requirements of the Deed of Settlement with regards to the Esperance Port have been fulfilled.
- ▶ **Objective 3 To achieve the desired outcomes of the Premier that the cleanup would be ‘thorough and comprehensive’.**
  - The auditor considers that the cleanup and validation testing of lead at the Esperance Port, the extent of testing undertaken – soil, port ground surfaces, external and internal building surfaces, air, wastewater and sediment, have combined to allow a thorough and comprehensive cleanup and validation of the Esperance Port.



# 1. Introduction

The Department of Transport commissioned Mr Andrew Kohlrusch, a Western Australia, Department of Environment and Conservation (DEC) accredited contaminated site auditor, to undertake a compliance and performance audit of the Esperance Cleanup and Recovery Project (ECRP) and the Esperance Ports Sea and Land for both the town site and the Esperance Port respectively. Maps of the Esperance Town site and Port are provided in Appendix A.

## 1.1 Purpose of the Audit

The audit was commissioned to assess whether the project met the objectives of the ECRP, met the requirements of the Deed of Settlement and the desired outcome of the Premier that the cleanup was “thorough and comprehensive”.

The key objectives of the ECRP were as follows:

- ▶ To assess/audit levels of lead and nickel in homes, premises and public spaces in Esperance and determine the need for cleaning by reference to agreed standards and guidelines;
- ▶ To remove lead and nickel residues in homes, premises and in public places to acceptable standards such that these contaminants do not pose a risk to the health of the Esperance community;
- ▶ To validate the cleaning process;
- ▶ To work with the Esperance community in this project and provide ongoing progress reporting; and
- ▶ To undertake sentinel monitoring to ensure no re-contamination of the Esperance town site.

In general, the ECRP aimed to provide assurance to the Esperance community that the cleanup of the port area and the townsite was to be undertaken in accordance with best practice.

The Deed of Settlement requires that the ECRP:

*“...undertaken the cleanup of the Esperance townsite and the Esperance port in accordance with all relevant laws and all requirements, standards, notices and guidelines of the Department of Environment and Conservation and Department of Consumer and Employment Protection.”*

And defines a Validation Report as:

*“means the report commissioned by the State and carried out by a duly qualified third party consultant and delivered to the State following completion of the cleanup of the Port Area and the town of Esperance that verifies and validates that the standards of cleanup referred to in clause 4.1 have been met.”*

This report includes an assessment of the Esperance Port only. The audit of the town site is provided under separate cover.

The audit has been undertaken with reference to the Western Australia, Department of Environment and Conservation guideline *Contaminated Sites Auditors: Guidelines for Accreditation, Conduct and Reporting* (2009). It is however recognised that the ECRP is a unique project, for which specific sampling, cleanup and validation methodologies have been developed and as such standards and guidelines may not exist for all facets of the project. Where this was the case, the auditor has used professional judgment and experience with similar projects to make conclusions and recommendations.



## 2. Scope of Works

This report includes an assessment of the works undertaken at Esperance Port only as the audit of the townsite was provided under separate cover (GHD, 2012). The port area is defined as the whole of Crown Reserve 28207. Figures of the port area and of the port berths and storage facilities are provided in Appendix A.

The works undertaken by EPSL at the Esperance Port, which were subsequently reviewed by WA DEC accredited auditor Mr Andrew Kohlrusch, comprised:

- ▶ Sampling, Cleanup and Validation of Esperance Port External Surfaces (including building walls, roofs);
- ▶ Sampling of marine sediment within the Esperance Port harbour and associated risk assessment;
- ▶ Removal of approximately 9000 tonnes of bulk lead carbonate concentrate from the Western Mining Corporation shed (WMC/lead shed);
- ▶ Demolition and disposal of the WMC shed and validation of the new shed; and
- ▶ Environmental monitoring of wastewater, sediment and ambient air as part of compliance with licencing monitoring.

During the undertaking of the above listed activities, community consultation was concurrently carried out by the EPSL. EPSL also informed the auditor that other works completed at the Esperance Port to prevent recontamination of the town with lead and nickel comprised:

- ▶ Cessation of lead exports;
- ▶ Upgrading the existing mineral concentrate circuit between 2007 and 2010;
- ▶ Reduction in bulk nickel exports from 2010 to zero exports since late 2011 following the Port request for an independent surveyor to inspect the corrosion of the upgraded mineral concentrate subsequently declaring it unsafe to use. All nickel at the time of this report was being exported in sealed containers;

At the time of reporting, the only other method likely to be considered by the Esperance Port for nickel export was the use of retainers to enable bulk export of nickel product with no significant odour or dust emissions.

In order to complete the audit, the following scope of works was undertaken for the Esperance Port.

### 2.1 Review of Esperance Port Sampling, Cleanup and Validation

The sampling, cleanup and validation of the Esperance Port **external surfaces** which comprised:

- ▶ Grid and judgement based sampling at a total of 560 sample locations between 15 November and 28 November 2007;
- ▶ Cleanup of identified hotspots by high pressure cleaning of vacuuming and subsequent validation testing; and
- ▶ Additional sampling, cleanup and validation of port surfaces following sampling conducted by the DEC in February 2009 indicating areas with lead still in excess of the validation criteria



was outlined in the following documents:

- Environmental Risk Solutions, *Esperance Port Authority, EPN Number DEC02 of 2007 Final Report, Implementation and Outcome of Lead Sampling, Cleanup and Validation*, 17 December 2007 (Document No. J91346\_EsPA\_SCVP\_Interim\_0);
- Sinclair Knight Merz, *Esperance Port Authority Validation Works*, 24 July 2008;
- Emissions Monitoring Pty Ltd, *Esperance Port Authority, EPN Number DEC02 of 2007, Final Report: Implementation & Outcome of Lead Sampling, Cleanup & Validation Plan*, 30 September 2008 (Document No. J8005\_EsPA\_FR\_0); and
- Emissions Monitoring Pty Ltd, *Esperance Ports Sea & Land, EPN Number DEC02 of 2007, Validation Sampling of the Lead Cleanup at Esperance Port*, 17 March 2010 (Document No. J9022\_EPL&S\_VAL).

Sampling of **marine sediment** from the Esperance Port within harbour waters was outlined in the following documents:

- Oceanica, 2007, *Port of Esperance Survey of Lead and Nickel in Marine Sediments, Level (Stage) 1 – Screening Assessment Report*, Oceanica Consulting Pty Ltd Report No. 606/2, November 2007.
- Oceanica, 2008. *Port of Esperance Survey of Lead and Nickel in Marine Sediments, Level (Stage) 2 Bioavailability Investigation Report*, Oceanica Consulting Pty Ltd, Report No. 606\_001/1, January 2008.
- Oceanica, 2010, *Esperance Port Survey of Lead and Nickel in Marine Sediments, Level (Stage) 3 Ecological Risk Assessment Report*, Oceanica Consulting Pty Ltd, Report No. 606\_001/2, January 2010.

The **removal of bulk lead carbonate** was outlined in the EsPA Lead Removal plan as referenced below and 17 weekly operation audit reports following documents:

- Esperance Port Authority, *Esperance Port Authority Lead Removal Plan*, 3 September 2008, EsPA document no. C/2300;
- Stewart, Jill, 2009a-q, *Esperance Lead Removal Plan Weekly Operational Audit*, Reported By: Jill Stewart (Independent LRP Auditor) Audit Completed for the week of: February 9 - 15 2009 to June 1-10 2009, 2009, Audit Reported: February 17, 2009 to June 12 2009.

The **demolition and removal of the WMC shed** (lead shed) is outlined in the following documents:

- AEC Environmental, 2009, *Qualitative Risk Assessment, Transport of Scrap Metal, Old WMC Shed, Port of Esperance, Esperance Western Australia*, AEC Environmental Pty Ltd, 30 July 2009.
- EPSL, 2010, *Esperance Port Sea & Land WMC Shed Swabs Sampling and Analysis Program April 2010*, Esperance Ports Sea & Land, 1 June 2010.
- Stewart, Jill Letter, *WMC Shed Certificate of Compliance*, 10 June 2009.

The following correspondence was also provided by the Esperance Port and reviewed by the auditor for background purposes:

- DEC Letter, *Environmental Protection Notice Served Pursuant to Section 65 of the Environmental Protection Act 1986*, 9 October 2007;
- DEC Letter, *Environmental Protection Notice (DEC 02 of 2007) Lead Cleanup*, 15 June 2009;



- DEC letter, *Environmental Protection Action 1986 – Environmental Protection Notice DEC 02 of 2007*, 6 January 2011.

## 2.2 Site Visit

The auditor conducted a site visit on 8 June 2012. The visit comprised a guided tour hosted by Alex Leonard of Esperance Port. During the visit, the auditor was shown the area where the lead carbonate was formerly stored and given a description of the process used to affect the cleanup and subsequent validation.

## 2.3 Review of Community Consultation

The auditor reviewed the community consultation program carried out by the EPSL and its compliance with the DEC *Community Consultation Guideline* (DEC 2006).

## 2.4 Review of Sentinel Monitoring Reports

ECRP is currently undertaking quarterly sentinel monitoring over a period of two years from November 2010 to November 2012 to determine if recontamination of the town site may be occurring. Concurrently, and as part of licencing conditions, the EPSL is also undertaking ongoing monitoring including; marine sediment monitoring (annual), wastewater monitoring (monthly) and ambient air quality monitoring (continuous to monthly). Although the ECRP sentinel monitoring is required for a period of two years, the EPSL monitoring is ongoing as per licencing requirements and has been undertaken for a number of years.

For the purpose of this audit, EPSL annual air, wastewater and marine sediment reports were reviewed. Only those years relevant to the lead dust fallout period have been included in the scope of the audit.

### **Air Monitoring**

- SKM, 2009, *Esperance Ports Sea & Land Annual Ambient Air Quality Monitoring Report – 1 October 2008 to 30 September 2009*, Sinclair Knight Merz, 30 October 2009.
- EPSL, 2011, *Esperance Ports Sea & Land Annual Ambient Air Quality Monitoring Report – 1 Oct 2010 to 30 Sept 2011*, Esperance Ports Sea & Land, 25 November 2011.

### **Wastewater Monitoring**

- EPSL, 2011, *Esperance Ports Sea & Land Annual Wastewater Monitoring Report – 1 Oct 2010 to 30 Sept 2011*, Esperance Ports Sea & Land, 25 November 2011

### **Sediment Monitoring**

- Oceanica, 2009a, *Comprehensive Sediment Monitoring and Reporting Plan*, Oceanica Consulting Pty Ltd, Esperance Port, March 2009.
- Oceanica, 2009b, *Esperance Port 2008 Annual Sediment Sampling. Sampling and Analysis (SAP) Implementation Report*, Oceanica Consulting Pty Ltd, May 2009
- EPSL, 2011, *Esperance Ports Sea & Land Annual Marine Sediment Monitoring Report for 1<sup>st</sup> October 2010 to 30<sup>th</sup> September 2011*, Esperance Ports Sea & Land, 15 November 2011.



## 3. Review of Background Documentation

### 3.1 Documentation

In addition to the reports and documentation listed in Section 2, the following correspondence was also provided by the Esperance Port and reviewed by the auditor for background purposes:

- ▶ DEC Letter, *Environmental Protection Notice Served Pursuant to Section 65 of the Environmental Protection Act 1986*, 9 October 2007;
- ▶ DEC Letter, *Environmental Protection Notice (DEC 02 of 2007) Lead Cleanup*, 15 June 2009; and
- ▶ DEC letter, *Environmental Protection Action 1986 – Environmental Protection Notice DEC 02 of 2007*, 6 January 2011.

### 3.2 Review Findings

A review of the letter correspondence from the DEC between 2007 and 2011 indicated that the Esperance Port was served with an Environmental Protection Notice (Number: DEC 02 of 2007) in 2007 to address lead carbonate contamination at the port. The works completed by the port were subsequently independently verified by the DEC and additional investigation and cleanup work was requested. Following the provision of a revised Cleanup and Validation Plan from the Esperance Port, the Environmental Protection Notice (EPN) was revoked in January 2011.

The EPN outlines the conditions that were to be satisfied to ensure cleanup requirements were met and also provides timelines for deliverables.

