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Port of Esperance Maintenance Dredging

Environmental Impact Assessment

April 2013

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Environmental Impact Assessment

Prepared for

Esperance Ports Sea and Land

Prepared by

Oceanica Consulting Pty Ltd

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Level	Definition	Status
A: Full	Underlying data, calculations and data entry have been checked. Report format has been checked and contents have been reviewed and signed off by Director.	☑
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Cover

Main image: Ship berthed at Esperance Port (Oceanica Consulting);
Minor images: Sampling vessel (Oceanica Consulting);
Coring (Oceanica Consulting).

Disclaimer

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Executive Summary

The Port of Esperance is a regional port, servicing the south-east agricultural and the eastern and north-eastern Goldfields regions of Western Australia. The Port handles bulk, solid and liquid cargoes. The main exports are grain, nickel concentrates and iron ore. Lead concentrate was also exported between July 2005 and March 2007. Imports include sulphur, magnesium oxide, petroleum and fertiliser products.

Esperance Port Sea and Land (EPSL) is proposing to dredge approximately 63,500 m^3 of material from the Port of Esperance's basin and channel to return the seabed to the 2001 design levels. The type of dredging plant has not yet been determined, but it is anticipated that a trailer suction hopper dredge will be used to carry out the works.

Several sediment sampling campaigns have been carried out in Esperance Port and the results of these were used to inform the contaminants of concern to be targeting in the sampling for this proposal. Sediment analysis was undertaken for:

- physical composition (particle size and settling velocity)
- total, elutriate and bioavailable metals
- organics (hydrocarbons, and total and elutriate tributyltin)
- acid sulfate soils.

Sediment analyses indicated that material adjacent to the berths may be unsuitable for unconfined ocean disposal, whereas channel sediments are suitable for unconfined ocean disposal. It is proposed to dispose all channel sediments to an existing, retentive, offshore spoil ground, approximately 2.5 nautical miles offshore at 35 m chart datum. This site was used for disposal of 1,500,000 m^3 of material during the Port's 1988 dredging campaign. It is proposed to dispose all berth sediments to EPSL's existing reclamation area. Dredged material is proposed to be pumped from the dredge to the onshore disposal area with return waters from the settlement pond to be discharged back into Port waters.

A number of management and monitoring measures have been proposed in order to reduce the risk of the following potential impacts:

- turbidity and sedimentation
- mobilisation of contaminants
- acid sulfate soils
- hydrocarbon spills
- noise
- vessel movement
- threatened or migratory species
- introduced marine species
- waste management
- impacts to other users
- dust
- aesthetics of onshore disposal site
- exposure to contaminants.

Consultation has been carried out with relevant stakeholders to ensure they are aware of the project. The outcomes of this consultation has informed the document.

This document presents an Environmental Impact Assessment (EIA) that serves three purposes:

- To support a referral to the Office of the Environmental Protection Authority (OEPA) in accordance with Section 38(1) of the *Environmental Protection Act 1986*, for a decision on whether formal assessment is required.
- To be submitted to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) in accordance with the*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for a decision on whether formal assessment is required.
- To support an application to DSEWPC for a sea dumping permit, in accordance with the *Environmental Protection (Sea Dumping) Act 1981.*

1. Introduction

1.1 Background

The Port of Esperance is a regional port, servicing the south-east agricultural and the eastern and north-eastern Goldfields regions of Western Australia. The Port handles bulk, solid and liquid cargoes. The main exports are grain, nickel concentrates and iron ore. Lead concentrate was also exported between July 2005 and March 2007. Imports include sulphur, magnesium oxide, petroleum and fertiliser products.

The Port of Esperance is sheltered from the south and east by a 1,200 m breakwater and to the west by the Esperance coast. The Port has two adjacent land-backed berths (Berths 1 and 2) and a third dolphin-type berth (Berth 3) on the main breakwater (Figure 1.1). Berths 1 and 2 face north-east and Berth 3 faces north-west. The dredged entrance channel is approximately 350 m long and adjoins a swing basin with an approximate diameter of 550 m.

A hydrographic survey in March 2013 showed that some areas of the Port have accreted by up to 2 m, posing a risk to navigation. In particular, the accretion north of Berth 3 is restricting the departure of fully-laden Cape vessels from Berth 3. Esperance Ports Sea and Land (EPSL) propose to undertake maintenance dredging of the channel and berths back to design levels to restore navigable depths (Figure 1.1).

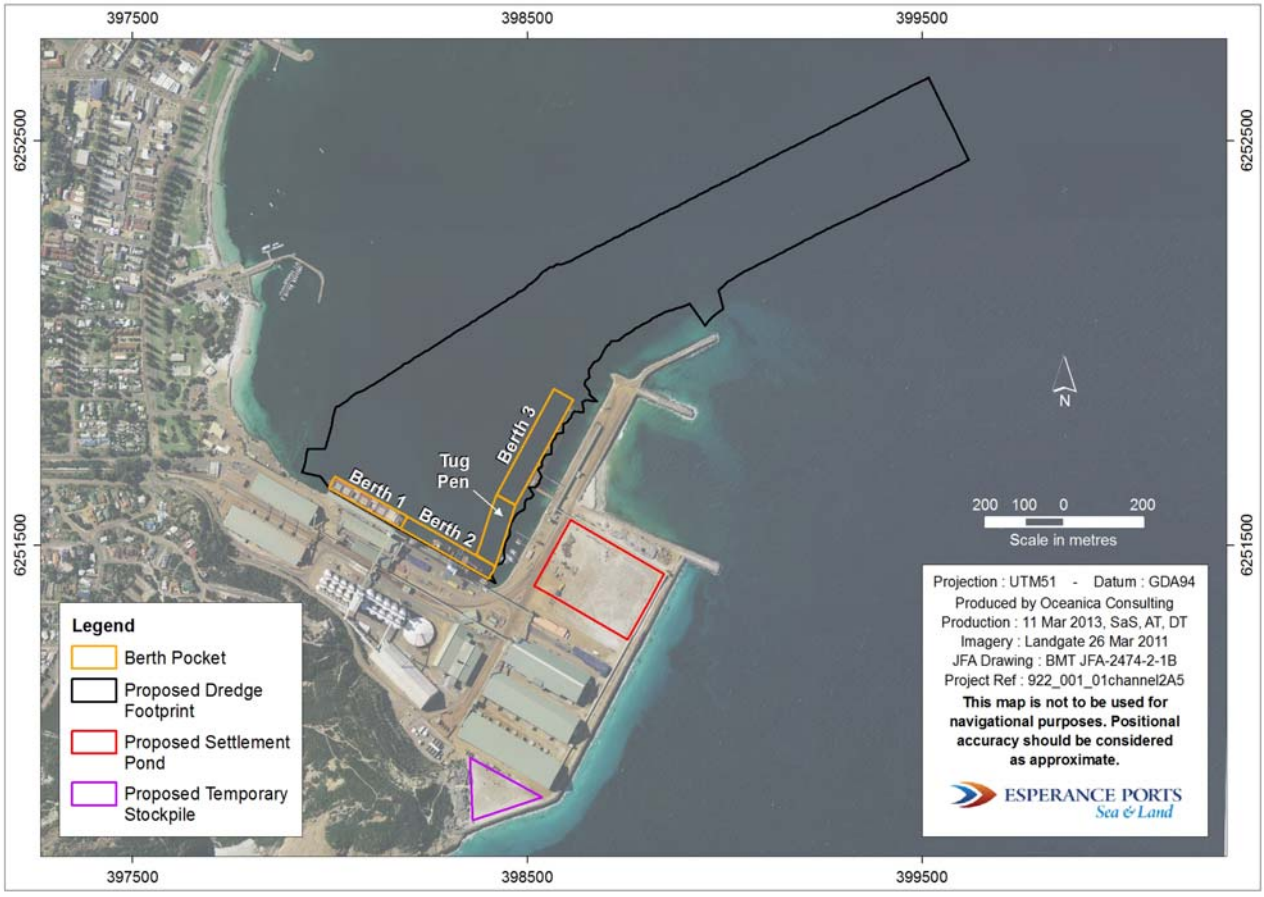


Figure 1.1 Port of Esperance berths and proposed dredge footprint, settlement pond and temporary stockpile areas

1.2 Purpose of this document

This document presents an Environmental Impact Assessment (EIA) that serves three purposes, as follows:

- To support a referral to the Office of the Environmental Protection Authority (OEPA) in accordance with Section 38(1) of the Western Australian *Environmental Protection Act 1986*, for a decision on whether formal assessment is required (Appendix A).
- To be submitted in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), whereby the proposed maintenance dredging is referred to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) for a decision on whether formal assessment is required. The EPBC Act ensures that the Federal Environment Minister assesses any action that has, will have, or is likely to have a significant impact on any matter of national environmental significance. The completed EPBC referral form is attached as Appendix B.
- To support an application for a sea dumping permit (Appendix C). The EIA along with the Sampling and Analysis Plan (SAP) (Oceanica 2012) and the SAP Implementation Report (Oceanica 2013) is submitted to DSEWPC, in accordance with the Commonwealth *Environmental Protection (Sea Dumping) Act 1981.*

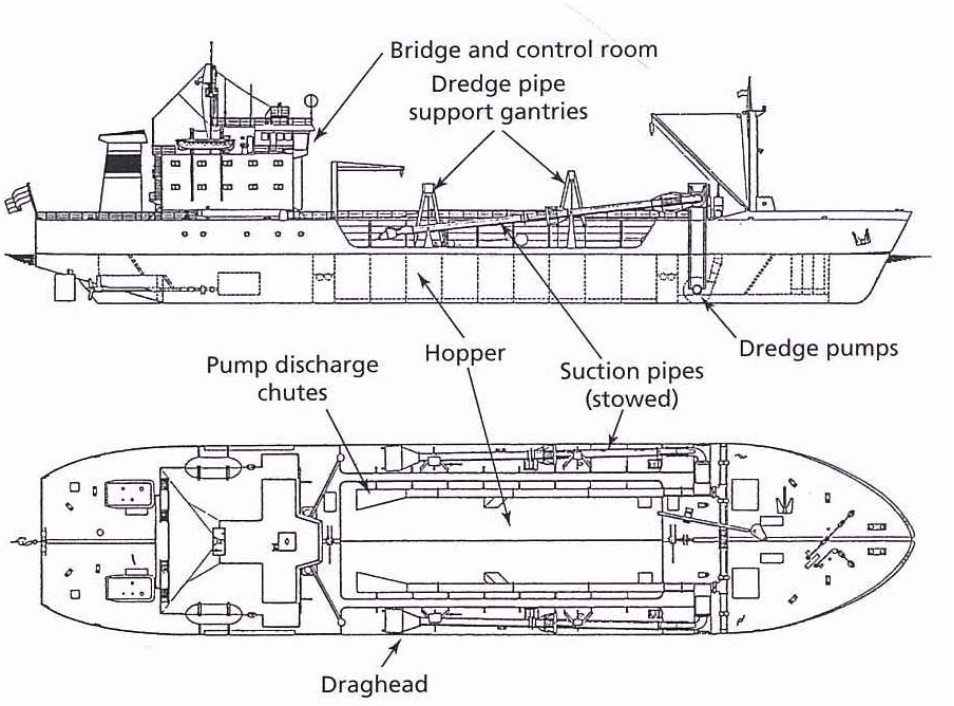
2. Project Description

2.1 Dredging

EPSL are proposing to dredge approximately 63,500 m^3 of material from the Port of Esperance's basin and channel to return the seabed to the 2001 design levels. The type of dredging plant has not yet been determined, but it is anticipated that a trailer suction hopper dredge (TSHD) will be used to carry out the works. A TSHD is a self-propelled ship with a hopper for the temporary storage of dredged material (Figure 2.1). It is a highly mobile vessel which uses a trailing suction pipe(s) to remove material from the seabed and is generally defined in terms of its 'hopper capacity'; that is, the maximum volume of water/sediment mix that can be contained in the hopper. The hopper capacity used for the Port Esperance maintenance dredging is expected to be in the range of 2,500–9,000 m^3.

A TSHD is fitted with one or two drag arms that can be lowered over the side to the seabed. The end of the drag arm is fitted with a draghead that can be fitted with ripping teeth and high pressure water jets as required. The dredge fills the hopper by travelling at low speeds (~1–2 knots) with the draghead on the seabed whilst a vacuum is created at the draghead by the dredge pumps. The vacuum entrains sediment and water from the seabed which is then transported up the drag arm as a slurry. The slurry travels through the dredge pump and is discharged into the hopper.

In the hopper, the sediment settles out from the water and is retained for disposal. Once the hopper reaches capacity with the sediment/water slurry, it is possible to overflow the surface water in the hopper to enable continued loading of sediment to continue. While draining off the water, fines that have not settled out will also be discharged in the overflow mix. Filling of the hopper ceases either when the dredge reaches its maximum load, or when the concentration of sediment (fines) contained in the overflow reaches an unacceptable limit. This limit is usually dictated by the economics of the operation or environmental constraints placed on the dredging. In some scenarios, no overflow at all is permitted such as for the dredging of contaminated sediments, or for dredging adjacent to areas of very high environmental sensitivity.



Source: Bray (2008)

Figure 2.1 Trailer suction hopper dredge (TSHD)

The total volume of solids that can be transported during each trip depends on the particle size and density of the material being dredged, and overflow limits. The proportion of solids in the hopper slurry is expected to be approximately 20% for berth sediments and 70% for channel sediments: this is because no overflow will be permitted during dredging of the berth material but will be permitted during dredging of channel material.

The typical sequence for a dredging cycle for the Port of Esperance can be summarised as:

1. dredge travels to dredge area with an empty hopper
2. the drag arm(s) are lowered to the seafloor, dredging commences to load the hopper – no overflow when dredging berth sediments
3. dredging ceases, after approximately 2 hr with overflow or 0.5 hr with no overflow, when the hopper is full
4. drag arm(s) are raised and brought onboard
5. dredge travels loaded to the onshore disposal site (disposal of berth sediments) or offshore disposal site (disposal of channel sediments)
6. material is discharged to the onshore or offshore disposal site
7. dredge travels empty back to the dredge area.

The timing of the maintenance dredging has not yet been determined as EPSL is hoping to opportunistically secure a dredge that is in transit past Port waters, to reduce mobilisation costs. Conservatively assuming that a small dredge will be used (hopper capacity 2,500 m^3), the average cycle duration will be approximately 2 hr. The dredging is anticipated to take approximately 4 weeks to complete, with dredging occurring 24 hours/day; however, approval will be sought for an 8-week window to allow for contingencies.

Although it is most likely that a small- to medium-sized TSHD will be used, a different type of dredge (e.g. cutter suction, bucket) may be used for all or part of the dredging program depending on dredge availability. This EIA has been prepared to consider the potential impacts of each dredge type.

2.1.1 Alternative options

Other options considered for the management of the harbour were to do nothing or to delay the maintenance works until the Port is unable to accommodate vessels. Doing nothing was not considered feasible as the decreasing drafts at Berth 3 and in the channel would restrict ship movements and reduce the safety and operability of the Port. Delaying the dredging was not considered to be in keeping with EPSL's charter as a responsible corporate citizen and carries unacceptable risks to the community, the Port's customers, the regional economy and the environment.

2.2 Spoil disposal

It is proposed to dispose, by bottom dumping, all channel sediments (51,500 m^3) to an existing, retentive, offshore spoil ground, approximately 2.5 nautical miles offshore at 35 m chart datum (CD) (Figure 2.2). This site was used for disposal of 1,500,000 m^3 of material during the Port's 1988 dredging campaign. A sea dumping permit from the then Commonwealth Department of the Arts, Sports, the Entertainment, Tourism and Territories was obtained for these works. The characteristics of the seafloor of the disposal site were investigated prior to the 1988 dredging via a hydrographic survey and a diver survey. The diver survey identified the material to be "fine, white sand devoid of seaweed, sponge, coral or other sedentary marine organisms" (Appendix D).

It is proposed to dispose all berth sediments (12,000 m^3) to EPSL's existing reclamation area, hereafter known as the onshore disposal site (Figure 1.1). A settlement pond of 200 m^2 will be constructed with some of the excavated material used to construct a perimeter bund and the rest of the material transported by trucks to a temporary stockpile to a maximum height of approximately 5 m above the existing ground level. Dredged material is proposed to be pumped from the dredge to the onshore disposal area with return waters from the settlement pond to be discharged back into Port waters. Dredge material will be capped with a minimum 1 m depth of previous reclamation fill material that will be stockpiled during dredging.

The rationale for this the proposed combination of ocean disposal and land disposal is given in Section6.

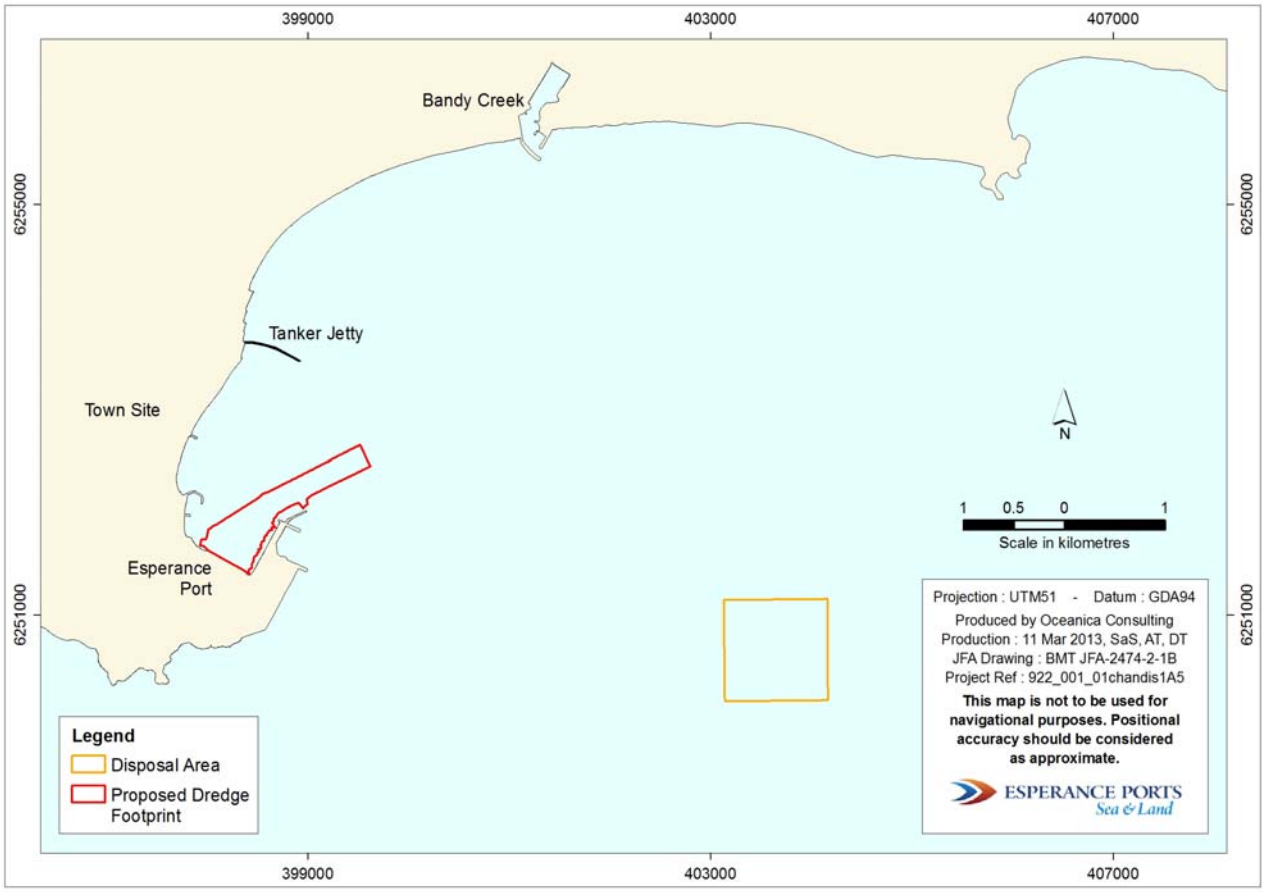


Figure 2.2 Proposed dredge footprint and offshore disposal area

2.2.1 Alternative options

Prior to sampling, the preferred option was disposal to the Esperance foreshore for beach nourishment. However, sediment analyses showed that some contaminant concentrations were above the relevant guidelines (Section 6). Disposal to the foreshore would not achieve the dilutions required to meet these guidelines, whereas disposal to the onshore and offshore disposal grounds would (discussed further in Section 6). Disposal to the onshore and offshore disposal grounds was therefore considered a more environmentally-acceptable option. It was also anticipated that the community would not be receptive to foreshore disposal, given the high level of community concern triggered by a previous lead contamination event in 2006 (refer to Section 3).

EPSL is also considering disposal of the dredged berth material at the local landfill facility for use as a capping material. If this option is pursued it will be ensured that relevant landfill guidelines are met.

3. Background

3.1 Previous dredging programs

The original facilities at the Port of Esperance were constructed in the early 1960s to replace the role of the Tanker Jetty in handling shipping trade (Table 3.1). The initial dredging of the harbour basin removed 2,100,000 m^3 of sediment. A second harbour dredging campaign was undertaken in 1969/1970 with a total 700,000 m^3 of sediment dredged. In 1988 the harbour basin was again deepened (by 2 m), the entrance channel was widened by 70 m and a 100 m long spur groyne was constructed on the offshore side of the breakwater. This dredge material was disposed to an offshore spoil ground (Section 2.2).

The most recent dredging campaign was the capital works undertaken in 2001 and involved deepening the harbour basin and entrance channel, constructing Berth 3 and reclaiming land to provide additional hardstand area. Approximately 1,800,000 m^3 of material was dredged, with the majority of spoil being used for land reclamation and approximately 70,000 m^3 disposed to the Esperance foreshore.

Table 3.1 The Port of Esperance's dredging history

Year	Dredge volume (m^3)	Dredge location	Disposal location
1962–1963	2,100,000	Harbour basin Breakwater	Unknown
1969–1970	700,000	Harbour basin	Beach renourishment of Esperance foreshore
1988–1989	1,400,000	Harbour basin Channel entrance Finger groyne construction	Offshore spoil ground
2000–2001	1,800,000	Harbour basin Berth 3	Land reclamation Beach renourishment

3.2 Previous sediment surveys

3.2.1 2001 capital dredging

Sediment sampling was undertaken prior to the 2001 dredging to characterise the material to be dredged (DAL & CMGCC 1999). Sediment cores, varying from 0.5 to 3.0 m in length, were taken at fifteen sites within the harbour basin. The ANZECC (1998) Interim Ocean Disposal Guidelines for total nickel were exceeded at sites adjacent to Berths 1 and 2. All sites sampled exceeded the screening level for tributyltin (TBT), but only two sites exceeded the maximum level. These sediments were adjacent to Berths 1 and 2 and were estimated to be <1% of the total dredge volume. All other metals and polycyclic aromatic hydrocarbons (PAHs) tested were below the guidelines.

3.2.2 Sediment monitoring, 2002-2006

Condition 4(a) of the EPSL environmental licence L5099/1974/13, issued on 24 February 2011, requires that "marine sediments are monitored in accordance with the 'Esperance Port Comprehensive Sediment Monitoring and Reporting Plan' dated March 2009" (Oceanica 2009). Prior to 2009 there was no requirement for sediment monitoring in EPSL's environmental licence conditions.

Ministerial Statement 555 (Esperance Port – Upgrading of marine facilities; 31 October 2000) required preparation (Condition 8.3) and implementation (Condition 8.4) of a Sediment Quality Management Plan for Port operations to ensure that sediment quality outside the inner harbour meet relevant sediment quality criteria. Ministerial Statement 681 (Esperance Port – Upgrading of marine facilities & Increase in iron ore export through the Port to 8 million tons per annum; 28 July 2005), which supersedes Ministerial Statement 555, also includes the requirement for preparation (Condition 8.3) and implementation (Condition 8.4) of a Sediment Quality Management Plan.

To meet Condition 8.4 of Ministerial Statement 555, from 2002 to 2005, and Condition 8.4 of Ministerial Statement 681 from 28 July 2005 until clearance of the conditions on 23 March 2006, EPSL has annually monitored sediment quality at three defined sites in the outer harbour (sites 5, 6 and 7, re-named sites A5, A6 and A7, Figure 3.1). EPSL also voluntarily monitored sediment quality at three inner harbour sites (sites 8, 9 and 10, re-named sites A8, A9 and A10, and located in the berth pockets of Berth 3, 2 and 1, respectively, Figure 3.1). In 2006, EPSL expanded its sediment monitoring program to include three additional sites (sites 11, 12 and 13, re-named sites A11, A12 and A13, Figure 3.1) to provide an early warning of any spread of contamination. Monitoring of nickel in sediment commenced in October 2002 and monitoring of lead commenced in November 2004. Analysis of metal concentrations was largely centred on total concentration (based on strong acid extraction of sediments). In October 2002, high concentrations of nickel were found at site 9. These findings were followed up with further sampling in March 2003, which included measurement of nickel after dilute acid extraction that better approximates the biologically available fraction (ANZECC/ARMCANZ 2000). Since March 2003, analysis of sediments from the inner harbour sites (A8, A9 and A10) generally included both total nickel and bioavailable nickel. The exact depth of sediment samples taken in the earlier surveys is not known, but the October 2006 survey targeted the top 2 cm of sediment (in accordance with standard practice), with some deeper cores (approximately 40 cm) also taken.

Data up to October 2006 indicated that total nickel concentrations were relatively stable in the berth pockets. Data from October 2006 for bioavailable nickel at sites A8, A9 and A10 were below the Interim Sediment Quality Guideline (ISQG)-low (ANZECC/ARMCANZ 2000), indicating low risk of adverse biological effects.

Shipping of lead carbonate commenced at Esperance Port in July 2005. Routine sediment sampling results indicated little or no lead contamination at inner harbour sites A8, A9 and A10 in May 2005, but an appreciable level of contamination in September 2005 (especially at site 9, Berth 2), which increased between September 2005 and October 2006. The degree to which lead in Port sediments was bioavailable historically is unknown, as historic data were for total concentrations only.

Figure 3.1 EPSL annual sediment monitoring sites

3.2.3 Detailed lead and nickel surveys, 2007

In late 2006 and early 2007, almost 800 bird deaths occurred in around Esperance and were attributed to lead concentrate handled at Esperance Port. Shipping of lead concentrate out of the Port of Esperance ceased in March 2007.

Preliminary sediment sampling undertaken by the Department of Environment and Conservation in early 2007 detected high lead and nickel concentrations in sediments near a discharge pipe at Berth 1. To examine the extent of lead and nickel contamination within the harbour, a Sampling and Analysis Programme (SAP) was developed (Oceanica 2007a). The SAP proposed a staged investigation:

- Stage 1-Screening Assessment Report
- Stage 2-Bioavailability Investigation Report
- Stage 3-Ecological Risk Assessment.