The key elements of the Environmental Protection Notice are summarised as follows:

- ▶ Investigate the extent and nature of the lead carbonate emission, through the development and implementation of a sampling plan.
- ▶ Prevent, control and abate the emissions, through the development of a cleanup and validation plan that includes:
  - Cleanup, monitoring, waste containment and waste disposal methodologies;
  - Appropriate cleanup guidelines approved by the Department of Health;
  - Validation methodologies;
- ▶ Report on actions undertaken, including:
  - Written progress;
  - Preparation of a final report outlining the operation, implementation and outcome of the sampling, cleanup and validation plans;
  - Provision of a compliance certificate stating that all requirements of the sampling, cleanup and validation plans have been met.

Table 1 outlines the key elements of each letter.



**Table 1 Summary of Background Documentation**

<b>Report</b>	<b>Comments</b>
Environmental Protection Notice (October 2007)	This letter includes the Environmental Protection Notice (Number: DEC 02 of 2007), which was issued to the Esperance Port by the DEC. As outlined above the EPN outlines the requirements for a sampling and analysis plan, cleanup and validation plan and final operation and implementation plan for the Esperance Port lead carbonate contamination. The notice states that the work was to be completed by December 2007.
Environmental Protection Notice (DEC 02 of 2007) Lead Cleanup (15 June 2009)	<p>This letter indicates that following submission of the <i>Implementation and Outcome of Lead Sampling, Cleanup and Validation Plan</i> (EM, September 2008) the DEC provided comments on the report. The report was subsequently revised by EM and reissued on 8 April 2009. The auditor has not been provided with this correspondence or the revised report. This letter indicates that the revised report addresses the issues outlined by the DEC.</p> <p>The letter also indicates that the DEC performed validation testing using and XRF at 55 sites and 10 soil sample locations. Of these, 10 XRF results and nine soil results reported lead concentrations above the adopted guideline level of 300 mg/kg. Consequently, the DEC requested immediate action to address these non-complaint results.</p>
Environmental Protection Notice DEC 02 of 2007(6 January 2011)	This letter from the DEC indicates that the conditions and requirements outlined in the Environmental Protection Notice (Number: DEC 02 of 2007) issued to the Esperance Port have been complied with and the EPN was now revoked.



## 4. Review of Esperance Port Sampling, Cleanup and Validation Reports

A number of investigations and cleanup actions have taken place at the Port incorporating removal of the lead carbonate and subsequent validation sampling, sampling and testing of sediments in the harbour and the demolition and removal of the shed in which the lead carbonate was formerly stored. This section of the report summarises and reviews available documentation pertaining to the activities mentioned above. Assessment of the effectiveness and compliance of these activities as documented in the reviewed reporting is provided in Section 7.

### 4.1 Documentation

The auditor independently and critically reviewed the following reports that were provided on the sampling, cleanup and validation of the Esperance Port external surfaces.

- ▶ Environmental Risk Solutions, *Esperance Port Authority, EPN Number DEC02 of 2007 Final Report, Implementation and Outcome of Lead Sampling, Cleanup and Validation*, 17 December 2007 (Document No. J91346\_EsPA\_SCVP\_Interim\_0);
- ▶ Sinclair Knight Merz, *Esperance Port Authority Validation Works*, 24 July 2008;
- ▶ Emissions Monitoring Pty Ltd, *Esperance Port Authority, EPN Number DEC02 of 2007, Final Report: Implementation & Outcome of Lead Sampling, Cleanup & Validation Plan*, 30 September 2008 (Document No. J8005\_EsPA\_FR\_0); and
- ▶ Emissions Monitoring Pty Ltd, *Esperance Port Sea & Land, EPN Number DEC02 of 2007, Validation Sampling of the Lead Clean-up at Esperance Port*, 17 March 2010 (Document No. J9022\_EPL&S\_VAL).

The auditor was not provided with a copy of the sampling plan or cleanup and validation plan which were requested by the DEC in the Environmental Protection Notice (Number: DEC 02 of 2007) as part of this review. The auditor's assessment is therefore based on review of the final validation reports only.

Sampling of marine sediment from the Esperance Port within harbour waters is outlined in the following documents:

- ▶ Oceanica, 2007, *Port of Esperance Survey of Lead and Nickel in Marine Sediments, Level (Stage) 1 – Screening Assessment Report*, Oceanica Consulting Pty Ltd Report No. 606/2, November 2007.
- ▶ Oceanica, 2008. *Port of Esperance Survey of Lead and Nickel in Marine Sediments, Level (Stage) 2 Bioavailability Investigation Report*, Oceanica Consulting Pty Ltd, Report No. 606\_001/1, January 2008.
- ▶ Oceanica, 2010, *Esperance Port Survey of Lead and Nickel in Marine Sediments, Level (Stage) 3 Ecological Risk Assessment Report*, Oceanica Consulting Pty Ltd, Report No. 606\_001/2, January 2010.

The removal of bulk lead carbonate was outlined in the EsPA Lead Removal plan as referenced below and 17 weekly operation audit reports following documents:



- ▶ Esperance Port Authority, *Esperance Port Authority Lead Removal Plan*, 3 September 2008, EsPA document no. C/2300;
- ▶ Stewart, Jill, 2009a-q, *Esperance Lead Removal Plan Weekly Operational Audit, Reported By: Jill Stewart (Independent LRP Auditor) Audit Completed for the week of: February 9 - 15 2009 to June 1-10 2009, 2009, Audit Reported: February 17, 2009 to June 12 2009.*
- ▶ Stewart, Jill Letter, WMC Shed Certificate of Compliance, 10 June 2009.

The demolition and removal of the WMC shed (lead shed) is outlined in the following documents:

- ▶ AEC Environmental, 2009, *Qualitative Risk Assessment, Transport of Scrap Metal, Old WMC Shed, Port of Esperance, Esperance Western Australia, AEC Environmental Pty Ltd, 30 July 2009.*
- ▶ EPSL, 2010, *Esperance Port Sea & Land WMC Shed Swabs Sampling and Analysis Program April 2010, Esperance Ports Sea & Land, 1 June 2010.*

## **4.2 Auditor Review of Documentation**

The Esperance Port sampling, cleanup and validation was undertaken in three stages between 2007 and 2012 and reported in three separate reports. The staged approach was in response to requests made by the DEC for the duration of the project. The content of each document is summarised in Table 2.



**Table 2 Auditor Comments on Validation Reports**

Report	Comments
<b>Lead Cleanup and Validation of Port External Surfaces</b>	
<b>Stage 1</b> Esperance Port Authority, EPN Number DEC02 of 2007 Final Report, <i>Implementation and Outcome of Lead Sampling, Cleanup and Validation</i> (December 2007) Environmental Risk Solution	<p>This report documents the cleanup and validation works undertaken at the port to meet the HIL-F lead guideline level of 1,500 mg/kg. Following completion of the cleanup, the DEC advised that cleanup levels needed to meet the HIL-A guideline level of 300 mg/kg and as such, the report acknowledged that additional works were required.</p> <p>The report outlines the sample locations and initial cleanup and validation works which were undertaken in late 2007 in an attempt to meet the Environmental Protection Notice. Due to the change of cleanup levels however, the report also provided a list of 23 actions for cleanup and validation necessary to meet the adopted guideline levels and identifies priority areas across the site based on the sample results. The report indicated that cleanup will include a combination of high pressure washing of external surfaces and vacuuming of internal surfaces and soils. Dust suppression was to be used on external soils before vacuuming.</p> <p>A summary of the nominated priority based cleanup requirements, based on the initial sampling program is as follows:</p> <p>Priority 1 – Lead Conveyors – Dry vacuum internal surfaces and high pressure wash external surfaces.</p> <p>Priority 2 – Nickel Concentrate In-loading – Apply dust suppressant and vacuum the top 50 mm of soil.</p> <p>Priority 3 – Port Premise Rail Corridor – Apply dust suppressant and vacuum top 20-30 mm of soil.</p> <p>Priority 4 – Black Swan Shed, Lead Shed and Cosmos Area – High pressure clean of the concrete apron.</p> <p>Priority 5 – CBH – Wet vacuum hot spot areas.</p> <p>Priority 6 – Stores Iron Ore Sheds and Tommy Windich Area – Apply dust suppressant and vacuum top 10 mm of soil near iron ore sheds and area adjoining Tommy Windich area. Clean the gutters on the iron ore sheds. Wet vacuum the stores.</p> <p>Priority 7 – Western Section – Vacuum lawns, gardens and gravels.</p> <p>The Eastern Section – No cleanup required.</p> <p>The report indicates that vacuumed material will be stored in the Great Boulder Shed on site for waste</p>



Report	Comments
Esperance Port Authority Validation Works (July 2008) SKM	<p>classification and final disposal.</p> <p>This report outlines the soil and swab sample validation sampling that was undertaken by SKM in selected areas of the site following the completion of the stage 1 investigation (ERS, 2007). The sampling program included validation soil and swab sampling in areas where cleanup works had been undertaken to reach the original 1,500 mg/kg lead guideline. The results indicated that in most cases samples reported concentrations below 1,500 mg/kg, but exceeded the 300 mg/kg guideline, and as such further cleanup was required.</p> <p>Limited soil sampling was also undertaken in some areas prior to and following the implementation of proposed cleanup methodologies to assess their effectiveness. No detail was provided on the actual cleanup methodology adopted. The findings of this assessment were inconclusive in determining the effectiveness of cleanup methodologies, based on the low initial lead concentrations.</p> <p>The report also included a quality assurance and quality control assessment of sample collection, transport and analysis procedures.</p>
<b>Stage 2</b> Esperance Port Authority, EPN Number DEC02 of 2007, <i>Implementation and Outcome of Lead Sampling, Cleanup and Validation Plans</i> (September 2008) Emissions Monitoring Pty Ltd.	<p>The report reiterated the sampling information provided in the December 2007 report and outlines the cleaning and validation works undertaken to meet the proposed actions. Cleanup was generally undertaken in accordance with the methodologies initially proposed, with the following changes noted:</p> <p>In some areas of the site containing gravelly soils, vacuuming soils was deemed insufficient and therefore, a bobcat was used to scrap the soil surface in these areas.</p> <p>Most railway tracks were clean using JDRails vacuum truck, which included a dust suppression system.</p> <p>Conveyors were cleaned using dry vacuum. The report provided information on both vacuum systems provided evidence to demonstrate they were capable of collecting material as fine as 0.3 microns. This was sufficient to collected 99% of lead dust, which was shown to contain 1% of particles less than 0.4 microns.</p> <p>Most areas of the site required a minimum of two stages to remove contamination to concentrations below the adopted guideline levels, while gravelly surfaces required up to five stage passes.</p> <p>The report concluded that all actions had been achieved and the site had been cleaned to the required level.</p>
<b>Stage 3</b> Esperance Ports Sea and Land, EPN Number DEC02 of 2007, Validation Sampling of the Lead Clean-up at Esperance	<p>This report outlined the additional sampling, cleanup and validation works that were undertaken in response to the DEC independent sampling, which identified lead concentrations above the adopted guideline levels. The additional works included cleanup and validation of the areas identified by the DEC as well as further sampling in other areas of the site where the potential for lead contamination was considered high.</p>



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Report	Comments
Port (17 March 2010) Emissions Monitoring Pty Ltd.	<p>All sample and validation results reported concentrations below the adopted guideline levels.</p> <p>The auditor notes that the report does not provide any information on the cleanup works that were undertaken prior to collection of validation sampling in the areas identified by the DEC.</p> <p>The report also indicated that dust monitoring from within the port reported concentrations four times greater than monitoring reported in the Esperance community. EM provided multiple lines of evidence to indicate that risk to the environment from the port is considered low irrespective of these dust results.</p>

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### Marine Sediment Sampling and Ecological Risk Assessment

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<i>Port of Esperance Survey of Lead and Nickel in Marine Sediments, Level (Stage) 1 – Screening Assessment Report, Oceanica Consulting Pty Ltd Report No. 606/2, November 2007.</i>	<p>The Stage 1 (Preliminary Sediment Screening Assessment) was designed to determine:</p> <p>The spatial pattern (extent, magnitude) of lead and nickel contamination in sediments around the suspected point sources (discharge pipe running from the heavy metals handling area into the harbour along Berth 1, and berth face of Berth 2;</p> <p>Whether discharge from the suspected point and/or linear (berth face of Berth 2) sources were sufficient to increase the level of lead and nickel contamination in sediments at any sites monitored as part of the Esperance Port Authority's routine sediment monitoring program since October 2006; and</p> <p>If Esperance Port Authority's routine monitoring sites were maintaining any spatial pattern of lead and nickel contamination in sediments since October 2006 that would suggest sources of lead and nickel other than the discharge pipe or Berth 2.</p> <p>Results from sediment sampling and laboratory analysis indicated that:</p> <p>Lead and nickel contamination was highest at the discharge pipe at Berth 1, but also high at the berth face of Berth 2. The spatial extent of lead contamination was much smaller than nickel (median concentration exceeding ISQG high at ten sites), with the ISQG-High only exceeded at two sites. The degree of lead contamination also declined rapidly (spatially) within 50 m of the discharge pipe at Berth 1, and the berth pocket site at Berth 2.</p> <p>Nickel contamination was far more widespread, exceeding national sediment quality guidelines (bot ISQG high and low) in an annular pattern around the edge of the harbour, however central harbour sediment that complied with National sediment quality guidelines.</p> <p>Based on sites monitored as part of the Esperance Port Authority's routine sediment monitoring program, contamination from the discharge pipe at Berth 1 was considered by Oceanica to be sufficient to</p>
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**Report**

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**Comments**

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increase the level of lead and nickel contamination in sediments at Berth 1 sites since October 2006. However, the level of lead and nickel contamination at Berth 2 was lower than that recorded in October 2006.