The results of each are discussed below.

Stage 1

The Stage 1 investigations found lead and nickel contamination was highest adjacent to the discharge pipe at Berth 1 and elevated along the face of Berth 2 (Oceanica 2007b). The spatial extent of lead contamination was less than nickel, with the National Sediment Quality Guidelines, ISQG-High (ANZECC/ARMCANZ 2000) for total lead (based on strong acid extraction) exceeded at only one site, while total nickel (based on strong acid extraction) exceeded the ISQG-High at ten sites. Lead contamination was attenuated within 50 m of the discharge pipe at Berth 1 and the berth pocket site at Berth 2. Nickel contamination was more widespread, exceeding ISQG-Low guidelines in an annular pattern around the edge of the harbour. Concentrations in the central harbour sediment were below the ISQG-Low guidelines.

Stage 2

In Stage 2, 51 samples (identified from results of Stage 1) were analysed for bioavailable lead and nickel (based on dilute acid extraction; 1 M hydrochloric acid as per NAGD protocols (CA 2009)) and compared against ISQG-Low and ISQG-High guidelines (Oceanica 2008a). Total lead contamination was 85% bioavailable, compared to 6% for nickel. Bioavailable lead was far more widespread than bioavailable nickel, with nine sites exceeding the ISQG-Low for lead (no sites exceeded the ISQG-High). For bioavailable nickel, no sites exceeded the ISQG-Low or ISQG-High.

Stage 3

The Stage 3 investigation involved analysing sediments sampled from deeper layers (2–6 and 6–10 cm) (Oceanica 2010). Lead contamination was highest in the 6–10 cm sediment layer, contrary to the contamination pattern expected if the contaminants were recent inputs. The ISQG-High guideline was exceeded at sites in Berth 2 and 3, mostly in sediments deeper than 2 cm.

The toxicity of contaminated sediments to marine organisms was assessed according to National protocols (ANZECC/ARMCANZ 2000; CA 2009). Sediment samples were chosen to most closely reflect the median lead concentration of the contaminated areas, and the toxicity tests undertaken were:

- 72 hour sea urchin larval development test (using sediment elutriate)
- 48 hour rock oyster larval development test (using sediment elutriate)
- 10 day amphipod (small crustacean) survival test (using whole sediment)
- 72 hour marine algal growth test (using sediment elutriate).

At bioavailable lead concentrations of 49–140 mg/kg, there was an extremely limited effect on marine organisms (Oceanica 2010). Sediment from site 4 showed a slight negative effect on sea urchin development at 100% sediment elutriate concentration, while survival of amphipods in sediment from site 31 was significantly reduced compared to the control (Oceanica 2010).

Although effects were observed for sea urchin development at site 4, there was no effect observed in sediments with lead concentrations nearly twice as high (site 74). Similarly, for the survival of amphipods, effects were observed at the lowest concentration of lead (site 31), but no effects were observed in the two sites that were 2- and 3-fold higher in lead (site 4 and 74, respectively). Therefore, although minimal effects were observed, they did not appear to be correlated with lead concentrations.

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. As the contaminated sediments were restricted to a small area and only minimal toxicity was found that did not appear to be correlated to lead contamination, the risks to the marine environment were considered to be minor and not sufficient to warrant remediation of the area.

3.2.4 Sediment monitoring, 2008–2010

The 2008 sediment monitoring involved sampling the top 2 cm of sediment from 19 sites in accordance with the recommendations in Oceanica (2008b). In 2010 further results of the Stage 3 Ecological Risk Assessment became available on the deeper (2–6 and 6–10 cm) fractions of sediment cores (Section 3.2.3). These results indicated that, contrary to the pattern of greatest contamination in surface (0–2 cm) sediments that is typically of most recently-contaminated sediments, many sites (especially the most contaminated sites) had higher levels of lead in the 2–6 cm fraction, and highest levels in the 6–10 cm fraction. These results may be due to an improvement in Port practices or due to sediments being mobilised by ships' propellers, but also indicated that the usual focus of sampling on the top 2 cm of sediment to assess risks to ecosystem health (because this typically captures the 'worst-case' scenario) was not applicable to inner harbour sediments at Esperance Port. Therefore, the next round of monitoring, in 2010, sampled deeper layers (to 10 cm). The same 19 sites were sampled in accordance with Environmental Licence L5099/1974/12 (now superseded by L5099/1974/13).

The concentrations of arsenic, cadmium, chromium and zinc were below the ISQG-low at all sites in both 2008 and 2010. Some sites exceeded ISQG-low for lead and nickel in both 2008 and 2010 and some sites exceeded the ISQG-low for copper in 2010 only.

In 2010, the total lead concentration and bioavailable lead concentration at site A9 (180 mg/kg) exceeded the ISQG-low and site A10 (250 mg/kg) exceeded the ISQG-high (Figure 3.2 and Figure 3.3). No sites exceeded the ISQG-high for lead in 2008, but this is likely a result of cores being taken on different sides of the sheet piling that retains the sediments under the berth (EPSL 2011). Bioavailable lead concentrations at site A9 and A10 have significantly decreased since 2007, so no management measures were necessary.

In 2010, total nickel concentrations at seven sites exceeded the ISQG-low and four sites exceeded the ISQG-high (Figure 3.4). The bioavailable nickel at one of these sites, A9 (26 mg/kg) also marginally exceeded the ISQG-low after previously being below the ISQG-low in 2008 (Figure 3.5). Since only four sites had 0–10 cm data in 2008 and the remaining 15 sites had only surficial (0–2 cm) data, direct comparisons with the 2010 sample (0–10 cm) results cannot be made. The bioavailable nickel concentration at A9 in 2010 increased 3-fold from the bioavailable fraction measured in 2008. This order of increase is consistent with other sites sampled within the berth pocket (A10, A14, A15 and A16). This is likely due to higher concentrations occurring in 2–10 cm layer which were not sampled in 2008.

Total copper concentrations were above the ISQG-low in 2010 at site A9 (Berth 2) and above the ISQG-high at site A8 (Berth 3). However, the bioavailable copper fractions at these sites were below the ISQG-low so no management measures were necessary. The source of this copper is likely to be anti-fouling paint used on ships servicing the Port.

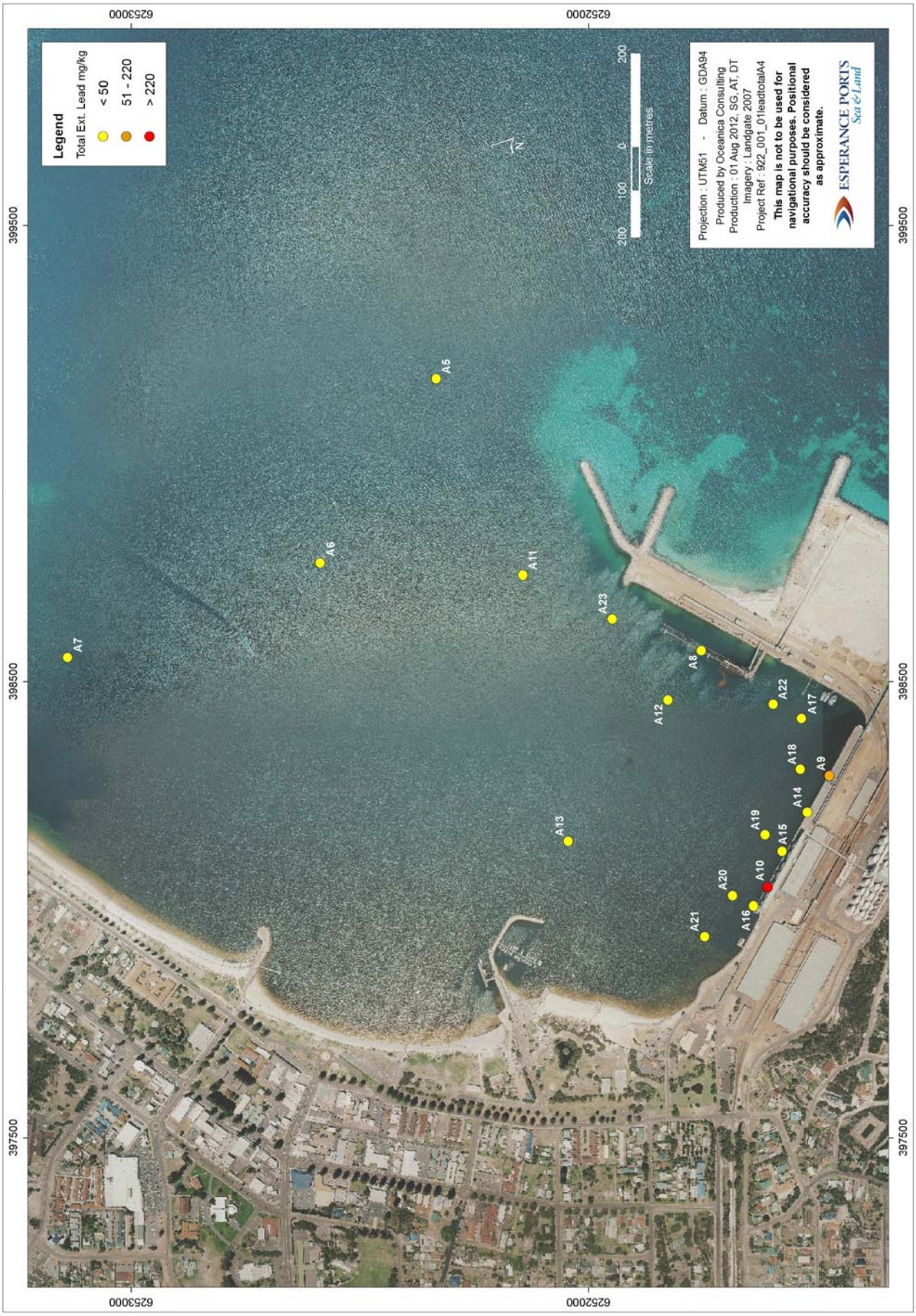


Figure 3.2 Total lead contamination (strong acid extraction) in surface sediments of Esperance Port, 2010

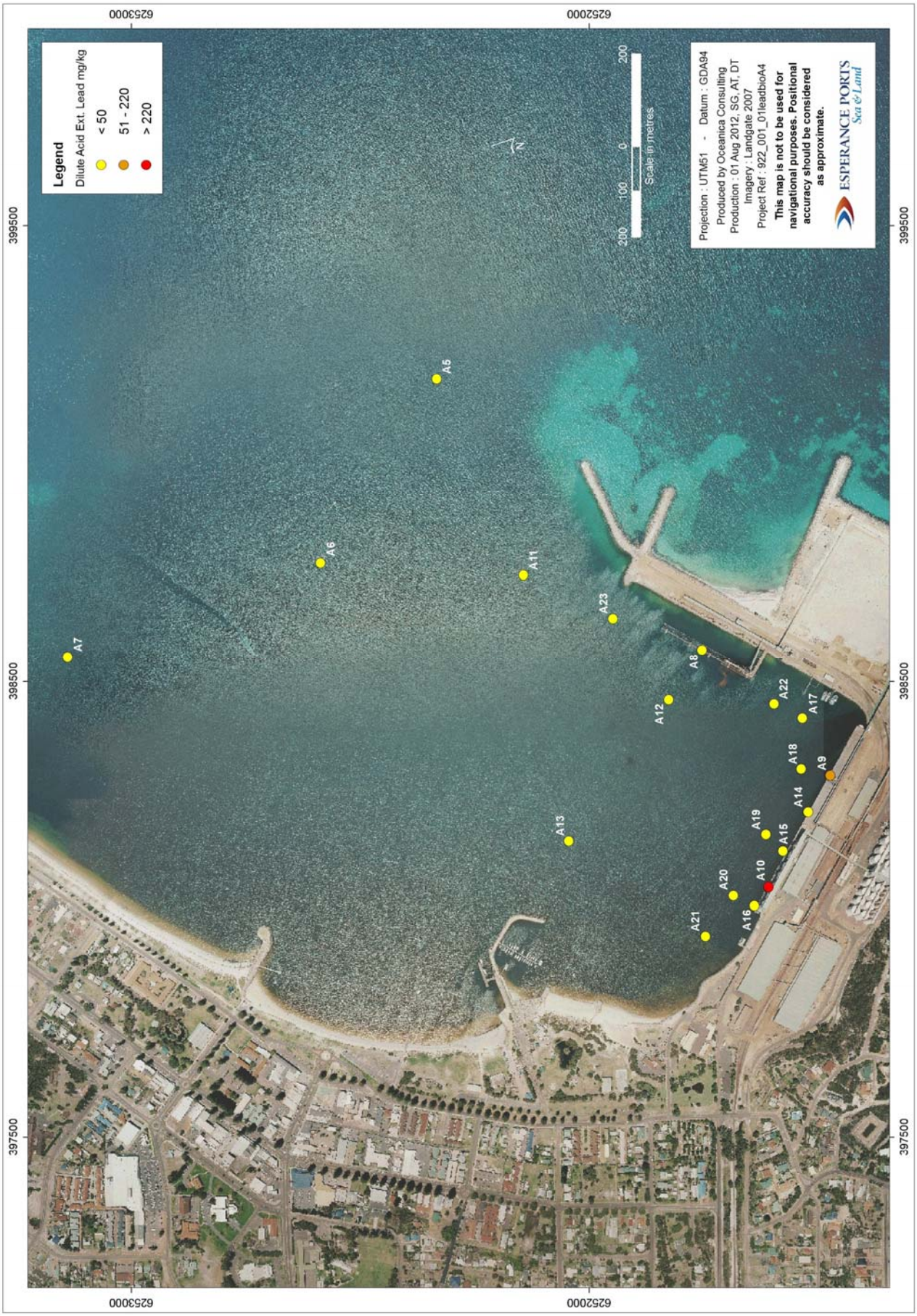


Figure 3.3 Bioavailable lead contamination (dilute acid extraction) in surface sediments of Esperance Port, 2010

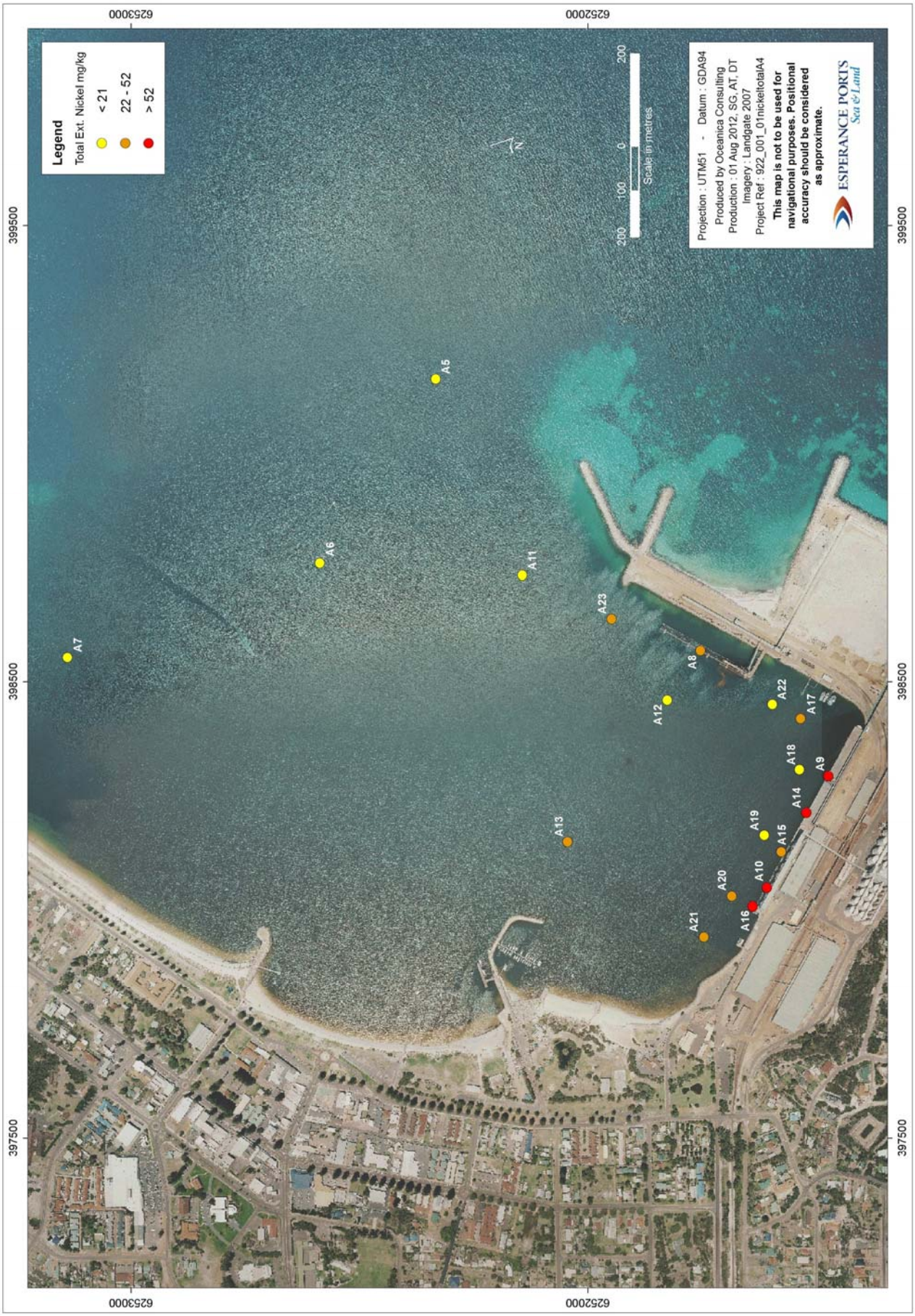


Figure 3.4 Total nickel contamination (strong acid extraction) in surface sediments of Esperance Port, 2010

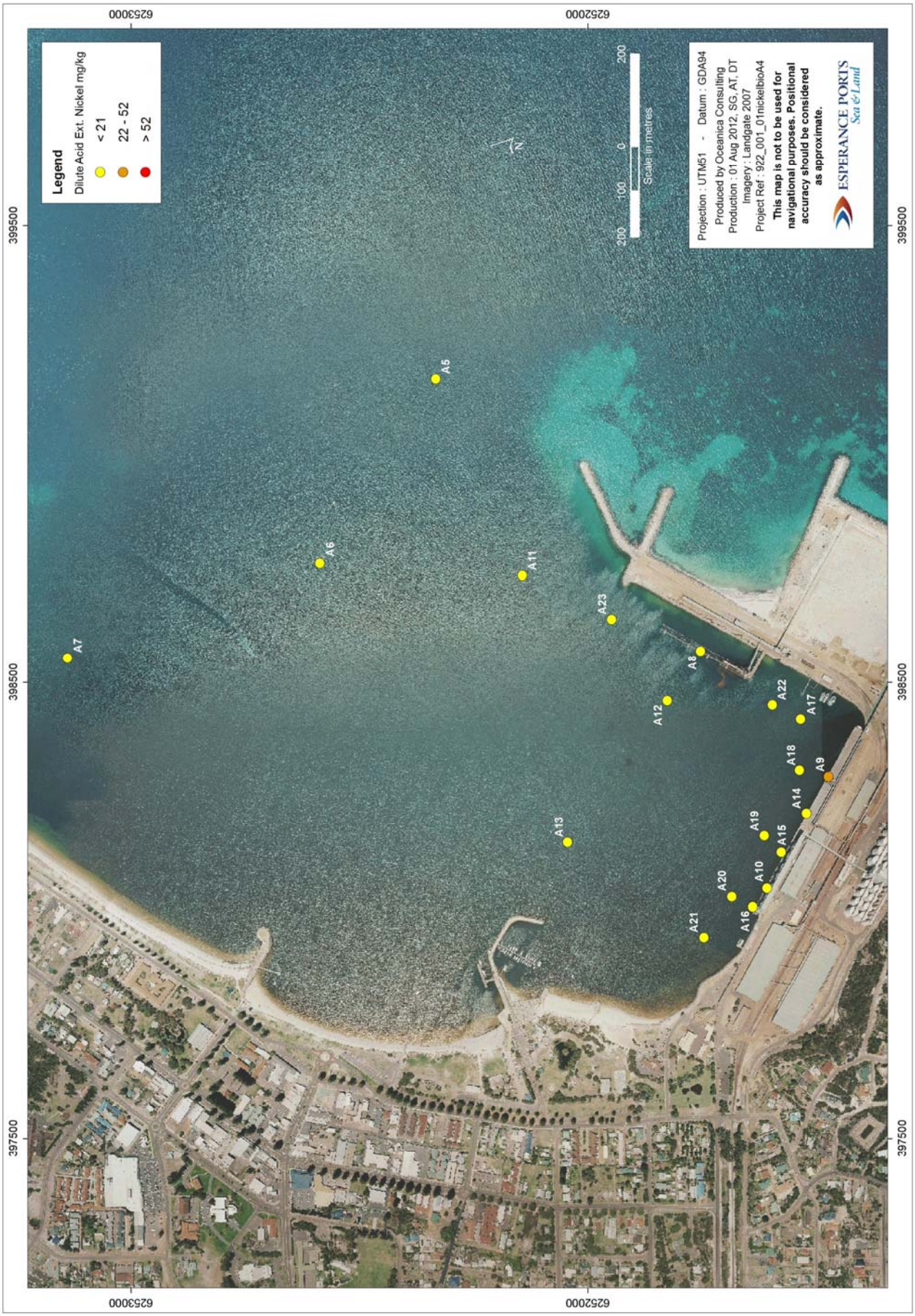


Figure 3.5 **Bioavailable nickel contamination (dilute acid extraction) in surface sediments of Esperance Port, 2010**

3.3 Contaminants of concern

The following contaminants of concern, for both land and ocean disposal, have been identified based on the potential contamination sources, existing sediment data (Section 3.2) and (for land disposal) the need to consider the potential for adverse effects due to acid sulfate soils:

- metals
  - arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc
- tributyltin (TBT)
- hydrocarbons
  - benzene, toluene, ethylbenzene and xylene (BTEX)
  - polycyclic aromatic hydrocarbons (PAH)
  - total petroleum hydrocarbons (TPH)
- acid sulfate soils.

4. Existing Environment

4.1 Bathymetry

The design depth of the Port of Esperance's Berths 1 and 2 is 14.6 m CD, Berth 3 and the inner channel are 19.1 m CD, the middle channel is 19.5 m CD, and the outer channel is 19.9 m CD (Figure 4.1). Water depths within the Port are decreasing due to accumulation of sandy sediments since the last dredging campaign in 2001.

The proposed offshore disposal site is located at a water depth of 35 m CD (Figure 4.1).