The results for Berth 1 were concluded to support the theory that the degree of contamination at the site entered the harbour through the discharge pipe at Berth 1 due to excessive stormwater runoff generated during the severe storm in December 2006.

Lead and nickel contamination at Berth 2 was observed by Oceanica to have declined since October 2006.

The results of the Stage 1 sediment study were used to identify sites that required further assessment of sediments for bioavailability of metals, for a Stage 2 risk assessment (consideration of factors controlling bioavailability).

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*Port of Esperance Survey of Lead and Nickel in Marine Sediments, Level (Stage) 2 Bioavailability Investigation Report, Oceanica Consulting Pty Ltd, Report No. 606\_001/1, January 2008.*

The Stage 2 Bioavailability assessment aimed to:

Determine the bioavailable levels of nickel and lead in marine sediment;

Identify areas in which the bioavailable lead and/or nickel concentrations exceeded the guidelines;

Identify any further sampling and analysis required for a Stage 3 (Ecological Risk Assessment) investigation;

Revise the sites sampled in the EPSL routine sediment sampling program

The results indicated:

Sediment lead concentrations at Esperance Port are more bioavailable than nickel with approximately 85% of the total lead being bioavailable compared to 6% for nickel;

Bioavailable lead contamination was far more widespread than bioavailable nickel;

No sites exceeded the ISQG-Low or ISQG-High for bioavailable nickel;

Nine sites exceeded the ISQG-Low for lead;

No sites exceeded the ISQG-High for lead;

Revision of sites sampled in the EPSL routine sediment sampling program would be conducted following the completion of the Stage 3 assessment.

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*Esperance Port Survey of Lead and Nickel in Marine Sediments, Level (Stage) 3 Ecological Risk Assessment Report,*

The Stage 3 Ecological Risk Assessment aimed to:

Delineate the lateral and vertical (up to 10 cm depth) extent of lead contamination in the harbour;

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**Report****Comments**

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Oceanica Consulting Pty Ltd, Report No. 606\_001/2, January 2010.

Determine ecological health risks posed by the lead contamination;

Revise sites sampled during annual sediment sampling.

The results indicated that overall, the effect of contamination in the top 10 cm of sediment in Berth 1 and 2 of Esperance Port had a minimal effect on the marine organisms tested. It was concluded that as the contaminated sediments were restricted to a small area and only minimal toxicity (not appearing to be correlated to the extent of lead contamination) was found, the risks to the marine environment were considered to be minor and not sufficient to warrant remediation of the area.

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**Removal of Lead Carbonate Concentrate From WMC Shed**

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Esperance Port Authority, Esperance Port Authority Lead Removal Plan, 3 September 2008, EsPA document no. C/2300;

Given the issuing by DEC of a Section 73A notice preventing the export of Magellan lead carbonate concentrate from the Port of Esperance, the Lead Removal Plan was prepared by the Esperance Port Authority to facilitate amendment of the s73A notice to allow the lead carbonate concentrate to be exported.

The Lead Removal Plan detailed proposed bagging, containerisation and containerised export through the Port of Esperance of the stockpiled Magellan lead carbonate concentrate, and provided assessment of risks associated with the proposed removal of the concentrate. Methodologies were developed to control the associated risks, in particular the dust emissions during the handling process.

The process of bagging the lead carbonate concentrate which was the activity most likely to pose a risk to the safety of human health and the environment was well documented in the Lead Removal Plan and is summarised as follows:

Bagging of the lead was to take place in the old WMC shed which was enclosed within another new concentrate shed. At no time would the door of the new concentrate shed be opened while the old WMC shed door was open. The old WMC shed and new concentrate shed were separated as dirty and clean areas respectively. The bulk-bags proposed were to meet United Nation 'world's best practice' standards. The bags would be double lined and sealed to prevent escape of lead carbonate dust. Following filling and sealing of the bulk bags, the external surfaces of the bags were to be vacuumed inside the WMC shed. Cleaned bulk bags were then to be transported to the new concentrate shed by a forklift which was to be prevented from entering the new concentrate shed by bunding between the new shed and the WMC shed. The sealed bulk bags were then to be loaded inside a container for storage and export.

During the process of bagging and loading of lead carbonate into the containers, air monitoring was proposed to assist in managing the environmental, occupational and biological risks posed during the proposed activities. Ambient air quality limits and a course of action following the detection of an exceedance were also

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Report	Comments
	<p>specified in the lead removal plan. In addition to the air monitoring, auditing of the process was proposed to be undertaken by an independent process auditor.</p> <p>The Lead Removal Plan also accounted for the legislative requirements relevant to the handling of the 9000 tonnes of stockpiled lead carbonate through the Port of Esperance and also detailed the community consultation plan to be undertaken prior to and during the proposed activities. The community consultation plan is reviewed in Section 5.</p>
<p>Stewart, Jill, 2009a-q, Esperance Lead Removal Plan Weekly Operational Audit, Reported By: Jill Stewart (Independent LRP Auditor) Audit Completed for the week of: February 9 - 15 2009 to June 1-10 2009, 2009, Audit Reported: February 17, 2009 to June 12 2009.</p>	<p>The weekly audit reports submitted to the DEC during the removal of the lead carbonate concentrate detailed project status/operations summaries, results of environmental monitoring and reporting on OH&amp;S, ventilation and security. The reports were sent weekly to the DEC.</p> <p>The review of these audit reports generally found that dust levels were only reported to exceed limits during grain loading activities at the site. Although lead was detected during air monitoring, the lead concentrations in air did not at any time exceed the adopted ambient air limits. Where non-conformances were noted during the audits, corrective action took place within a reasonable time frame.</p>
<p>Stewart, Jill Letter, WMC Shed Certificate of Compliance, 10 June 2009.</p>	<p>This letter is a certificate of compliance from independent process auditor Jill Stewart. The letter states that following:</p> <ul style="list-style-type: none"><li>removal of the lead carbonate from the shed;</li><li>dry vacuuming and wet pressure washing of the internal structures of the shed;</li><li>detailed inspection of the entire structure and internal infrastructure by independent process auditor Jill Stewart and marine surveyor Captain Chris Keys;</li><li>declaration by Captain Chris Keys that the structure had been 'swept clean'; and</li><li>verification by an unnamed DEC officer that the structure was clean;</li></ul> <p>the project was considered to be compliant with the Section 73A notice.</p>
<b>Demolition and Removal of Old WMC Shed (lead shed)</b>	
<p><i>Qualitative Risk Assessment, Transport of Scrap Metal, Old WMC Shed, Port of Esperance, Esperance Western Australia, AEC Environmental Pty Ltd, 30 July 2009.</i></p>	<p>The report details a Qualitative Risk Assessment (QRA) for the transport of scrap metal (product) from the Port of Esperance to the Simsmetal recycling facility at Kalgoorlie, Western Australia. The report relates solely to the transport of product and provides management measures to be adopted during the transport process.</p>



Report	Comments
	<p>The report summarised the measures taken to limit risk of lead carbonate contamination during the dismantling and transport of the product as follows:</p> <p><i>The product was scraped and vacuumed, washed, coated three times with PVA, PVA surfaces confirmed 'clean' (&lt;50 µg/cm<sup>2</sup>); The process of certifying clean was accepted by Peter Skitmore of the DEC prior to trucks leaving the port.</i></p>
<p><i>Esperance Port Sea &amp; Land WMC Shed Swabs Sampling and Analysis Program April 2010, Esperance Ports Sea &amp; Land, 1 June 2010.</i></p>	<p>The report outlines the sampling and analysis of the remaining new shed which encased the demolished old WMC lead shed for the purposes of handing the shed over to BHBP for storage of nickel sulphide.</p> <p>Judgmental sampling was conducted from eight walls based on the high relative levels of dust accumulation at those locations. Samples were taken using swabs and tested for lead and nickel and compared to site specific target levels.</p> <p>All lead concentrations were reported below the target level and nickel concentrations which exceeded the trigger level were deemed 'not relevant' due to the future use of the shed being for nickel sulphide storage.</p>



### 4.3 Scope of Sampling, Cleanup and Validation of Port External Surfaces

Based on review of the reports provided, it is the auditor's understanding that the following scope of works has been completed at the Esperance Port in response to the EPN (Number: DEC 02 of 2007).

#### Stage 1 - Sampling

- ▶ Grid and judgement based sampling at a total of 481 sample locations between 15 November and 25 November 2007.
- ▶ An additional 79 sample locations were subsequently collected on 26 to 28 November 2007 as part of a gap analysis and initial validation and cleanup trials. Consequently, the final amount of samples comprised a total of 560 samples, comprising 350 soils, 134 bitumen and concrete surfaces and 76 swab samples of concrete bitumen, wood, etc. In total, 686 XRF sample locations were recorded, which included multiple readings at some sample locations.
- ▶ XRF was used on unsealed surfaces, swabbing and XRF readings were taken from bitumen and concrete surface and swabbing was taken from metal surfaces.
- ▶ During sampling, a total of 22 soil samples out of the 350 XRF readings were collected for laboratory verification. This equated total rate of 6.3%. There was a high degree of variation between lab readings and XRF and this was attributed to soil heterogeneity and XRF readings were used for cleanup and validation purposes.
- ▶ During sampling, 76 swab samples were collected, 12 of which were sent for laboratory confirmation analysis. This equates to a verification rate of approximately 16%.
- ▶ Some initial cleanup and validation work was undertaken to meet the 1,500 mg/kg guideline level. However, following notification from the DEC that the adopted cleanup level was amended to 300 mg/kg, the cleanup program required revision.

#### Stage 2 – Cleanup

- ▶ Cleanup works included:
  - Priority 1 – Lead Conveyors – Dry vacuum internal surfaces and high pressure wash external surfaces.
  - Priority 2 – Nickel Concentrate In-loading – Apply dust suppressant and vacuum the top 50 mm of soil.
  - Priority 3 – Port Premise Rail Corridor – Apply dust suppressant and vacuum top 20 to 30 mm of soil.
  - Priority 4 – Black Swan Shed, Lead Shed and Cosmos Area – High pressure clean of the concrete apron.
  - Priority 5 – CBH – Wet vacuum hot spot areas.
  - Priority 6 – Stores Iron Ore Sheds and Tommy Windich Area – Apply dust suppressant and vacuum top 10 mm of soil near iron ore sheds and area adjoining Tommy Windich area. Cleaning of the gutters of the iron ore sheds. Wet vacuum the stores.
  - Priority 7 – Western Section – Vacuum lawns, gardens and gravels.
  - The Eastern Section – No cleanup required.
- ▶ The following modifications were made to the cleanup works:



- In some areas of the site containing gravelly soils, vacuuming soils was deemed insufficient and therefore, a bobcat was used to scrap the soil surface in these areas.
  - Most Railway tracks were clean using JDRails vacuum truck, which included a dust suppression system.
  - Conveyors were cleaned using dry vacuum. Both vacuum systems provided evidence to demonstrate they were capable of collecting material as fine as 0.3 microns. This was sufficient to collect 99% of lead dust, which was shown to contain 1% of particles less than 0.4 microns.
  - Most areas of the site required a minimum of two stages to remove contamination to concentrations below the adopted guideline levels, while gravelly surfaces required up to five stages.
- ▶ During cleanup and validation of soil, 703 XRF validation locations were screened and 40 samples were collected for laboratory validation. This equates to a validation density of 5.7%. Correlation between XRF readings and laboratory results were observed to be in good agreement at low lead concentrations but limited at high lead concentrations. It was determined that the XRF was to be used as a qualitative screening tool only during soil testing.
  - ▶ Over the duration of the project (i.e. sampling, cleanup and validation) 890 XRF samples (soil and other surfaces) were tested, 104 swab samples were collected and of these 32 samples were analysed for laboratory validation. Of this 32 swab samples and 20 validation samples were taken as part of the cleanup and validation.
  - ▶ Approximately 1,000 tonnes of lead impacted material from the cleaning works, which was temporarily stored in the Great Boulder Shed, was removed from the site and disposed of at a Class 3 landfill. Waste disposal documentation was not provided in the reporting.

### **Stage 3 – Additional Sampling, Cleanup and Validation**

Additional sampling, cleanup and validation of port surfaces was carried out following sampling conducted by the DEC in February 2009 indicating areas with lead still in excess of the validation criteria.

- ▶ The additional works included XRF screening at 70 locations, 63 soil and gravel areas and seven swabbed surfaces.
- ▶ The report suggests that the areas identified by the DEC were subsequently cleaned however, no evidence was provided in the documentation on the cleanup methodologies adopted.
- ▶ Sixty three soil XRF sample locations were selected and five soil validation samples collected for laboratory verification. This equates to a validation rate of 7.9%. Comparison of XRF results with laboratory results indicated reasonable agreement with deviations ranging from -11 % to +20%.
- ▶ Seven swab samples were collected and three were selected for laboratory verification analysis. This equates to a validation rate of 43%.

## **4.4 Scope of Marine Sediment Sampling**

In addition to external port surfaces, the EPSL also conducted marine sediment assessment in three stages. The scope of work for each stage is summarised below:



### Stage 1 - Screening Assessment

- ▶ Sampling of marine sediment at 67 locations in the inner and outer harbour including EPSL routine monitoring sites and four reference (background) locations;
- ▶ 10 cm deep sediment cores were collected at each location;
- ▶ Samples from the 0-2 cm fraction were tested for particle size distribution, lead and nickel;
- ▶ The remaining 2-6 cm and 6-10 cm fractions were stored for further testing as necessary;
- ▶ QA/QC consisted of three replicate samples obtained from each site, each batch (10-20 samples) of samples analysed for metals including one laboratory blank, one standard reference material and one spike.
- ▶ Lead and nickel concentrations were compared to Interim Sediment Quality Guidelines (ISQG) and historical data.

### Stage 2 – Bioavailability Investigation Report

- ▶ Fifty one 0-2 cm depth sediment samples (including replicates) collected from 23 locations and stored during the Stage 1 assessment were subsequently analysed for bioavailable lead and nickel based upon initial stage 1 results exceeding the relevant guidelines;
- ▶ The results were compared to the National sediment quality guidelines (ISQG-Low and ISQG-High) (ANZECC/ARMCANZ 2000), background concentrations and historical data.

### Stage 3 – Ecological Risk Assessment

- ▶ Deeper sample fractions (2-6 and 6-10 cm) at 36 sites were analysed for total and bioavailable lead;
- ▶ A further thirty three sampling sites were sampled and used to delineate lead contamination in the Berth 3 area with all three depth fractions analysed for lead;
- ▶ Toxicity testing was conducted from one site at Berth 1 and 2 sites at Berth 2 based on highest concentration results;
- ▶ Toxicity test sediment samples were selected from the 0-10 cm fraction and were 2 L in volume;
- ▶ The following toxicity tests were performed:
  - 72 hour sea urchin larval development test using *Heliocidaris tuberculata*
  - 48 hour larval development test using the rock oyster *Saccostrea commercialis*
  - 10 day whole sediment toxicity test using the amphipod *Melita plumulosa*
  - 72 hour marine algal growth test using *Nitzschia closterium*
- ▶ QA/QC consisted of three replicate samples obtained from each site, each batch (10-20 samples) of samples analysed for metals including one laboratory blank, one standard reference material and one spike. QA/QC results were generally in compliance with acceptance criteria.

## 4.5 Removal of Lead Carbonate Concentrate and Old WMC Shed

In addition to the scope of works for cleanup and validation of external surfaces and testing of marine sediments in the Esperance port the port also conducted removal of the bulk lead carbonate concentrate



which was stored in the old WMC shed and demolition and removal of that shed. The scope of works is summarised below:

#### **Removal of Lead Carbonate Concentrate**

- ▶ Approximately 9 000 tonnes of lead carbonate concentrate was bagged and containerised for export out of Esperance under negative air pressure conditions from 8 February 2009 to 10 June 2009;
- ▶ Ambient air monitoring for dust and lead concentrations was conducted as follows:
  - Continuous (real time) PM<sub>10</sub> dust monitoring with Tapered Element Oscillating Microbalance (TEOM) at four locations;
  - 24 h high volume air sampling of total suspended particulates and lead at six locations;
  - Monthly dust deposition monitoring at 16 locations within the community and two locations on the Port premises, tested for dust and lead;
  - Continuous operational dust monitoring with three to four fixed particle counters (E-samplers) and;
  - Continuous operational dust monitoring with Two mobile Dust Track units.
- ▶ Occupational air monitoring and biological monitoring relevant to lead exposure was conducted as follows:
  - Inhalable lead dust concentrations on personal monitors worn by two personnel each day and tested daily by the laboratory;
  - Baseline (before bagging began) and fortnightly blood lead level testing of all personnel involved in the handling, transport and cleanup of the lead carbonate.
- ▶ Weekly operational auditing of the works conducted by an independent process auditor who stated all operations were compliant with requirements of the LRP.

#### **Demolition and Removal of Old WMC Shed (lead shed) and Testing of New Shed**

The scope of works undertaken during demolition and removal of the old WMC shed (lead shed) relevant to lead dust management was as follows:

- ▶ Swab sampling internal surfaces to be disposed as scrap metal for lead;
- ▶ The scrap metal was scraped, vacuumed, washed, coated three times with PVA;
- ▶ Scrap metal re-sampled following PVA coating by swabbing confirming lead concentrations did not exceed the target level of 50 µg/cm<sup>2</sup>.
- ▶ Disposal of PVA coated scrap metal at Simsmetal Kalgoorlie recycling depot.

The scope of works undertaken for testing of the new shed (which encased the demolished and removed WMC shed) prior to handing over to BHBP for storage of nickel sulphide was as follows:

- ▶ Judgemental sampling conducted from eight walls based on the high relative levels of dust accumulation at those locations;
- ▶ Sampling conducted using swabs;
- ▶ Laboratory analysis for lead and nickel concentrations; and
- ▶ Signoff on the shed as being fit for storage of nickel



## 5. Review of Community Consultation

### 5.1 Introduction

Prior to the lead contamination issue being identified, the Port of Esperance (in 1994) established a community liaison group which later became the Port Development Consultative Committee (PDCC), the purpose of which was to provide a consultation mechanism between the Esperance Port Authority and the Esperance Community.

Immediately following the lead contamination incident, the EPSL offered water filters to local residents whose water from rainwater tanks showed lead levels above Health Department guideline levels and inspection and cleaning of rainwater tanks was offered to local residents who registered with the Port for this service. Furthermore, cleaning of homes of those children under 5 years of age with blood lead levels above 10 µg/dL was arranged by the EPSL. This was subsequently widened to include those children under 5 years of age with blood lead levels at or above 5 µg/dL. Furthermore,

In June 2007, the Esperance Community Reference Group (ECRG) was established to communicate information for the State and Local governments to the Esperance community. This group included citizens from relevant government departments (DEC and DoH), local government, community groups and the port. The outcome from the ECRG included, but was not limited to the following:

- ▶ establishment of a blood lead sampling program;
- ▶ sampling and cleanup at selected locations;
- ▶ public presentations and public information sessions;
- ▶ investigations and subsequent improvements to the conveyor and ship loading infrastructure at the Esperance Port Authority;
- ▶ public campaign to promote Esperance;
- ▶ development of community newsletters, letter box drops and public meetings; and
- ▶ two public open days.

The ECRG and PDCC later merged to form the Port Consultative Committee whose role included the activities of the ECRG that was established by the State Government following lead contamination of Esperance.

In October 2008, with a change in government a “Co-ordinator Esperance Community Consultations” was established, highlighting the importance of community consultation as part of this project. This was followed by a series of high profile public meetings in Esperance, which culminated in the development of the ECRP. While the Esperance Port is not a formal member of the ECRP Steering Committee, it was represented on an ad hoc basis and in the early days of the ECRP formation was valued for its experience in coordinating the cleaning of homes and rainwater tanks immediately after the lead contamination was first recognised.

This community consultation review relates specifically to information made available to the auditor regarding the role of EPSL following the lead contamination and from personal communication with the Executive Officer of the EPSL. Detailed review of community consultation by the ECRP is included in the ECRP Townsite audit report (GHD 2012).



## **5.2 Community Consultation Techniques**

Apart from the procedures conducted by the ECRG and the ECRP, the EPSL used the following techniques to consult with the community following the lead contamination.

### **5.2.1 Documentation**

The EPSL developed a protocol for the PCC (Dec 2007) which is available on the EPSL website. The protocol outlines the purpose of the PCC, terms of reference, membership, meeting frequency and working principles and protocols.

Prior to the removal of lead carbonate from the old WMC shed (lead shed), a community consultation plan was developed as part of the Lead Removal Plan (EsPA and Magellan 2008).

### **5.2.2 Website**

The EPSL website contains information for the community on current port issues, newsletters, media releases, the PCC, and environmental management reporting.

### **5.2.3 Newsletters**

The EPSL issued newsletters on an approximately quarterly basis from December 2004 to June 2010 (as per the EPSL website). The newsletters were distributed via post to over 2000 houses. The newsletters contained updates on the lead contamination issue with regards to cleanup around the port in general, removal of bulk lead carbonate and the demolition of the WMC shed.

### **5.2.4 Community Survey**

The EPSL conducted two community surveys. One shortly following the lead contamination in between August and September 2007 while the other comprised a follow-up survey a year later in June 2008. The outcome of the surveys was published in the January 2008 issue of the *Esperance rePORT* newsletter and the 2008 Annual report (available on the EPSL website).

### **5.2.5 Meetings**

The PDCC and later the PCC aimed to meet at least quarterly. Immediately following the lead contamination incident the PCC would meet up to monthly. During development of the LRP, 15 stakeholder meetings were held between March and August 2007 to inform stakeholders of the removal plan and to obtain feedback.

### **5.2.6 Media**

Ad hoc media releases are uploaded on the EPSL website dating back to 28 March 2007. Six of the 19 releases on the website relate specifically to the lead contamination issue. The 28 March 2007 media release offers water filters to residents whose rainwater tanks showed lead levels above Health department guidelines.

The PCC protocols state that statements to the media from the PCC would come from the Chairperson only.



### 5.2.7 Direct Correspondence

The Community Consultation Plan in the LRP states that a draft LRP was sent to government agencies DoH, DoECP and the DEC for comment.

### 5.2.8 Public Information Sessions and Open Days

A public information session was held on 9 May 2007 at the Esperance Civic Centre to discuss removal of the bulk lead carbonate. On 26 October 2008, a Family Open Day attended by over 2500 people was held by the EPSL providing tours of the port and to provide information on the port's plans for removal of the bulk lead carbonate and future port operations.

### 5.2.9 Weekly Reports

The LRP Community Consultation Plan stated that during the lead carbonate removal operations, weekly progress reports and monitoring results would be published on a weekly basis and a hard copy would be displayed in the EsPA foyer. The weekly reports are reviewed in Section 4.