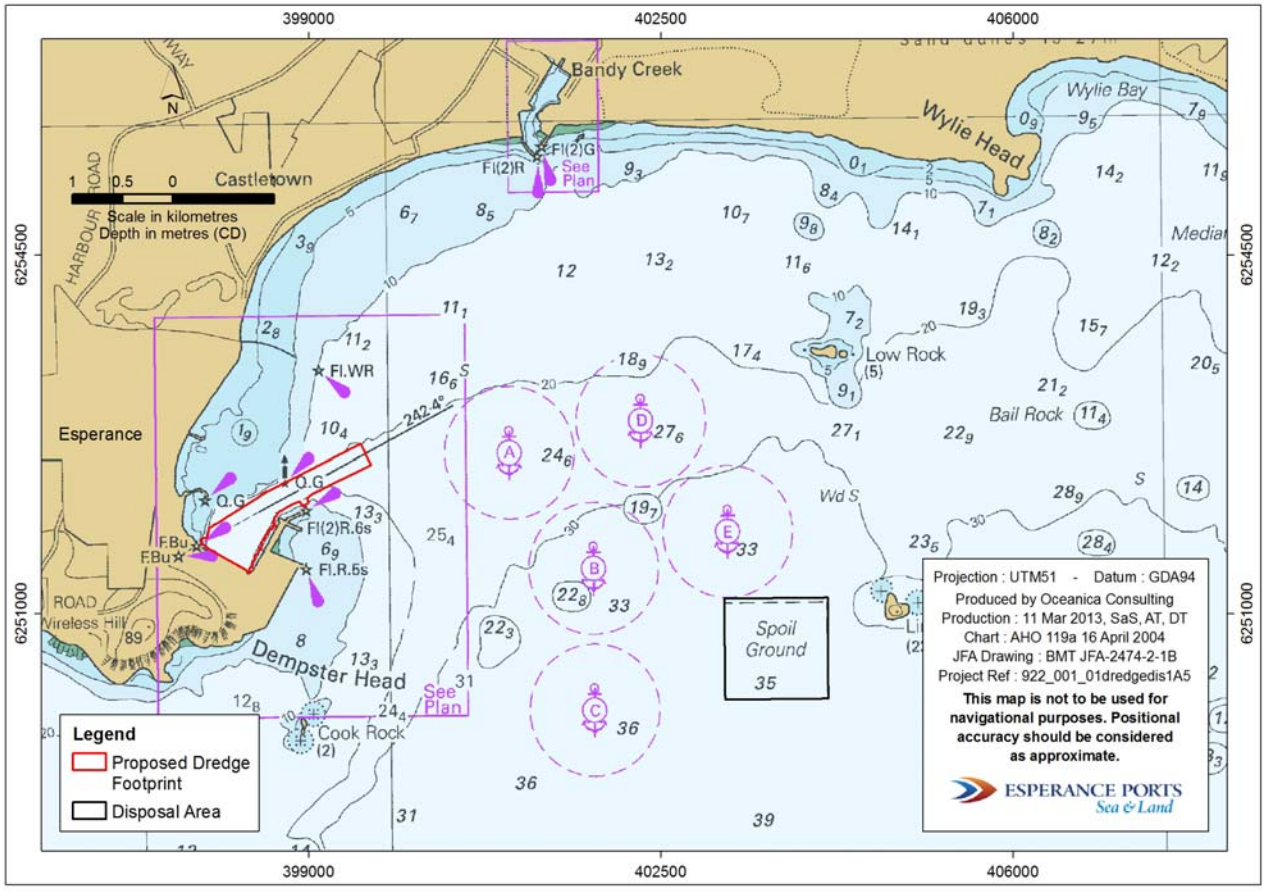


Figure 4.1 Bathymetry of the dredging and disposal areas

4.2 Oceanography

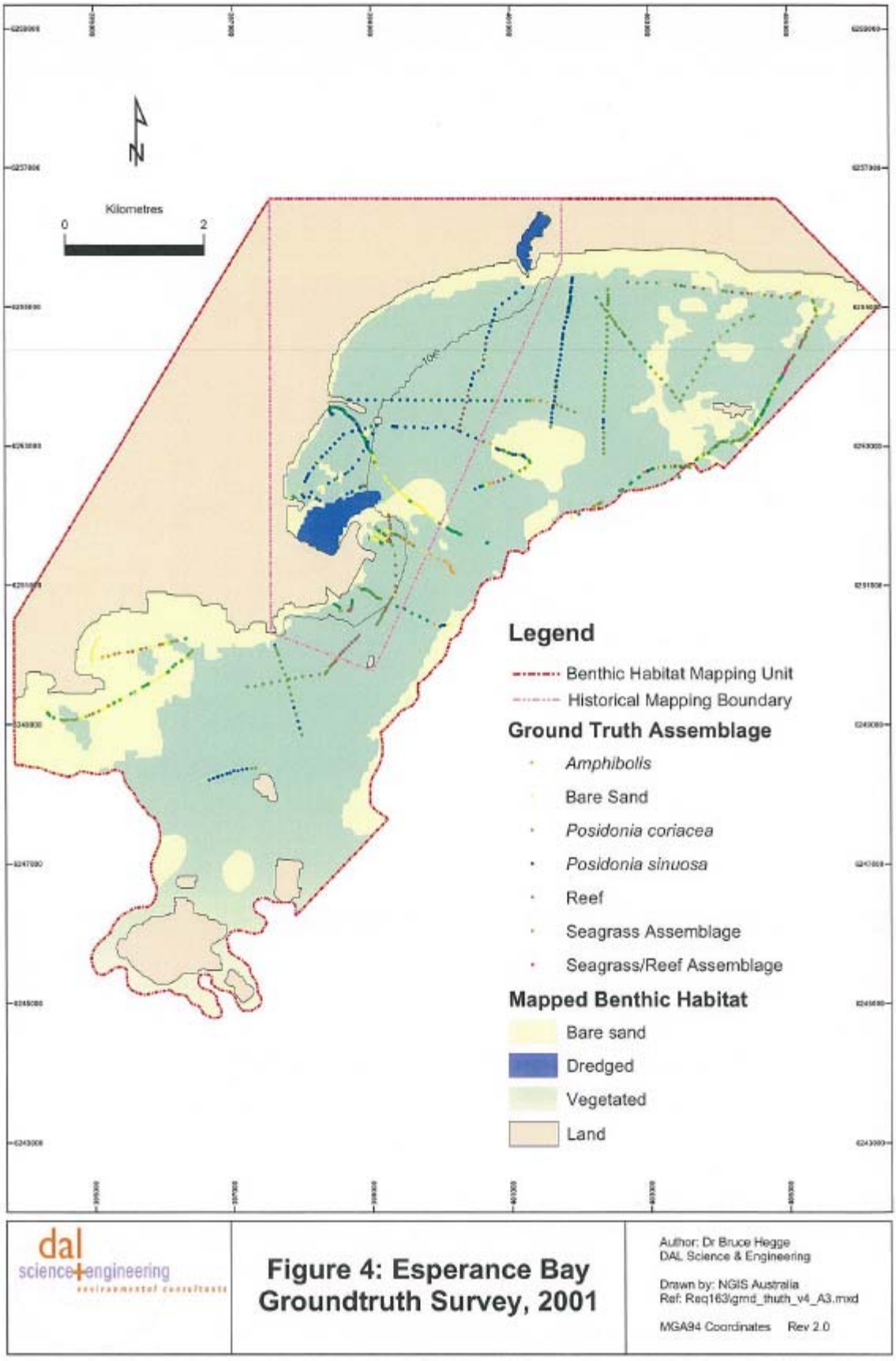
Tides at Esperance are predominantly semi-diurnal with a mean spring tide range of 0.7 m and a mean neap tide range of 0.1 m (Department of Defence 2002). The range from lowest to highest astronomical tide is 1.4 m. The influence of barometric pressure, wind set-up, seiching and other longer-period water level fluctuations can often overwhelm the tidal signal in this area. Tidal currents are also relatively weak in Esperance Bay, due to the small tidal range. Wind-driven currents in Esperance Bay range in speed from 0.07 to 0.21 m/s (GHD 1999).

Esperance Bay is largely sheltered from the direct impact of the prevailing south-westerly swell waves. Observations of offshore waves near Magistrates Rock, 5 km south of the disposal site and in 47 m of water, indicated a median significant wave height of 1.4 m (GHD 1999). Wave heights recorded inside Esperance Bay, offshore from Bandy Creek (Figure 4.1) in 12 m of water, showed a median significant wave height of 0.65 m (GHD 1999). This attenuation of wave energy is a result of wave shoaling, refraction and diffraction in the presence of the islands and reefs of the Recherche Archipelago and the wave damping by seagrass meadows within Esperance Bay.

The prevailing offshore swell direction is south-westerly and on refraction into Esperance Bay results in eastward longshore currents. Conversely, the south-easterly sea breeze winds in summer result in westward currents.

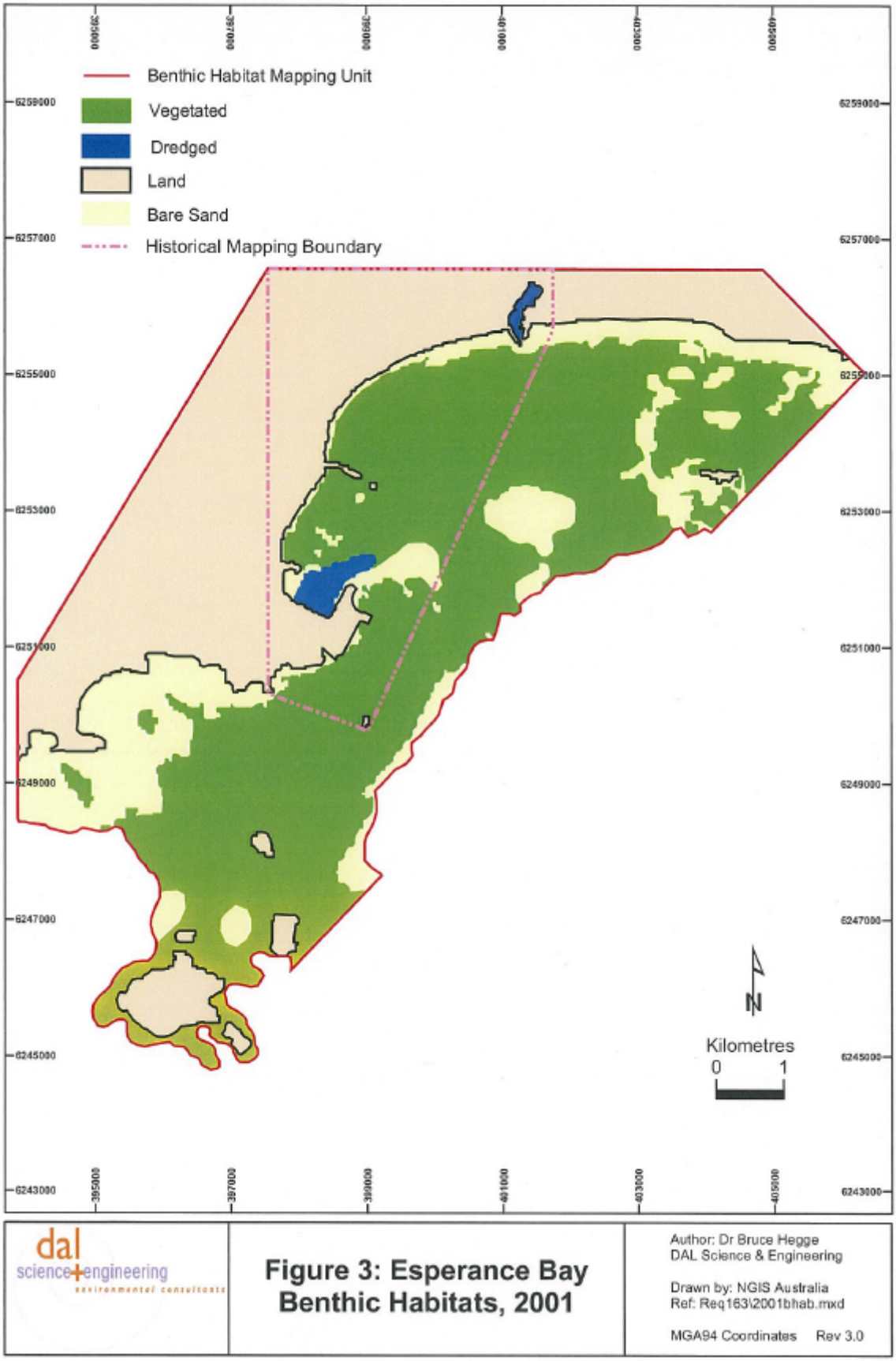
4.3 Benthic habitats and communities

The benthic habitats in the vicinity of Esperance were mapped in detail in 2002 as part of Ministerial Conditions for the 2001 Port expansion (see Section 3.1) (DALSE & UWA 2002). A 7085.2 ha benthic habitat management unit (BHMU) was defined. Underwater video footage from 1035 groundtruth sites (Figure 4.2) within the BHMU established that there was 4583.2 ha of marine habitat (Figure 4.3), of which 72.9% was vegetated (approx. 3341 ha), 25.7% bare sand (approx. 1178 ha) and 1.5% dredged (approx. 69 ha, comprising dredging at both Esperance Port and at Bandy Creek boat harbour) (DALSE & UWA 2002). The main vegetated habitats were *Posidonia sinuosa* and seagrass assemblage (a mix of seagrass species, including *Posidonia* spp., *Amphibolis* spp., *Halophila ovalis*, *Heterozostera tasmanica* and *Syringodium isoetifolium*) throughout the northwest section of the BHMU, and *Posidonia coriacea* and *Amphibolis* spp. in the southern and deeper waters of the BHMU (Figure 4.2) (DALSE & UWA 2002).



Source: DALSE & UWA (2002)

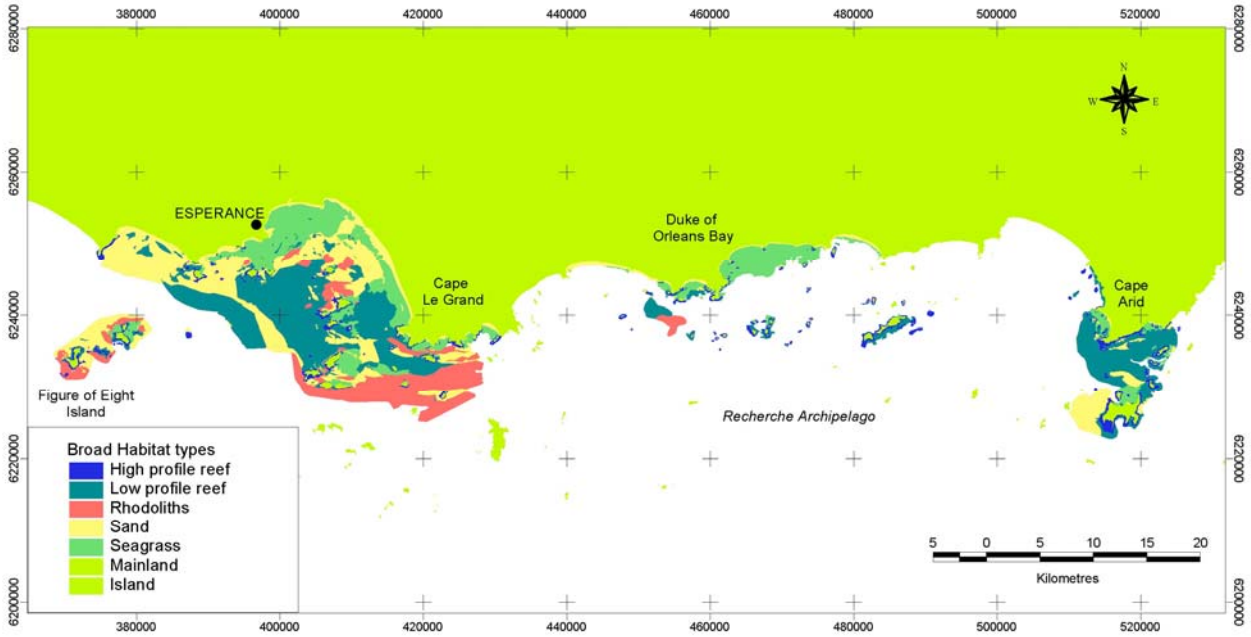
Figure 4.2 Groundtruthing survey sites, 2002 benthic habitat mapping of Esperance Bay



Source: DALSE & UWA (2002)

Figure 4.3 Benthic habitats of Esperance Bay, April 2002

The broader area of the Recherche Archipelago was also mapped in 2002 and 2003 (Kendrick et al. 2004), with 1054 km^2 of habitat comprising 28.3% bare sand, 33.4% low profile reef, 20.1% seagrass, 13.7% rhodoliths (benthic red algae that resemble coral) and 4.6% high profile reefs (Figure 4.4). The same study also examined the broad scale distribution of demersal[1] fish and infauna[2] (Kendrick et al. 2004). Distinctive fish assemblages were found in each main habitat type, although sand habitat and rhodolith habitat were similar. The fish assemblages differed among habitats, with reef habitat having the greatest number of species and individuals, followed by seagrass, then sand and rhodolith habitats. Reefs also had the most diverse infauna with species of sponges and bryozoans predominating, while in the soft bottom habitat types (sand, seagrass and rhodolith) crustaceans and polychaetes were predominant. Rhodolith habitat had the highest diversity and species richness.



Source: Kendrick et al. (2004)

Figure 4.4 Benthic habitats of the Recherche Archipelago, 2003

Benthic habitat mapping in the vicinity of the Port in recent years has been confined to monitoring of the seagrass habitat along the seaward edge of the reclamation area built during the 2001 Port expansion (refer to Section 3.1). This monitoring is required under Ministerial Conditions for the Port expansion, and is undertaken to confirm that the area of unvegetated benthic habitat immediately adjacent to the reclamation area (defined as the bare sand halo) meets the stability criterion for the annual rate of change expected due to longshore sediment transport. The stability criterion is for the area of bare sand halo to undergo an annual rate of change of less than 10%, and monitoring in 2012 indicates this criterion is presently met (Oceanica DRAFT).