### 5.2.10 Telephone

EPSL established a toll-free telephone number for stakeholder questions and feedback during the bulk lead carbonate removal operations.

## 5.3 Documentation Review

The auditor reviewed the means by which community consultation was implemented by the EPSL. A review of available documentation is outlined in Table 3.

**Table 3 Documentation Review of Community Consultation Materials**

Item	Procedure	Comments
1	Port Consultative Committee Protocols	The protocol clearly outlines the purpose of the PCC, terms of reference, membership, meeting frequency and working principles and protocols. This is considered to be a straightforward document.
2	Lead Removal Plan Community Consultation Plan	<p>The Community Consultation Plan outlined in the Lead Removal Plan thoroughly details the communications techniques used prior to and during the removal of bulk lead carbonate. The frequency of communications during operations was also provided. Stakeholders are clearly listed and the range of consultative techniques was broad.</p> <p>The Community Consultation Plan was generally in accordance with the DEC <i>Community Consultation Guideline</i> (DEC, 2006).</p>
3	Newsletters	<p>Newsletters were available on the EPSL website from December 2004 to June 2010. The newsletters were distributed to the Esperance community via post (2500 copies were printed per issue) and on the EPSL website.</p> <p>The newsletter included information on issues related in general to port activities along with updates on the cleanup and validation</p>



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of lead at the Port external surfaces, bulk lead carbonate removal and demolition of the old WMC shed. Environmental monitoring results were also published in the newsletters.

The newsletters also openly welcomed comments or feedback from its readers and provided contact details for this forum.

It is considered that the newsletters and the extent to which they were disseminated were a useful tool for informing the public about port operations and updates on management of the lead contamination.

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4 Website

The EPSL website contains extensive information relating to the ports activities and future operations in the form of newsletters, media releases and annual reports. Where appropriate, information pertaining to the cleanup of lead at the port was included in these media though this made it somewhat difficult to find information specifically related to the lead contamination. The Lead Removal Plan and environmental monitoring reports (air, wastewater and sediment) were also available on the website.

It is the auditor's opinion that the website is easy to navigate, well presented and professional though may have benefited from a section specifically designated to the port's management of the lead contamination. It provides a comprehensive range of information sources for the public and methods to contact EPSL where necessary.

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## 5.4 Community Consultation Assessment

The auditor has reviewed the community consultation program undertaken by EPSL with respect to the guidance outlined in the DEC Contaminated Sites Management Series, *Community Consultation Guideline* (DEC, 2006) and provides the following assessment.

### 5.4.1 Community Consultation Techniques

Through a combination of public meetings, surveys, regular newsletters and update postings on the designated website, it is considered that a wide range of communication techniques have been presented by the EPSL.

The auditor understands that the EPSL has always made itself available for discussions with community members when requested and communication methods are easily accessed.

### 5.4.2 Extent of Community Consultation

Considering the sensitive nature of the contamination and the level of cleanup undertaken, the extent of community consultation undertaken was considered sufficient by the auditor.

### 5.4.3 Identification of Stakeholders

The PCC protocols and LRP Community Consultation Plan provided a detailed list of key stakeholders. It is recommended that this list is updated on a regular basis to account for changes to this group.



#### **5.4.4 Timing of Community Consultation**

Based on the information provided, it appears that some level of community consultation has been undertaken at all stages of the project. It is the auditor's opinion that community consultation undertaken by the EPSL has been appropriately timed throughout the duration of the project.

#### **5.4.5 Practical Considerations**

Based on the information provided, it is considered that the community consultation techniques, extent of consultation, timing and stakeholder identification were undertaken in a practical manner which maximised the effectiveness of the program.



## 6. Review of Sentinel Monitoring

### 6.1 Introduction

ECRP is currently undertaking quarterly sentinel monitoring over a period of two years from November 2010 to November 2012 to determine if re-contamination of the town site is occurring. Concurrently, and as part of licencing conditions, the EPSL is also undertaking ongoing monitoring including; marine sediment monitoring (annual), wastewater monitoring (monthly) and ambient air quality monitoring (continuous to monthly). Although the ECRP sentinel monitoring is required for a period of two years, the EPSL monitoring is ongoing as per licencing requirements and has been undertaken for a number of years.

For the purpose of this audit, EPSL annual air, wastewater and marine sediment reports only were reviewed given their direct relevance to the Port. Only those reports related to years relevant to the lead dust fallout period have been reviewed as part of this audit.

### 6.2 Documentation

Documents pertaining to monitoring conducted at Esperance Port that were reviewed are as follows:

#### **Air Monitoring**

- SKM, 2009, *Esperance Ports Sea & Land Annual Ambient Air Quality Monitoring Report – 1 October 2008 to 30 September 2009*, Sinclair Knight Merz, 30 October 2009.
- EPSL, 2010, *Esperance Ports Sea & Land Annual Ambient Air Quality Monitoring Report – 1 October 2010 to 30 September 2011*, Esperance Ports Sea & Land, 31 October 2010.
- EPSL, 2011, *Esperance Ports Sea & Land Annual Ambient Air Quality Monitoring Report – 1st October 2010 to 30th September 2011*, Esperance Ports Sea & Land, 25 November 2011.

#### **Wastewater Monitoring**

- EPSL, 2011, *Esperance Ports Sea & Land Annual Wastewater Monitoring Report – 1 Oct 2010 to 30 Sept 2011*, Esperance Ports Sea & Land, 25 November 2011

#### **Sediment Monitoring**

- Oceanica, 2009a, *Comprehensive Sediment Monitoring and Reporting Plan*, Oceanica Consulting Pty Ltd, Esperance Port, March 2009.
- Oceanica, 2009b, *Esperance Port 2008 Annual Sediment Sampling. Sampling and Analysis (SAP) Implementation Report*, Oceanica Consulting Pty Ltd, May 2009
- EPSL, 2011, *Esperance Ports Sea & Land Annual Marine Sediment Monitoring Report for 1<sup>st</sup> October 2010 to 30<sup>th</sup> September 2011*, Esperance Ports Sea & Land, 15 November 2011.

### 6.3 Documentation Review

#### 6.3.1 Annual Air Monitoring

The annual air monitoring program conducted by EPSL is summarised in Table 4.



**Table 4 Summary of Annual Air Monitoring Program**

Type of Monitor	Site ID	Testing Parameter	Reporting Frequency
TEOM	Site 1 to Site 4	PM <sub>10</sub>	Continuous and 24 h
HVAS	Site 1 to Site 5	Total Suspended Particulates (TSP), iron, nickel, lead, lithium, zinc, sulphur	24 h (TSP), every 3 days (metals)
OASIS SM200-series samplers	Site 1, Site 2 and Site 4	PM <sub>10</sub> on a PVC filter for silica quartz	24 h
Dust deposition gauges (off site)	DG1, DG3 to DG8, DG11 to DG19	Total dust deposition, nickel, lead, iron, sulphur, lithium and zinc	Monthly
Dust deposition gauges (off site)	DG9 and DG10	Total dust deposition, nickel, lead, iron, sulphur, lithium and zinc	Monthly
Rainwater Tanks	DG3, DG5, DG8, DG11, DG12 and DG14	Nickel, lead, iron, sulphur	Monthly
Meteorological station	EP7	Wind speed, wind direction	5 minutely to hourly
MetOne E-Samplers	EP5, EP6, EP7, EP8	TSP	Continuous

The sites listed above are shown maps from the 2010/2011 annual air monitoring report in appendix A.

The assessment criteria used for comparison of air monitoring results are adopted from the NEPC 2003, the NHMRC/NRMMC 2004, NSW EPA 2005, WHO 2006 and the environmental licence L5099/1974/13 and are listed in Table 5:

**Table 5 Air Monitoring Assessment Criteria**

Testing Parameter	Assessment Level	Source
PM <sub>10</sub>	50 µg/m <sup>3</sup> as a max 24 h average concentration	NEPC, 2003 and Licence L5099/1974/13
TSP	90 µg/m <sup>3</sup> as a max 24 h average concentration target	Licence L5099/1974/13
Nickel	0.14 µg/m <sup>3</sup> as a max 24 h average concentration	Licence L5099/1974/13
	0.02 mg/L drinking water	NHMRC/NRMMC 2004
Silica quartz	10 µg/m <sup>3</sup> as a max 24 h average concentration target	Licence L5099/1974/13
Lead	0.5 µg/m <sup>3</sup> as an annual concentration	NEPC, 2003
	0.01 mg/L drinking water	NHMRC/NRMMC 2004



Testing Parameter	Assessment Level	Source
Total dust deposition	4000 mg/m <sup>2</sup> /month allowable insoluble dust deposition rate	NSW EPA 2005
Iron	2 mg/L drinking water	WHO, 2006

Guidelines are not available for deposited contaminants lead, nickel, sulphur and iron.

The auditor's summary of the reviewed annual air monitoring reports specifically relating to lead and nickel is provided in Table 6.

**Table 6 Annual Air Monitoring Report Review**

Annual Report	Comments
1 Oct 2008 to 30 Sept 2009	<p>Monitoring for this period indicated:</p> <ul style="list-style-type: none"> <li>▶ Assessment criteria were exceeded on a number of occasions;</li> <li>▶ The majority of exceedances of assessment criteria were attributed to sources other than the port (beach, unsealed surfaces) or from grain loading activities from berth 1 of the Port;</li> <li>▶ Two incidences of nickel exceeding assessment criteria for air were attributed to ship loading activities;</li> <li>▶ Although detected, lead dust concentrations from the HVAS did not exceed the specified assessment criteria;</li> <li>▶ Lead dust concentrations did not correlate with removal of bulk lead carbonate February to June 2009;</li> <li>▶ Metals concentrations in rainwater tanks exceeded drinking water guidelines on a number of occasions;</li> <li>▶ It was concluded that major sources of lead and other metals other than dust deposition (roof tiles, pvc pipes) were contributing to the metals concentration in rainwater tanks and that the rainwater collected from tanks was not representative of actual rainwater quality and did not correlate with dust deposition rates.</li> </ul>
1 Oct 2009 to 30 Sept 2010	<p>In this round of monitoring it was noted that the reporting was prepared by the EPSL and indicated:</p> <ul style="list-style-type: none"> <li>▶ TSP exceedances in general decreased from the previous year of monitoring;</li> <li>▶ Off site emissions of nickel in TSP declined from 17 exceedances of the established criterion in 2008/2009 monitoring to zero exceedances. This was attributed to improvement of Port operations;</li> <li>▶ Although detected, lead dust concentrations from the HVAS did not exceed the specified assessment criterion</li> <li>▶ Metals concentrations in rainwater tanks exceeded drinking water guidelines on a number of occasions;</li> <li>▶ Drinking water guideline exceedances of metals in rainwater tanks was attributed to sources unrelated to dust deposition rates;</li> </ul>



Annual Report	Comments
	<ul style="list-style-type: none"> <li>Isotopic testing of lead in water from rainwater tanks was to be conducted by ECRP to determine if the lead detected was from the Magellan mine. Results are provided in the following year's reporting.</li> </ul>
1 Oct 2010 to 30 Sept 2011	<p>This round of monitoring indicated:</p> <ul style="list-style-type: none"> <li>Nickel exports had doubled that year compared to the previous monitoring year, but there was a reduction in bulk nickel export with the majority being nickel exported in containers;</li> <li>Lithium, zinc and silica quartz were added to the monitoring schedule due to potential for future export of spodumene from the port;</li> <li>TSP exceedances in general increased from the previous year of monitoring which was attributed to weather conditions;</li> <li>Off site emissions of nickel in TSP declined in general with no exceedances of the assessment criterion. This was attributed to the reduction in bulk nickel export;</li> <li>Although detected, lead dust concentrations from the HVAS did not exceed the specified assessment criterion;</li> <li>Metals concentrations in rainwater tanks exceeded drinking water guidelines on a number of occasions and nickel exceedances were noted to have reduced significantly;</li> <li>Drinking water guideline exceedances of metals in rainwater tanks were attributed to sources unrelated to dust deposition rates;</li> <li>Isotopic testing of lead in water from rainwater tanks by ECRP indicated the lead was not Magellan.</li> </ul>

### 6.3.2 Annual Wastewater Monitoring

A summary of the annual wastewater monitoring program as per the EPSL report is provided in Table 7 are provided in Appendix A:

**Table 7 Summary of Annual Wastewater Monitoring Program**

Location description	Site ID	Testing Parameter	Testing Frequency
Metals water treatment plant final effluent grab sample	Final storage tank	Total Suspended Solids (TSS), Total Dissolved Solids (TDS), iron, nickel, lead, sulphur, total nitrogen, ammonium-nitrogen, nitrate+nitrite nitrogen, total phosphorus, zinc and lithium, pH	Quarterly
Hume Interceptors and Stormwater outlets grab samples	H1 to H4, SW1 to SW3	TSS, iron, nickel, lead, sulphur, total nitrogen, total phosphorous, zinc and lithium.	Monthly



EPSL adopted the ANZECC/ARMCANZ 2000 short-term irrigation water trigger values for assessment of treated wastewater effluent and the ANZECC-ARMCANZ 2000 marine waters 90<sup>th</sup> percentile protection level for assessment of stormwater from the hume interceptors and drains. A summary of the adopted assessment criteria is provided in Table 8:

**Table 8 Wastewater Monitoring Assessment Criteria**

Testing parameter	Treated wastewater assessment level	Stormwater assessment level
TSS	No guideline	1 to 2 NTU
pH	6 to 9	Not assessed
Total nitrogen	25 to 125 mg/L	0.23 mg/L
Total phosphorus	0.8 to 12 mg/L	0.02 mg/L
Sulphur	No guideline	No guideline
Iron	10 mg/L	No guideline
Lead	5 mg/L	0.0066 mg/L
Nickel	2 mg/L	0.2 mg/L

The 2010 to 2011 annual wastewater monitoring report indicated the following with respect to nickel and lead:

- ▶ The influent to the metals wastewater treatment plant includes wash waters from the nickel circuit, including those from Berth 2, the conveyors, the train inloading area and general road sweep and also includes rinse waters from the sulphur circuit;
- ▶ The main contaminants of concern include nickel, grain dust, sulphur and bulk fertilisers imported across Berth 2;
- ▶ Treated wastewaters are used within the Port for mainly road wash (>70 %) and dust suppression (<30 %);
- ▶ Nickel concentrations in final effluent of treated wastewater exceeded the reuse criterion on one occasion (September 2011) and resulted in retreating of the water and testing to indicate nickel concentrations were below the reuse criterion;
- ▶ Nickel concentrations in stormwater were still in excess of the adopted marine waters criterion and were considered to be 70 % bioavailable. Remedial measures such as the reduction of bulk nickel exporting, cleaning and inspection of stormwater infrastructure and investigation into potential sources were suggested in the report. GHD understands that at the time of preparing this report, these measures were being implemented by the EPSL. Lead concentrations in stormwater generally did not exceed the nominated criterion with the exception of the location Drain 1. The elevated lead concentration was considered in the report to not be related to any areas where bulk lead was handled and was also not considered to be highly bioavailable.



### 6.3.3 Annual Sediment Monitoring

A summary of the annual marine sediment monitoring program as per the EPSL 2010 to 2011 monitoring period is provided in Table 9:

**Table 9 Summary of Annual Marine Sediment Sampling Program**

Site ID	Testing Parameter	Frequency
A5 - A23	Total and bioavailable nickel and lead, particle size distribution	Metals annual, PSD every 3 years
A5 – A13	Total and bioavailable arsenic, cadmium, chromium, copper, zinc and sulphur	Annual
A8, A9, A10	tributyltin, dibutyltin, monobutyltin and total organic carbon	Annual

Results were compared to the ANZECC 2000 Interim Sediment Quality Guidelines (ISQG) as summarised in Table 10. The ISQG Low criteria is a trigger value which is a threshold concentration and below this concentration the frequency of adverse effects is expected to be very low. The ISQG High concentration is intended to represent a concentration which adverse biological effects are expected to occur more frequently.

**Table 10 Sediment Monitoring Assessment Criteria**

Testing Parameter	ISQG Low (mg/kg)	ISQG High (mg/kg)
Arsenic	20	70
Cadmium	1.5	10
Chromium	80	370
Copper	65	270
Lead	50	220
Nickel	21	52
Zinc	200	410
Sulphur	n/a	n/a
Organotins (TBT, DBT, MBT)	9 µg Sn/kg 2	80 µg Sn/kg 2
TOC	n/a	n/a

A summary of the reviewed annual marine sediment monitoring reports specifically relating to lead and nickel is provided in Table 11.



**Table 11 Annual Sediment Monitoring Report Review**

<b>Annual Report</b>	<b>Comments</b>
2008 Annual Sediment Sampling	<p>Sample analysis was performed as per Table 9 above however laboratory analysis was only conducted on the 0-2 cm fraction. Monitoring for this period indicated:</p> <ul style="list-style-type: none"><li>▶ All outer harbour sites had lead and nickel concentrations below relevant sediment guideline levels (ISQG-Low).</li><li>▶ Total nickel exceeded the ISQG-Low at seven inner harbour sites. The ISQG-High was exceeded at two sites in Berth 1 and 2. The bioavailability of nickel at sites exceeding the ISQG-Low was between 4 and 10%. Bioavailable nickel was below the ISQG-Low at all sites.</li><li>▶ Total nickel concentrations in 2008 were similar to 2007.</li><li>▶ Total lead exceeded the ISQG-Low at two sites in Berth 1 and 2. The bioavailability of lead at these two sites was 84 and 100%, respectively. Bioavailable lead exceeded the ISQG-Low at one site in Berth 1.</li></ul>
1 Oct 2010 to 30 Sept 2011	<p>Sample analysis was performed as per Table 9 above however laboratory analysis was conducted on the 0-10 cm fraction, making comparisons with historic data problematic. Monitoring for this period indicated:</p> <ul style="list-style-type: none"><li>▶ All outer harbour sites had lead and nickel concentrations below relevant sediment guideline levels (ISQG-Low).</li><li>▶ Total nickel exceeded the ISQG-Low at 11 inner harbour sites and four of these also exceeded the ISQG-High in Berths 1 and 2. Bioavailable nickel exceeded ISQG-Low at one site (A9 Berth 2).</li><li>▶ Total and bioavailable lead exceeded the ISQG-Low at two sites in Berth 1 and 2. Total and bioavailable lead at one of these sites (A10 Berth 1) also exceeded the ISQG-High.</li><li>▶ Average lead concentrations in the inner harbour sites from the 2010 monitoring were concluded to be statistically lower (20 fold) than the earliest sampling conducted in 2007, but not statistically different to the 2008 sediment data.</li></ul>

#### **6.3.4 Auditor's Assessment of Annual Monitoring / Sentinel Monitoring**

The following comments relate to the annual monitoring reports which were reviewed and may be implemented into future reporting:

- ▶ Ambient Air Monitoring 1 Oct 2010 to 30 Sept 2011 attributes decline in nickel concentrations in air to the decrease in handling of bulk nickel from the port, but does not acknowledge that this has been responsible for the decline in nickel concentration in rainwater and is therefore inconsistent. The argument is that concentrations of metals in rainwater samples do not correlate with concentrations of metals in dust deposition samples, however statistical correlation of these parameters has not been carried out or is not presented in the annual reports.
- ▶ Air monitoring assessment criteria references NEPC 2003 which is not listed in the reference section.



- ▶ Locations SW1, SW2 and SW3 as indicated in the licencing and Table A of the wastewater monitoring report are not specifically identified in reporting as being sampled at locations Drain 1, Drain 2 and Drain 3. This should be clarified early on in the reporting.
- ▶ The wastewater report makes statements regarding the bioavailability of lead and nickel in stormwater. It should be clarified in future reporting where the bioavailability figures are sourced and how they are determined.
- ▶ The significance or otherwise of lead concentrations in the final effluent of treated wastewater were not discussed in the annual wastewater monitoring results and should be included for clarification purposes.
- ▶ The source of the lead concentrations that exceeded the nominated guideline levels in stormwater from Drain 1 should be investigated. Upon querying this results, EPSL provided the following response which the auditor considers satisfactory:
  - *Comparison of 80<sup>th</sup> percentile value of “dissolved” lead from the last 12 months of data (0.006 ug/L) to the marine species protection values for lead concentrations in Drain 1 (EPSL selected 90<sup>th</sup> percentile =0.066 ug/L) as recommended by ANZECC-ARMCANZ (2000), indicates stormwater quality has a low risk of causing toxicity in the marine environment. Previous point of stormwater cleaning works will also likely to reduce these concentrations.*
- ▶ Given the persistent detections of nickel concentrations in stormwater which exceed marine quality guidelines, it is recommended that the source of the nickel is investigated and remediated or appropriately managed. It is understood that at the time of this audit report EPSL had implemented or plans to implement remedial measures such as reduction of bulk nickel export, cleaning and surveying of stormwater infrastructure and land topography
- ▶ Assessment of the effectiveness of field and laboratory QA/QC measures was not conducted in the 2010-2011 Annual Marine Sediment Monitoring report and should be included in future reporting.



## 7. Auditor's Assessment of Compliance

The auditor has completed a critical and independent review of the reports prepared for the EPSL regarding sampling, cleanup and validation of lead contamination at the Esperance port. The key findings of the auditor's review of these reports are documented in the following sections.

### 7.1 Sampling, Cleanup and Validation of Port External Surfaces

Published guidelines available on the investigation, cleanup and validation of lead dust are limited, however, the auditor has assessed the sampling, cleanup and validation program in terms of the DEC CSMS, *Development of Sampling and Analysis Programs* (DEC, 2001) and considers that the application of this guideline is appropriate to the auditor's assessment given the majority of testing was conducted on soils.

#### ***Sample Locations, Pattern and depth***

The lead sampling program included a grid based sampling on an approximate 25 m or 50 m grid as well as judgemental sampling in selected locations. Based on the detailed information available on the nature and extent of contamination at the site, the auditor considers the soil sampling program undertaken is sufficient to identify the extent of contamination at the site. The sampling was also considered sufficient to identify a reasonable size hot spot in comparison to the size of the site. The soil sampling program was also undertaken in general accordance with the DEC CSMS, *Development of Sampling and Analysis Programs* (DEC, 2001).

#### ***Sample Integrity***

The auditor notes that there was no information provided in the documentation on the sample collection, transport and preservation methodologies that were adopted for soil samples collected for laboratory analysis. Therefore the auditor is unable to make an assessment of the soil sample integrity in accordance with the DEC CSMS and Australian Standard, *AS 4482.1 – 2005, Guide to the investigation and sampling of site with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds*.

Given the lack of information on the sampling protocols, the auditor makes the following comments:

- ▶ Lead does not readily degrade or change form in soils and it also has a long sample holding time of approximately 180 days (as outlined in Table 3 of AS 4482.1-2005);
- ▶ The assessment of lead contamination focused on XRF readings and reliance on laboratory soil sample results was limited. Correlation between laboratory and XRF field readings was generally in good agreement;
- ▶ The soil samples were surface samples which are most prone to fluctuations in moisture and temperature conditions meaning preservation of field sample conditions is difficult to maintain and would not unduly affect analysis for heavy metals..

On this basis, it is the auditor's opinion that although the sample collection, transport and preservation may potentially not be consistent with relevant guidelines, it is unlikely to have had a significant impact on the reliability of the lead laboratory test results.



### **Laboratory**

The laboratory reports from MPL Laboratories, indicated that it is NATA accredited for the soil sample analysis, but not for the swab sample laboratory analysis. Emissions Monitoring has analysed some field blank samples to provide an assessment of the representativeness of laboratory results. On the basis of these quality assurance results, in consideration of the unique nature of swab sample analysis and the large number of samples collected, the auditor considers the laboratory results sufficient for the purpose of this assessment.

### **Methodology**

Environmental Risk Solutions and Emissions Monitoring indicated that laboratory validation of field XRF results reported a great degree of variation which was considered acceptable based on heterogeneous nature of soils and that the final set of results did not have any lead concentrations in excess of the nominated validation levels. The auditor understands that the XRF records lead concentrations from the surface 1-3 mm, while soil samples were collected from the surface to 10-20 mm over a larger surface area. It is therefore highly likely that XRF readings provided a more conservative and higher concentration of the area of lead fall impact given that the samples submitted for laboratory analysis were collected over a greater depth profile resulting in an averaging compared with the immediate surface dust impact. This is reflected in the soil laboratory results, which in most occasions, were lower than that reported in the field with the XRF. In consideration of this information, the auditor concurs with the methodology adopted by Emissions Monitoring to determine validation levels based on field XRF readings as these are likely to be more conservative than those reported in the laboratory, resulting in a conservative approach to site cleanup. Furthermore, swab samples were collected and sent to the laboratory for testing during validation exercises to confirm the validation had been effective.