4.4 Listed threatened species and ecological communities

The coastal waters near Esperance provide habitat, breeding grounds and migratory routes for cetaceans and other marine fauna, including the Southern Right Whale (*Eubalaena australis*), Humpback Whale (*Megaptera novaeangliae*), Australian Sea-lion (*Neophoca cinerea*), Great White Shark (*Carcharodon carcharias*) and Mackerel Shark (*Lamna nasus*) (DSEWPC 2012). These species are protected under the EPBC Act as threatened and/or migratory species. A full list of marine species that may occur in the Esperance region and which are protected under the EPBC Act is provided in Table 4.1.

Terrestrial species and birds have not been listed below as the proposal consists of maintenance dredging, offshore disposal and onshore disposal on industrial (Port) land, so there is no risk of significant impact on these species.

1 *Fish that live and feed on or near the seabed*

2 *Invertebrate fauna that live on or in the seabed*

Table 4.1 Threatened and migratory marine species that may be present in the area

Species	Status	Type of presence
Threatened Species		
Blue Whale (*Balaenoptera musculus*)	Endangered	Species or species habitat may occur within area
Southern Right Whale (*Eubalaena australis*)	Endangered	Breeding known to occur within area
Humpback Whale (*Megaptera novaeangliae*)	Vulnerable	Species or species habitat likely to occur within area
Australian Sea-lion (*Neophoca cinerea*)	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Loggerhead Turtle (*Caretta caretta*)	Endangered	Breeding likely to occur within area
Green Turtle (*Chelonia mydas*)	Vulnerable	Species or species habitat likely to occur within area
Leatherback Turtle (*Dermochelys coriacea*)	Endangered	Species or species habitat likely to occur within area
Grey Nurse Shark (*Carcharias taurus*)	Vulnerable	Species or species habitat may occur within area
Great White Shark (*Carcharodon carcharias*)	Vulnerable	Species or species habitat known to occur within area
Whale Shark (*Rhincodon typus*)	Vulnerable	Species or species habitat may occur within area
Migratory Species		
Bryde's Whale (*Balaenoptera edeni*)	Migratory	Species or species habitat may occur within area
Blue Whale (*Balaenoptera musculus*)	Migratory	Species or species habitat may occur within area
Pygmy Right Whale (*Caperea marginata*)	Migratory	Species or species habitat may occur within area
Great White Shark (*Carcharodon carcharias*)	Migratory	Species or species habitat likely to occur within area
Loggerhead Turtle (*Caretta caretta*)	Migratory	Breeding likely to occur within area
Green Turtle (*Chelonia mydas*)	Migratory	Species or species habitat likely to occur within area
Leatherback Turtle (*Dermochelys coriacea*)	Migratory	Species or species habitat likely to occur within area
Southern Right Whale (*Eubalaena australis*)	Migratory	Breeding known to occur within area
Dusky Dolphin (*Lagenorhynchus obscures*)	Migratory	Species or species habitat may occur within area
Mackerel Shark (*Lamna nasus*)	Migratory	Species or species habitat likely to occur within area
Humpback Whale (*Megaptera novaeangliae)*	Migratory	Species or species habitat likely to occur within area
Killer Whale (*Orcinus orca*)	Migratory	Species or species habitat may occur within area
Whale Shark (*Rhincodon typus*)	Migratory	Species or species habitat may occur within area

4.5 Introduced marine species

Introduced marine species are marine plants or animals that are not native to Australia but have been introduced by human activities such as shipping (CA 2013a). They have the potential to significantly impact marine industries and the environment. Australia has over 250 introduced marine species; most remain relatively harmless but some have become aggressive pests. These pest species have had significant impacts on marine ecosystems and marine industries.

Sixty species are known to have been introduced into Western Australia and are established; most of these are cool water temperate species (Wells et al. 2009). There are currently no introduced marine pests identified at Esperance (CA 2013b), although 15 introduced marine species have been identified (Huisman et al. 2008):

Bryozoans
- *Bugula neritina*
- *Bugula stolonifera*
- *Conopeum seurati*
- *Schizoporella errata*
- *Schizoporella unicornis*
- *Watersipora arcuata*

Crustaceans
- *Paracerceis sculpta*
- *Sphaeroma serratum*
- *Amphibalanus amphitrite*
- *Megabalanus tintinnabulum*

Polychaetes
- *Sabella spallanzanii*

Ascidians
- *Ascidiella aspersa*
- *Ciona intestinalis*
- *Botryllus schlosseri*
- *Styela plicata*

4.6 Offshore disposal site

It is proposed that channel sediments will be disposed of to an existing offshore disposal ground as outlined in Section 2.2. The existing environment at the offshore disposal site is described below.

4.6.1 Sediment characteristics

Physical composition

The disposal site sediments, as characterised in August 2012 according to the DSEWPAC-approved SAP for the proposed dredging (refer to Section 5.3.4), were dominated by fine to medium grained sands (Table 4.2). The sediments did not contain and clay or silt fractions.

Table 4.2 Particle size distribution (% volume within each size range)

Sediment composition	Size category (µm)	D1	D2	D3	D4	D5	D6
Total gravel	>2,000	0.1	0.0	0.1	0.0	0.2	0.0
Very coarse sand	1,000–2,000	0.2	0.2	0.3	0.3	0.6	0.1
Coarse sand	500–1,000	1.0	1.4	2.9	2.5	2.2	0.2
Medium sand	250–500	45.1	46.2	29.2	38.6	43.6	31.6
Fine sand	125–250	49.1	47.7	56.7	52.3	48.6	58.2
Very fine sand	63–125	4.5	4.5	10.8	6.3	4.7	9.9
Total sand	63–2000 um	99.9	100.0	99.9	100.0	99.8	100.0
Coarse silt	31–63	0.0	0.0	0.0	0.0	0.0	0.0
Medium silt	16–31	0.0	0.0	0.0	0.0	0.0	0.0
Fine silt	8–16	0.0	0.0	0.0	0.0	0.0	0.0
Very fine silt	4–8	0.0	0.0	0.0	0.0	0.0	0.0
Total silt	4–63 um	0.0	0.0	0.0	0.0	0.0	0.0
Total clay	0–4 um	0.0	0.0	0.0	0.0	0.0	0.0

Metals

The concentration of metals in the disposal site samples were all below the relevant NAGD screening levels (CA 2009) (Table 4.3). The concentrations of cadmium, nickel, lead and mercury were also below the laboratory reporting limit in all disposal site samples.

Table 4.3 Disposal site metal concentrations (mg/kg)

Site	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
NAGD screening level	**20**	**1.5**	**80**	**65**	**21**	**50**	**200**	**0.15**
NAGD sediment quality high	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
D1	<2	<0.1	7.7	0.2	<0.7	<1	0.8	<0.01
D2	<2	<0.1	8.8	<0.2	<0.7	<1	0.6	<0.01
D3	<2	<0.1	7.0	0.3	<0.7	<1	0.6	<0.01
D4	<2	<0.1	4.1	<0.2	<0.7	<1	<0.5	<0.01
D5	2	<0.1	8.7	<0.2	<0.7	<1	0.6	<0.01
D6	<2	<0.1	8.9	<0.2	<0.7	<1	0.7	<0.01

4.6.2 Biological characteristics

Underwater video footage along two transects within the disposal site showed a sandy seabed with wrack and occasional isolated patches or sprigs of seagrass: several patches of *Posidonia coriacea* (Figure 4.5) were identified along both transects and one patch of *Halophila* spp. (Figure 4.6*). Halophila* are ephemeral, colonising species that do not form dense meadows. *Posidonia coriacea* is reported to occur to 30 m, usually in areas of high wave energy and was very sparsely distributed at the depth of the disposal site (Kuo & Cambridge 1984). As the disposal site is at a water depth of 35 m CD, the predominantly sandy habitat is expected. These findings of a predominantly bare sandy habitat are consistent with those of earlier studies of the disposal site (refer to Section 2.2).

Figure 4.5 **A patch of sparsely distributed *Posidonia coriacea* on Transect 2**

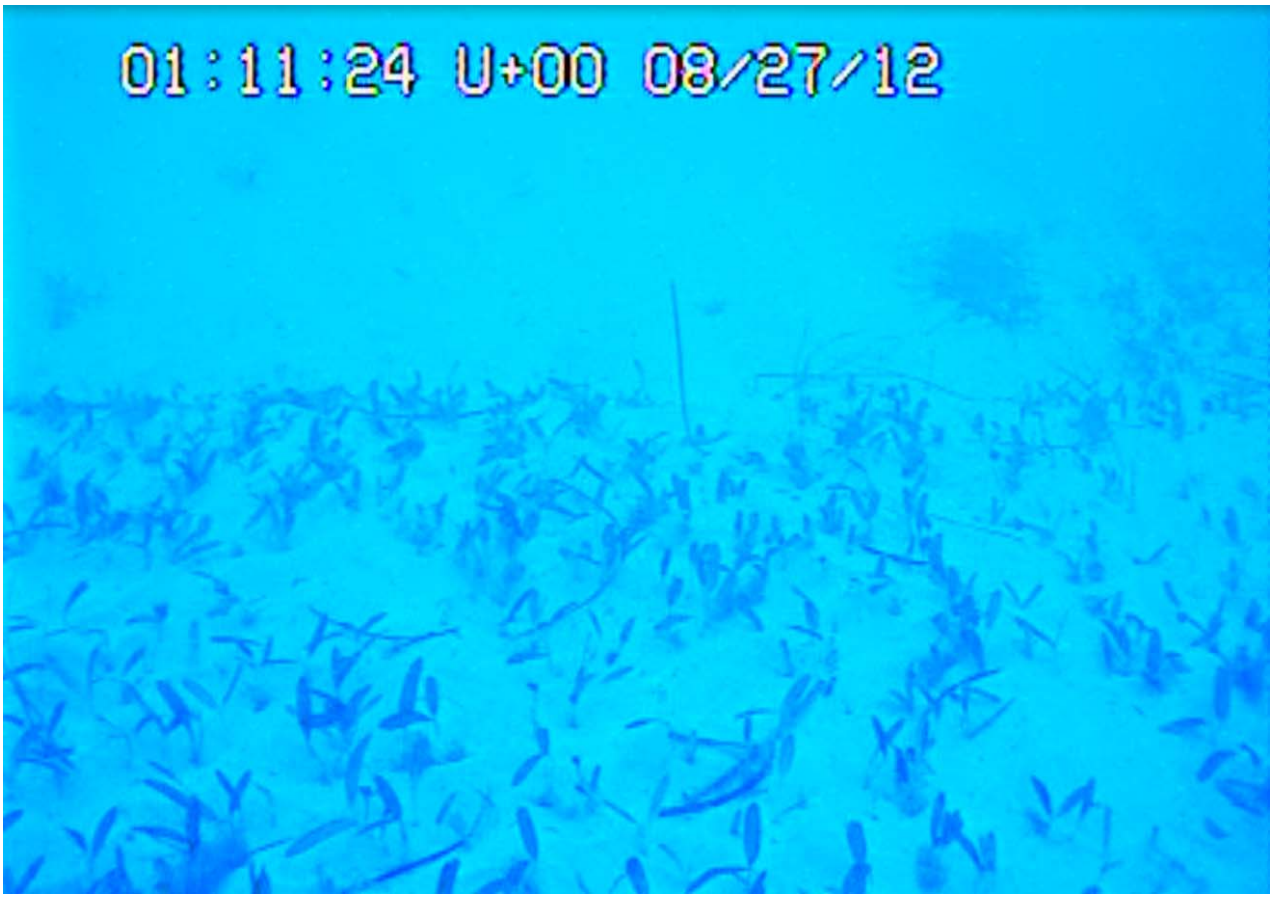


Figure 4.6 **A patch of sparsely distributed *Halophila* spp. on Transect 2**

4.7 Onshore disposal site

It is proposed that berth sediments will be disposed of to an existing reclamation area. This area was reclaimed during a Port dredging campaign that was completed in 2001. This reclaimed area has been vacant Port land since reclamation.

It is proposed that a settlement pond of up to 200 m^2 will be constructed.

4.8 Temporary stockpile

The temporary stockpile is proposed to be situated on an area that was reclaimed during a dredging campaign that was completed in 2001. This reclaimed area has been vacant Port land since reclamation.

5. Sediment Sampling Design

Sediment sampling and analysis was undertaken to characterise the proposed dredge material in accordance with the National Assessment Guidelines for Dredging (NAGD; CA 2009). A Sampling and Analysis Plan (Oceanica 2012) was approved by DSEWPC on 8 August 2012.

5.1 Timing

Sediment sampling was undertaken from 27 to 29 August 2012.

5.2 Sites

The placement of sampling sites was based on the NAGD guidelines (CA 2009, Oceanica 2012). The dredge area was not sub-divided due to the consistent status of 'probably contaminated' across the area. Sediments were sampled from 15 sites randomly distributed within the dredge area (Table 5.1). Two of EPSL's annual monitoring sites, A8 and A10, are located adjacent to the proposed dredge area and have previously recorded elevated levels of nickel and lead. To provide information on the depth of lead and nickel contamination and any temporal changes that may have occurred at these locations, samples were taken at two additional sites, EP2 and EP10, that were as close as possible to these sites but within the dredge area. An additional site between Berths 1 and 3, EP7, was also sampled as previous sediment sampling campaigns (Section 3.2.2) have recorded elevated nickel in this area. Therefore, a total of 18 sites were sampled (Table 5.1).