The auditor notes from the photographs provided in the reports that XRF screening was undertaken through two layers of a plastic bag. Given the shallow penetration of XRF readings, this has the potential to further reduce the depth of XRF readings. However, considering that a consistent sampling technique was used at all sample locations, the sample methodology was considered adequate.

### **Data Quality**

Limited information has been provided in the reports on the quality assurance and quality control (QA/QC) data collected such as field QA/QC (duplicates, blanks, sample handling) and laboratory QA/QC (matrix spikes, laboratory control blanks, duplicates etc.) and therefore, the auditor is unable to validate the results.

### **Assessment Criteria**

The auditor completed a review of the assessment criteria used for the assessment of lead dust sampling and cleanup targets and considers the criteria to be appropriate given the physical nature of the contamination (being lead dust) and the proximity of sensitive receptors and the nature of activities that take place in the affected area/s.

## **7.2 Sediment Sampling**

The auditor has assessed the sediment sampling program in terms of the DEC CSMS, *Development of Sampling and Analysis Programs* (DEC, 2001) and the following findings are presented:



### ***Sample Locations, Pattern and Depth***

The sediment sampling program comprised grid based and judgmental sampling locations and expanded with each stage of the investigation to a sufficient number by which to identify the contamination and significant hotspots. Areas of judgmental sampling targeting the berths and discharge pipes were considered appropriate. The depth of sampling (0-10 cm) was considered appropriate for the likely receptors.

### ***Sample Integrity***

Sediment sample collection, transport and preservation methodologies were adequately described in the reports reviewed and were considered appropriate for the purposes of maintaining sample integrity. Chain of custody documentation was not included in the reporting and therefore an assessment of the sample tracking process cannot be made. However, sampling dates and laboratory analysis dates were determinable through the report text and laboratory reports, indicating required holding times were not exceeded.

### ***Laboratory***

The laboratory used for sediment testing of metals was NATA accredited for the scheduled testing and conducted the appropriate internal laboratory QA/QC testing. It is noted that CSIRO laboratory used for the assessment of particle size distribution was not NATA accredited for the procedure however it is stated that CSIRO followed internal QA/QC measures (such as method blanks and internal duplicates), though these were not documented in the reporting. Assessment of laboratory QA/QC was only conducted in the Stage 3 report. The auditor considers however that the above discrepancies were not of significant impact to the quality of laboratory results and that the laboratory data was adequate to be relied upon for assessment of site conditions.

### ***Methodology***

The sampling methodology was stated to be based upon the Oceanica 2007 SAP prepared for the staged investigations. A copy of this SAP was not reviewed and it would have been beneficial for the guidance documents upon which the SAP was based to be referenced in the investigations. It is considered however that the sampling methodology in each report reviewed was sufficiently detailed and given the sampling density and collection of triplicate samples for each location, it is considered that the sampling program was quite conservative. Furthermore, the sampling techniques over each stage of investigations were consistent and were considered to be adequate for this assessment.

### ***Data Quality***

Although samples were collected in triplicate, an assessment of data reproducibility was not performed by Oceanica. This was mainly due to the triplicate sampling being intended for purposes of gaining average concentrations rather than as a test of reproducibility. Relative standard deviations for average sample concentrations were calculated in the Stage 3 assessment however, where standard deviations exceeded the adopted acceptance criteria ( $\pm 50\%$ , DEWHA 2009), no contingency is provided on how to assess these specific sample results. Although not critically assessed by Oceanica, the auditor considers that given the sampling density, consistent sampling techniques and use of NATA accredited laboratory for testing of metals concentrations, data quality was adequate for the purposes of this assessment.



### **Assessment Criteria**

The auditor has undertaken a review of the assessment criteria used for the assessment of sediment contamination and considers the adopted criteria to be appropriate.

## **7.3 Bulk Lead Removal and Shed Removal**

For the purposes of this audit, the removal of bulk lead carbonate concentrate was compared to the protocols and methods presented in DEC (2011) *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites, remediation and other related activities*. The guideline is directly applicable to the storage and handling of bulk materials.

### **Sampling Locations and Frequency**

The sampling locations and frequency of sampling of ambient air quality during removal of bulk lead was considered to be adequate and in accordance with DEC guidance.

The sampling conducted during the removal of the WMC shed (lead shed) and the validation of the new shed was considered to be adequate for the purposes of reducing risk of exposure to the environment and human health during dismantling and transport of the shed walls (product). It is noted that the base of the shed was not tested for residual lead following cleanup by dry vacuuming and wet pressure washing, but it is acknowledged that the shed was inspected by the independent process auditor, a marine surveyor and a DEC representative to confirm that visually, the surfaces were considered to be adequately cleaned.

### **Sample Integrity**

The auditor notes that there is no information provided in the documentation on the sample collection, transport and preservation methodologies that were adopted for air quality samples or swab validation samples collected for laboratory analysis. Therefore the auditor is unable to make an assessment of the sample integrity in accordance with the DEC guidance and Australian Standards AS 3580.9.8-2001, AS 3580.9.6:2003, AS 3580.9.3:2003 and AS 2800-1985.

### **Laboratory**

Reference to specific laboratories used and laboratory QA/QC procedures were not present in any of the documentation reviewed and therefore an assessment of the laboratory results cannot be conducted.

### **Methodology**

Information on the protocols used for the sampling of ambient air is limited and cannot be assessed in terms of the adequacy for providing representative samples. Methodologies detailed on the sampling of the WMC shed walls prior to dismantling and the sampling of walls of the new shed were however considered adequate for the purposes of screening for residual lead concentrations on the tested matrices.

### **Data Quality**

An assessment on data quality cannot be provided for the bulk lead removal nor demolition of the lead shed given the lack of information pertaining to chain of custody documentation, laboratory reports and QA/QC assessment.



### ***Assessment Criteria***

The auditor has undertaken a review of the assessment criteria used for the assessment of ambient air quality and residual lead contamination and considers the adopted criteria to be appropriate.



## 8. Audit Conclusions

### 8.1 Assessment Against Project Objectives

The auditor provides the following conclusions on the works undertaken by the EPSL in the Esperance Port in relation to the objectives of the ECRP:

- ▶ **Objective 1 (a) To assess/audit levels of lead and nickel in homes, premises and public places in Esperance and determine the need for cleaning by reference to agreed standards and guidelines;**
  - Lead levels across the site have been assessed in general accordance with relevant guidelines, the Environmental Protection Notice and legislation. The sampling and validation procedures were in general adequately defined in the reporting. Where information was not readily available to the auditor, this information was not considered to materially affect the assessment of the need for cleaning. The procedures were considered generally adequate to document the works completed. It is the auditor's opinion that the sampling and validation works were sufficient to determine the levels of lead present within the Esperance Port site for the purposes of determining where cleanup was required.
  - The assessment of nickel concentrations (as required for homes, premises and public spaces) was not undertaken of the port soil, ground surfaces or building surfaces. The auditor notes however that the Environmental Protection Notice related to the port cleanup and validation works did not require that nickel was tested or cleaned up at the port. Furthermore, as cleanup for lead was conducted and validated, it would be expected that a commensurate reduction in nickel concentrations would also have transpired.
- ▶ **Objective 1 (b) To remove lead and nickel residues in homes, premises and in public places to acceptable standards such that these contaminants do not pose a risk to the health of the Esperance community;**
  - Validation testing conducted by the EPSL provided assurance to the auditor that cleaning works were thorough and comprehensive.
  - Although not tested, it is considered that some cleanup of nickel at the port (though not including any contamination hot spots) would have occurred during the removal of lead at the Port. As previously stated, the Environmental Protection Notice related to the port clean up and validation works and did not require that nickel was tested or cleaned up.
- ▶ **Objective 1 (c) To validate the cleaning process;**
  - The auditor notes that limited information has been provided on the cleanup methodologies adopted and no information has been provided on the additional cleanup works undertaken following DEC independent sampling. Therefore, the auditor was unable to verify the suitability of the cleanup methodologies and must rely solely on the validation test results to confirm the effectiveness of the cleanup.
  - As stated against objective 1 (b) the validation testing data conducted by EPSL provided assurance to the auditor that the cleaning works were effective.



- ▶ **Objective 1 (d) To work with the Esperance community in this project and provide ongoing progress reporting; and**
  - The auditor considers the community consultation undertaken by ECRP was more than adequate to meet the project objectives of providing ongoing progress reporting throughout the project.
- ▶ **Objective 1 (e) To undertake sentinel monitoring to ensure no re-contamination of the Esperance townsite.**
  - Sentinel monitoring is ongoing and therefore a conclusion on the completeness of the sentinel monitoring cannot be undertaken at this stage.
- ▶ **Objective 2 To meet the requirements of the Deed of Settlement.**
  - The Esperance Port cleanup and validation program was based on adopting either standard procedures or developing methods through consultation with health professionals and/or environmental consultants. The cleanup and validation and environmental monitoring were also based upon Environmental Protection Notices and Licencing conditions to which EPSL is compliant. The auditor considers that based on the review of the sampling, cleanup and validation testing at the Esperance Port, the requirements of the Deed of Settlement with regards to the Esperance Port have been fulfilled.
- ▶ **Objective 3 To achieve the desired outcomes of the Premier that the cleanup would be ‘thorough and comprehensive’.**
  - The auditor considers that the cleanup and validation testing of lead at the Esperance Port, the extent of testing undertaken – soil, port ground surfaces, external and internal building surfaces, air, wastewater and sediment, have combined to allow a thorough and comprehensive cleanup and validation of the Esperance Port.



## 9. References

ANZECC/ARMCANZ, 2000, Australian and New Zealand Water Quality Guidelines for Fresh and Marine Water Quality.

Australian Standards, AS 3580.9.8-2001, Method for sampling and analysis of ambient air - Determination of suspended particulate matter – PM 10 continuous direct mass method using a tapered element oscillating microbalance analyser

Australian Standards, AS 3580.9.6:2003, Methods for sampling and analysis of ambient air - Determination of suspended particulate matter – PM 10 high volume sampler with size-selective inlet - Gravimetric method

Australian Standards, AS 3580.9.3:2003, Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - Total suspended particulate matter (TSP) - High volume sampler gravimetric method

Australian Standards, AS 2800-1985. Ambient Air – Determination of particulate lead - High volume sampler gravimetric collection - Flame atomic absorption spectrometric method

Australian Standard, AS 4482.1 – 2005, Guide to the investigation and sampling of site with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds

DEC (2006) Community Consultation Guideline. Contaminated Sites Management Series. DEC: Perth.

DEC (2009) Contaminated Sites Auditors: Guidelines for Accreditation, Conduct and Reporting. Contaminated Sites Management Series. DEC: Perth.

DEC, 2011, A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites, remediation and other related activities, Department of Environment and Conservation, January 2011.

DEP (2001) Development of Sampling and Analysis Programs. Contaminated Sites Management Series. DEC: Perth.

DoT (2012) Governance Model Under-pinning the Esperance Cleanup and Recovery Project. DRAFT.

GHD (2012) Department of Transport Report for Esperance Cleanup and Recovery Project, Esperance Townsite – Compliance and Performance Audit Report, June 2012.

DEWHA, 2009, National Assessment Guidelines for Dredging (2009), Environmental Assessment Branch, Department of the Environment, Water, Heritage and the Arts, Commonwealth of Australia, Canberra.

NEPC, 2003, National Environment Protection (Ambient Air Quality) Measure as amended, National Environment Protection Council, 7 July 2003.

NHMRC/NRMMC, 2004, Australian Drinking Water Guidelines, National Health and Medical Research Council and Natural Resource Management Ministerial Council

NSW EPA, 2005, Approved methods for the modelling and assessment of air pollutants in New South Wales, NSW Environmental Protection Agency.