Following initial analysis and determination of areas of contamination the sites were separated into either 'berth' or 'channel' (Table 5.1). Data analysis was performed separately on berth and channel sites as sediments from the berth areas will be disposed of onshore and from the channel may be disposed of at sea or onshore, and each are required to be compared to different guidelines.

Table 5.1 Sediment sampling sites

Site ID	Coordinates (UTM51 GDA94)		Location
	Easting	Northing	
EP1	397967	6251700	Berth
EP2	398055	6251620	Berth
EP3	398123	6251585	Berth
EP4	398201	6251532	Berth
EP5	398251	6251518	Berth
EP6	398285	6251487	Berth
EP7	398432	6251472	Berth
EP8	398347	6251721	Channel
EP9	398390	6251775	Channel
EP10	398555	6251747	Berth
EP11	398508	6251777	Channel
EP12	398576	6251788	Berth
EP13	398603	6251835	Berth
EP14	398628	6251902	Channel
EP15	398663	6251976	Channel
EP16	398714	6252039	Channel
EP17	399147	6252449	Channel
EP18	399077	6252272	Channel

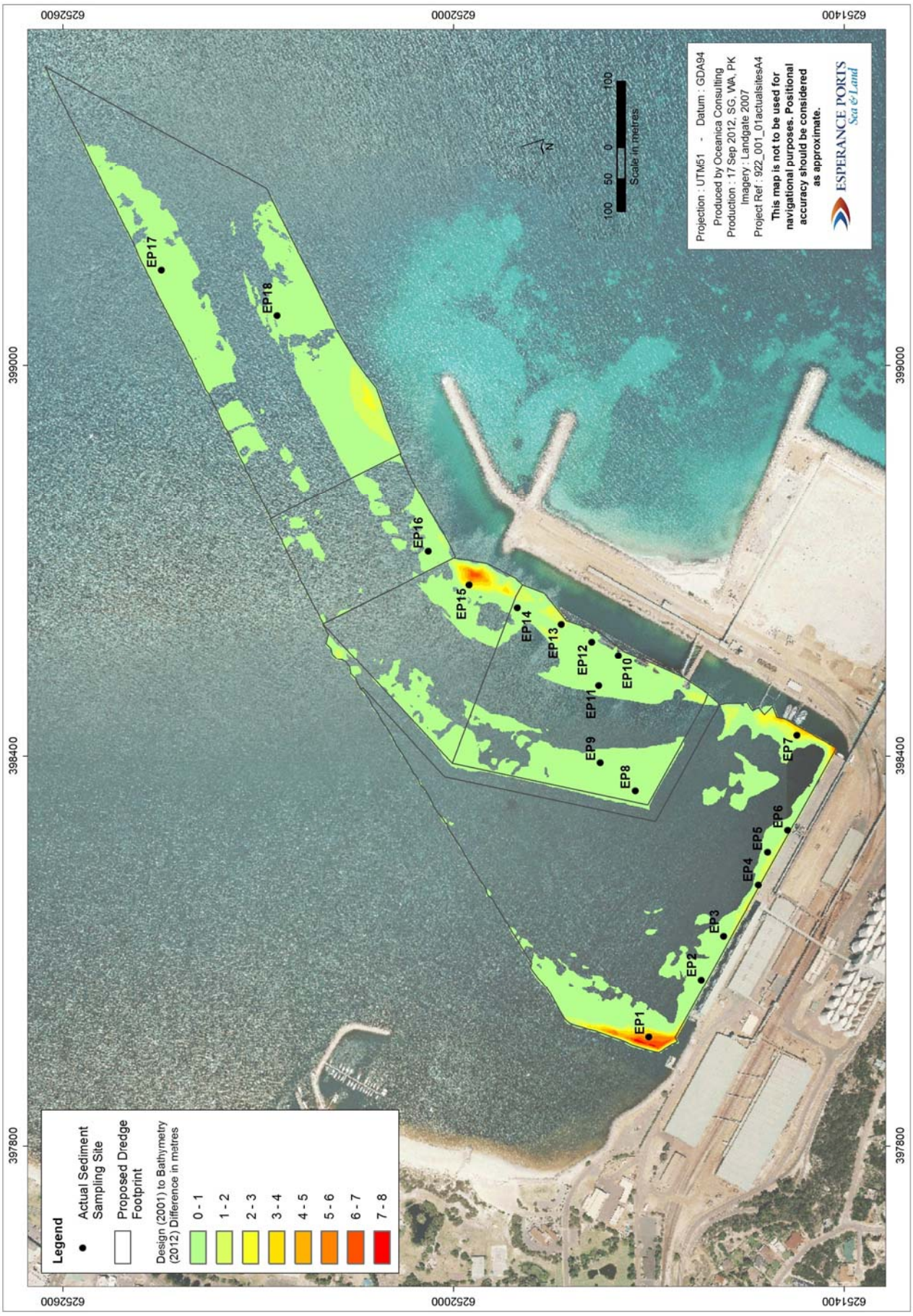


Figure 5.1 Sediment sampling sites

5.3 Methods

5.3.1 Location of sites

The vessel crew located the sampling sites using the vessel's GPS system and deployed a surface marker buoy as close to the proposed location as possible. The vessel then anchored as close to the marker buoy as weather and sea conditions permitted. The passage of ships and other vessels in the area were taken into account during vessel anchorage.

Five sampling sites had to be moved by 20–350 m from the locations proposed in SAP (Oceanica 2012) due to shipping movements, weather conditions and core refusal (Table 5.2).

Table 5.2 Changes to proposed sampling site locations

Site	Distance from proposed site	Direction from proposed site	Reason
EP8	50 m	West	Shaly sediment prevented vibrocoring
EP12	30 m	East	Shipping traffic restricted site access
EP15	20 m	North-west	Sea state prevented sampling close to the navigation marker
EP17	350 m	North-east	Wrack mats prevented vibrocoring
EP18	150 m	North-east	Slope of the seabed and wrack mats prevented vibrocoring

5.3.2 Sediment coring

Sampling of sediments was undertaken using a mini-vibrocoring unit operated from the vessel. The cores consisted of 80 mm diameter, clear PVC liners inside an aluminium pipe, up to 2 m in length. Once the vessel was in position, the core was lowered down to the seabed inside an A-frame, using a winch. Once the A-frame was settled horizontally on the seabed, the core was vibrated down to the required depth, or until refusal, using an air-driven vibrating motor. A core catcher at the end of the core prevented loss of sediment and the A-frame was pulled to the surface.

Once on board, the core catcher was removed and the PVC liner was liberated from the aluminium pipe into a core tray. Once the sediment was extracted, the core was photographed, length recorded and sediment characteristics noted.

The total length of the sediment core was measured, photographed and sediment characteristics noted while still in the clear PVC lining (Appendix E). Cores were taken to the full depth of dredging (except at sites EP1 and EP15 or where core refusal occurred), and sub-sampled every 0.5 m giving a total of 31 samples (Table 5.1). The two small 'high spots', west of Berth 1 (site EP1) and north of Berth 3 (site EP15), have not been dredged before so are classified as capital dredging. Therefore, sites EP1 and EP15 were not sampled to the full depth of dredging as the material underneath is expected to be uncontaminated, natural geological material (Oceanica 2012): subsequent analysis of dredging requirements by BMT JFA (2013) has also indicated there may be no need to dredge the deeper layers at these two small high spots. The proposed sampling depths (Oceanica 2012) were not achieved at sites EP1, 4, 7, 8, 14, 15 and 18 due to core refusal.

Each 0.5 m section was homogenised within a Pyrex glass bowl with a plastic spoon until the colour and texture were uniform. Sub-samples were placed in jars for transport to the laboratory. A small headspace was maintained to allow the sediment/water matrix to expand slightly during freezing.

Table 5.3 Sample names and depths

Site ID	Location	Dredging depth (m)	Core length (m)	Number of samples	Sample name	Sample depth (m)
EP1	Berth	4.85	1.5	3	EP1A	0–0.5
					EP1B	0.5–1
					EP1C	1–1.5
EP2	Berth	0.24	1	2	EP2A	0–0.5
					EP2B	0.5–1
EP3	Berth	0.75	1	2	EP3A	0–0.5
					EP3B	0.5–1
EP4	Berth	1.31	1	2	EP4A	0–0.5
					EP4B	0.5–1
EP5	Berth	0.75	1	2	EP5A	0–0.5
					EP5B	0.5–1
EP6	Berth	0.90	1	2	EP6A	0–0.5
					EP6B	0.5–1
EP7	Berth	2.20	1.5	3	EP7A	0–0.5
					EP7B	0.5–1
					EP7C	1–1.5
EP8	Channel	0.23	0.5	1	EP8A	0–0.5
EP9	Channel	0.42	0.5	1	EP9A	0–0.5
EP10	Berth	0.44	0.5	1	EP10A	0–0.5
EP11	Channel	0.40	0.5	1	EP11A	0–0.5
EP12	Berth	0.44	0.5	1	EP12A	0–0.5
EP13	Berth	1.21	1	2	EP13A	0–0.5
					EP13B	0.5–1
EP14	Channel	0.25	0.5	1	EP14A	0–0.5
EP15	Channel	3.06	1.5	3	EP15A	0–0.5
					EP15B	0.5–1
					EP15C	1–1.5
EP16	Channel	0.27	0.5	1	EP16A	0–0.5
EP17	Channel	0.08	0.5	1	EP17A	0–0.5
EP18	Channel	0.21	1	2	EP18A	0–0.5
					EP18B	0.5–1
Total number of samples				**31**		

5.3.3 Elutriate sample compositing

Elutriate metals and elutriate TBT were analysed for six composite areas representative of likely patterns in contamination (Table 5.4). Spare samples were retained from each of the original 31 samples (Table 5.3) and on completion of the sediment coring, equal volumes from each sample within a composite area were homogenised within a Pyrex glass bowl with a plastic spoon until the colour and texture were uniform. Each 0.5 m layer was separately composited, giving up to three samples per composite area and a total of 16 samples (Table 5.4).

Table 5.4 Number of sediment elutriate samples

Site ID	Location	Core length (m)	Composite sample name	Number of composite samples
EP1	Berth	1.5	EP1	3
EP2	Berth	1	EP2–6	2
EP3	Berth	1		
EP4	Berth	1		
EP5	Berth	1		
EP6	Berth	1		
EP7	Berth	1.5	EP7	3
EP8	Channel	0.5	EP8–9	1
EP9	Channel	0.5		
EP10	Berth	0.5	EP10–13	2
EP11	Channel	0.5		
EP12	Berth	0.5		
EP13	Berth	1		
EP14	Channel	0.5	EP14–16	3
EP15	Channel	1.5		
EP16	Channel	0.5		
EP17	Channel	0.5	EP17–18	2
EP18	Channel	1		
Total				**16**

5.3.4 Offshore disposal area

Surface sediment samples were obtained, from six randomly distributed locations with the disposal area, to characterise the sediments of the receiving environment (Table 5.5, Figure 5.2). Surface samples were obtained using a 0.1 m^3 stainless steel grab operated from the vessel. Once the vessel was in position, the grab was lowered down to the seabed. Once the grab made contact with the seabed, it was pulled up to the vessel. Sediment samples were taken directly from the middle of the grab, avoiding contact with the sides.

Table 5.5 Proposed disposal site sampling locations

Site ID	Coordinates (UTM51 GDA94)	
	Easting	Northing
D1	403225	6250519
D2	403181	6250231
D3	403501	6250651
D4	403746	6250906
D5	403801	6250463
D6	403959	6250835

Information on benthic habitat characteristics of the disposal site was obtained via a towed video camera survey. Video footage along the proposed transects (Oceanica 2012) could not be obtained while the vessel was under power, as the effects of drag pulled the towed video system away from the seabed. To obtain footage of the seabed, the vessel had to drift across the disposal ground under no power. This method achieved video footage along two, 350 m-long transects running east-west across the spoil ground (Figure 5.2). The towed video recordings were paired with matching GPS tracklogs.