WHO 2006, Guidelines for drinking-water quality - first addendum to third edition, vol 1, World Health Organisation Press, Geneva, Switzerland.



## 10. Assumptions and Limitations

This report presents the results of a methodology and process audit of sampling and cleanup methodologies and practices as prepared and conducted by the Esperance Ports Sea & Land (EPSL).

The audit was undertaken in response to a request from the Department of Transport to provide a further level of confidence that the EPSL has achieved project objectives of the Esperance Cleanup and Recovery Project. The advice provided herein relates only to this purpose and must be reviewed by a competent person, experienced in contaminated site investigations, before being used for any other purpose. GHD Pty Ltd (GHD) and the auditor accept no responsibility for other use of the advice.

The audit was limited to the scope of works as outlined in section 2.0 of this report with regards to the Esperance Port.

This report should not be altered, amended or abbreviated, issued in part and issued incomplete in any way without prior checking and approval by GHD and the auditor. GHD and the auditor accept no responsibility for any circumstances that arise from the issue of the report that has been modified in any way as outlined above.



Appendix A

## Figures

Esperance Port Cadastre

Esperance Port Berths and Storage Facilities

Ambient Air Monitoring Locations

Wastewater Monitoring Locations

Sediment Monitoring Locations

# Attachment 1 - Esperance Port Premises



## LEGEND

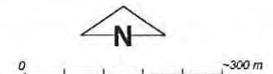
### Cadastral - DLI

- Freehold
- Crown Reserve
- State Forest / Timber Reserve
- Marine Park
- Crown Lease
- (cont)

- Lease / Reserve
- Lease on State Forest / Timber Reserve
- Public Roads
- Unallocated Crown Land
- Water
- Local Government Authorities - DLI

- Road Centrelines - DLI
- 1/5/04

Esperance Townsite 20cm  
Orthomosaic - DLI03



Scale 1:11586  
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Prepared by: Department of Environment and Conservation  
Prepared for:  
Date: 9/10/2007 12:21:02 PM

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

Maps

**ESPERANCE PORT**



**Berths (red numbers)**

- 1. Berth No. 1 – Grains
- 2. Berth No. 2 – Mineral Concentrate, Fertiliser, Fuel
- 3. Berth No. 3 – Iron Ore

**Storage facilities (yellow numbers)**

- 1. Shed 1 - Iron Ore
- 2. Shed 2 - Iron Ore
- 3. Shed 6 - Mineral Concentrate
- 4. Shed 7 - Mineral Concentrate
- 5. Shed 5 - Mineral Concentrate
- 6. CBH Operations
- 7. Summit Fertilisers
- 8. Gas Fired Power Station
- 9. Shed 3 - Iron Ore
- 10. Shed 4 - Iron Ore
- 11. Shed 10 - Sulphur
- 12. Container Storage Area

ATTACHMENT 3 – AIR QUALITY MONITORING SITES (1)

LICENCE NUMBER L5099/1974/13

FILE NUMBER 2010/007474

AIR QUALITY MONITORING SITES: Locations of Dust Gauges



Disclaimer: This map consists of shape files generated by EPSL (2011) and Landgate (2010). This map is not to be used for navigational purposes. Positional accuracy should be considered as approximate.

**Title: Location of dust deposition gauges required by operating licence of Esperance Port Sea and Land**

**Scale: 1:14,941**

0 130 260 520 780 1,040 Meters

**Date: 17 Dec 2011**

Map no.

ISSUE DATE:

Thursday, 3rd March 2011

DATE OF LAST AMENDMENT: Thursday, 16 February 2012

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ATTACHMENT 4 – AIR QUALITY MONITORING SITES (2)

LICENCE NUMBER L5099/1974/13

FILE NUMBER 2010/007474

**AIR QUALITY MONITORING SITES: Locations of HVAS and TEOM Samplers**

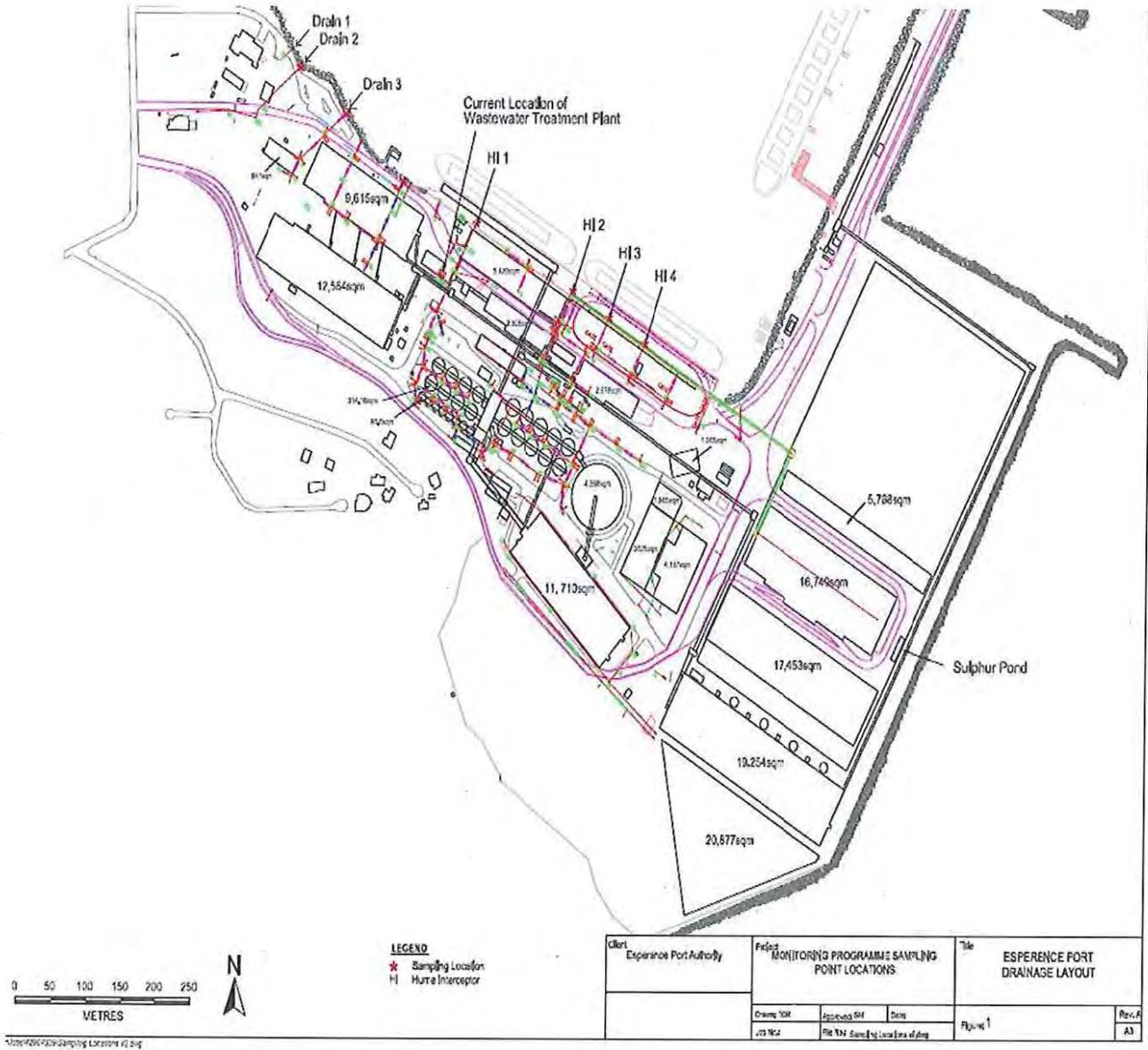


# ATTACHMENT 5 – WATER QUALITY MONITORING SITES (2)

LICENCE NUMBER L5099/1974/13

FILE NUMBER 2010/007474

## STORMWATER MONITORING SITES



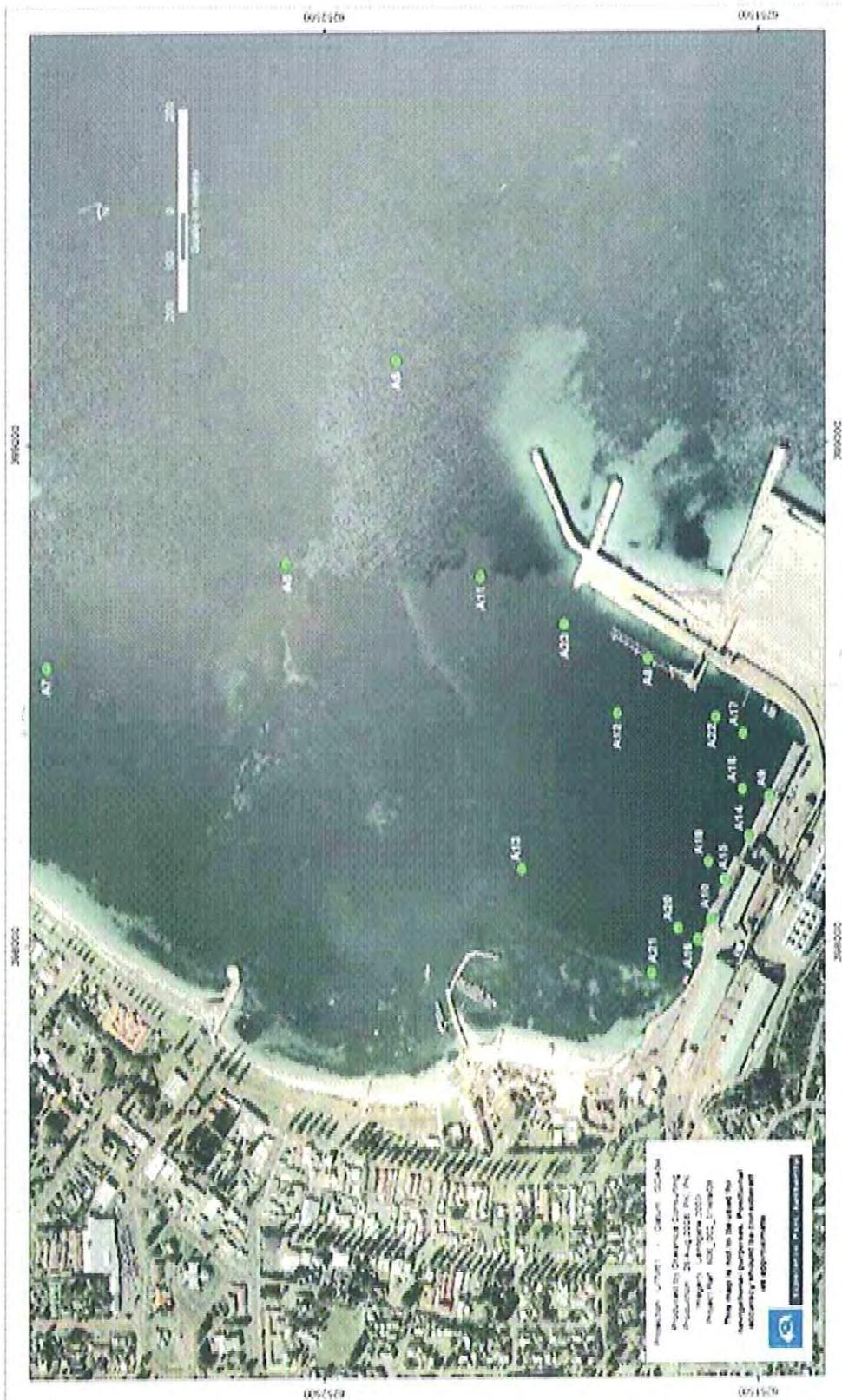
Client Esperance Port Authority	Project MONITORING PROGRAMME SAMPLING POINT LOCATIONS	Title ESPERANCE PORT DRAINAGE LAYOUT
Drawn By JTB	Approved By RFB	Date 11/03/11
File No 2010-007474	File No 2010-007474	Page No 1
		Rev A3

ATTACHMENT 5 – WATER QUALITY MONITORING SITES (2)

LICENCE NUMBER L5099/1974/13

FILE NUMBER 2010/007474

**SEDIIMENT MONITORING SITES**



ISSUE DATE:

Thursday, 3rd March 2011

DATE OF LAST AMENDMENT: Thursday, 16 February 2012

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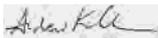
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