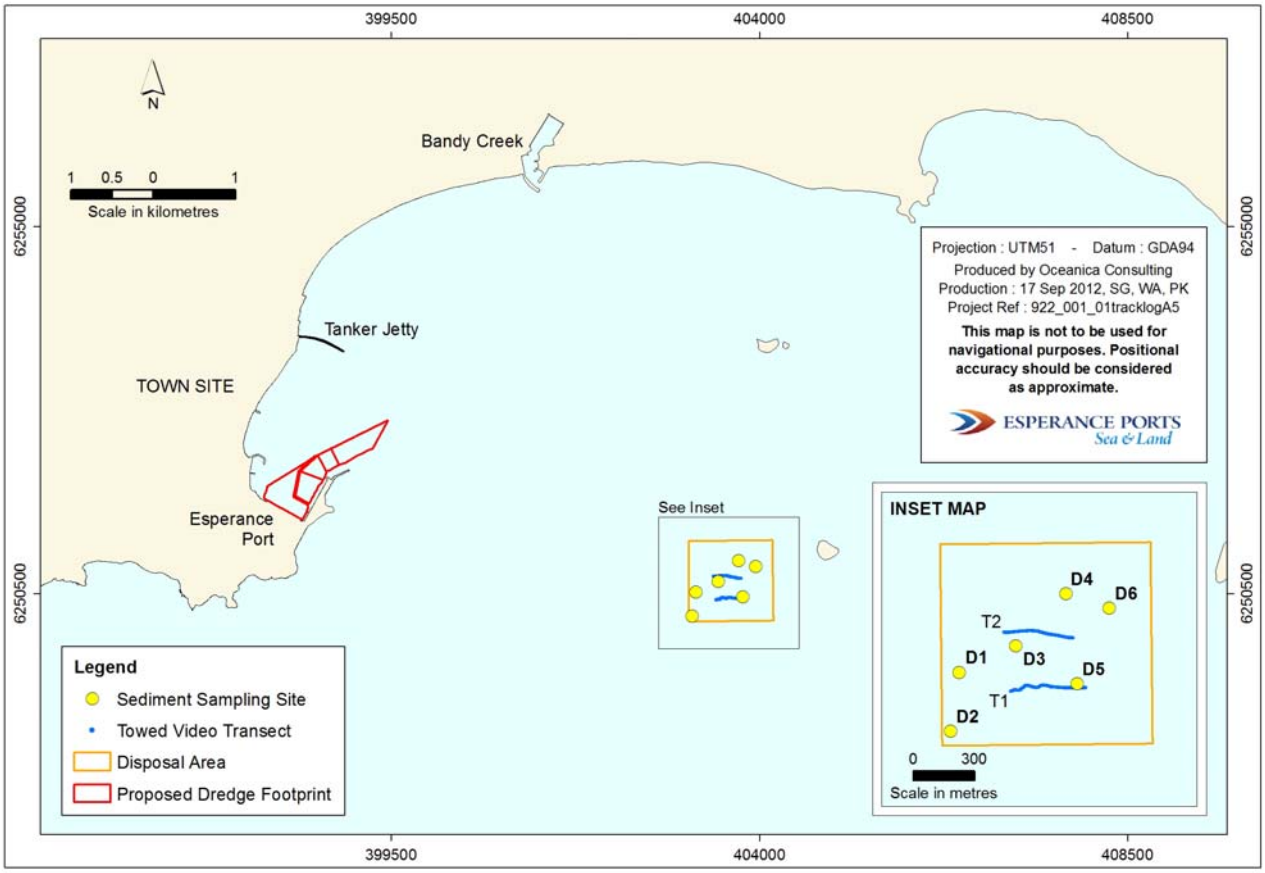


Figure 5.2 Disposal site sampling locations and towed video transects

5.4 QA/QC procedures

Two types of field quality assurance and quality control (QA/QC) samples were obtained, as recommend by the NAGD (CA 2009):

- Field splits, where one sample was collected, homogenised, split into three in the field and analysed individually. Two samples were analysed at one laboratory) and one sample was analysed at another.
- Field triplicates, where three separate cores were taken at the same location and analysed individually at the same laboratory.

Field splits are required on 5% of locations and field triplicates are required on 10% of location (CA 2009). This sampling resulted in six additional samples (Table 5.6).

Table 5.6 Number of field QA/QC samples from the proposed dredge area

Type of sampling	Sites	Number of locations	Number of extra samples
Triplicate sampling	EP5, EP15	2	4
Field split sampling	EP11	1	2

5.4.1 Elutriate QA/QC

Field triplicate sampling was undertaken on 20% of elutriate sampling locations, as recommended in the NAGD (CA 2009). This resulted in four additional samples (Table 5.7).

Table 5.7 Number of field QA/QC composite samples for elutriate testing from the proposed dredge area

Type of sampling	Sites	Number of locations	Number of extra samples
Triplicate sampling	EP5, EP15	2	4

5.4.2 Laboratory QA/QC

Murdoch University's Marine and Freshwater Research Laboratory was used for the metal analyses and the National Measurement Institute laboratory was used for the analysis of organics, organotins and acid sulphate soils. Particle size distribution was undertaken by Microanalysis Australia Pty Ltd. Envirolab Group was used for the QA/QC analysis of field split samples for metals, organics, organotins and acid sulfate soils. All the laboratories used are NATA accredited.

As part of their procedures all laboratories undertook the required testing of blanks, spikes and standards and completed laboratory duplicates as required by the NAGD (CA 2009) and to the satisfaction of NATA requirements.

5.5 Sediment analysis

5.5.1 Dredging area

Sediments

Each sample was analysed for the following:

- metals
  - arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc
- tributyltin (TBT)
- hydrocarbons
  - polycyclic aromatic hydrocarbons (PAH)
  - total petroleum hydrocarbons (TPH)
  - BTEX
- acid sulfate soils
- total organic carbon (TOC)
- particle size distribution (PSD).

Total organic carbon (TOC) was used to normalise the TBT, PAH and TPH concentrations to 1% TOC, as recommended by the NAGD (CA 2009), and PSD was used to assess potential impacts due to turbidity during dredging and disposal.

Sediment elutriates

Elutriate metals and elutriate TBT were analysed concurrently with total metals to save on sampling costs, due to the short holding times for laboratory analysis. Samples were composited for elutriate analysis as described in Section 5.3.3.

Bioavailability testing

Where a sediment sample had metal concentrations above the (CA 2009) screening levels, dilute acid extraction of metals was undertaken to estimate the bioavailable fraction.

5.5.2 Offshore disposal site

The offshore disposal site samples were analysed for particle size distribution and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), to characterise the sediments of the receiving environment.

5.6 Data analysis methods

5.6.1 Computation of 95% upper confidence limit of the mean

Initial analysis of sediment data found that the sediment along the berths had different levels of contamination than sediments in the turning basin and channel. Therefore, berth sediments (EP1, 2, 3, 4, 5, 6, 7, 10, 12 and 13) and turning basin/channel sediments (EP8, 9, 11, 14, 15, 16, 17 and 18 – referred to herein as channel sediments) were analysed separately for assessment purposes, with data from each 0.5 m layer analysed separately. Data collected from the 0–0.5 m layer for each of the 18 sites were pooled, all data collected from ten of the 18 sites from 0.5–1 m were pooled, and all data collected from three of the 18 sites from 1–1.5 m were pooled.

The pooled data were tested for normality using the software ProUCL 4.0 (USEPA). Depending on the distribution of the data, size of the data set and the proportion of values below LoR (which introduce statistical complexities into the analysis) the software recommended the most appropriate method for calculating the 95% upper confidence limit (UCL) of the mean. This included parametric (such as student's t-UCL) and non-parametric (such as boot-strap) methods. Data below LoR were assigned a value of LoR/2 in order to compute a 95% UCL of the mean (CA 2009).

5.6.2 1.1.1 Normalisation of organics data to 1% TOC

Sediment TBT, PAH and TPH levels were standardised to 1% TOC prior to reporting. In samples where the TOC was <0.2% or >10% the outer boundary values (0.2 or 10%) were used. If a TBT or PAH concentration was below the limit of reporting (LoR), half the LoR value was used for normalisation purposes.

5.6.3 Acid sulfate soils

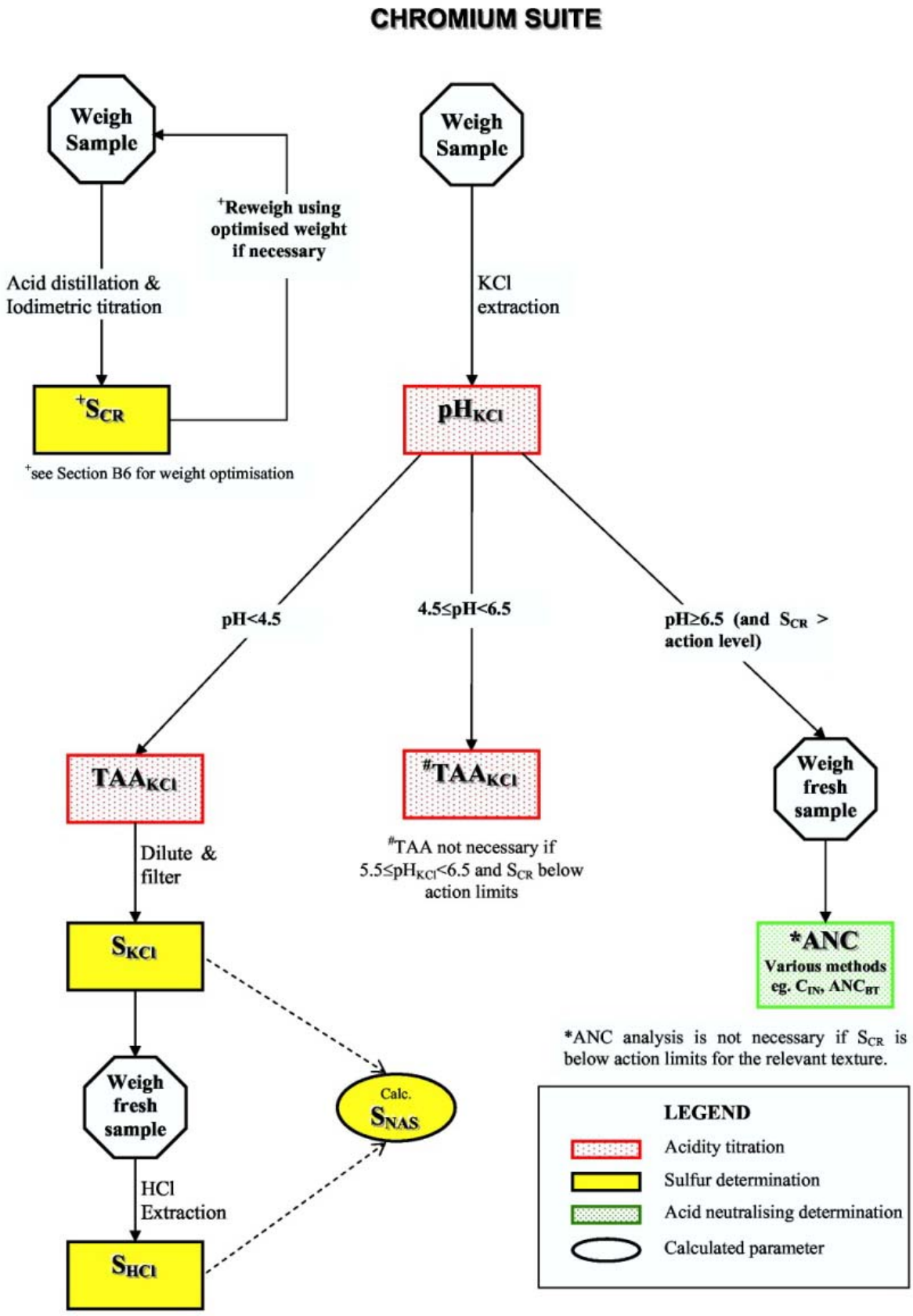
The chromium reducible sulphur suite method allows an estimate of the actual and potential acidity of a sediment sample, the acid neutralising capacity and the total net acidity via a number of steps (as shown in Figure 5.3). The reduced inorganic sulphur content (SCR) provides an estimate of the potential sulphuric acidity of the sediment. The soil pH, in potassium chloride suspension (pHKCl), estimates the actual acidity of the sediment. Titratable Actual Acidity (TAAKCl) and or Net Acid Soluble Sulphur (SNAS) are analysed if pHKCl is <6.5. The acid neutralising capacity (ANC) provides an estimate of the ability of the sediment to naturally neutralise any acid produced (for example due to the presence of carbonate material).
The total net acidity is calculated via Acid-Base Accounting (ABA), using the following equation:

$$Net\ \ acidity = Potential\ sulphidic\ acidity + Existing\ acidity - \frac{ANC}{FF}$$ (Ahern et al. 2004)

where:

Potential sulfidic acidity is represented by SCR (converted from %S to mol H+/tonne by multiplying by 623.7)
If there is no existing acidity in these sediments the existing acidity term is neglected (if TAA=0)
Acid neutralising capacity (ANC) is represented by ANCBT (converted from %CaCO3 to mol H+/tonne by multiplying by 199.8)
Fineness Factor (FF) = 1.5.

As the samples are finely ground in the laboratory, the net acid risk likely to be experienced in the field could be underestimated. To allow for this, the measurement of ANC is divided by a fineness factor (FF) during ABA. The minimum fineness factor that should be applied to any ANC is 1.5; however, larger factors (e.g. 2, 2.5 or 3) may be applicable for shell or other forms of neutralising inclusions in the soil (Ahern et al. 2004). A fineness factor of 1.5 was selected for this study to ensure a conservative calculation of the neutralising capacity for the fine shell and carbonate silts.



Source: Ahern et al. (2004)

Figure 5.3 Chromium suite flow diagram

6. Nature of the Material to be Dredged

6.1 Physical composition

6.1.1 Particle size

The sediments in the areas to be dredged are dominated by fine to medium grained sands in both berth sediments (Table 6.1) and channel sediments (Table 6.2). Berth sediments generally had a higher silt and clay fraction than channel sediments (Table 6.1 and Table 6.2).

Table 6.1 Particle size distribution of berth sediments (% volume within each size range)

	Sediment composition (Wentworth scale)												
	Total gravel	very coarse sand	coarse sand	medium sand	fine sand	very fine sand	**Total sand**	coarse silt	medium silt	fine silt	very fine silt	**Total silt**	**Total clay**
Size (µm)	**>2,000**	1,000–2,000	500–1,000	250–500	125–250	63–125	**63–2000**	31–63	16–31	8–16	4–8	**4–63**	**0–4**
EP1A	2.4	0.8	2.0	18.2	41.4	16.5	79.0	4.9	5.4	3.8	2.5	16.5	2.0
EP1B	2.4	0.8	2.0	22.6	46.5	14.3	86.2	2.5	3.7	2.3	1.6	10.1	1.3
EP1C	1.0	0.9	2.0	29.8	53.3	10.3	96.3	0.2	1.2	0.4	0.6	2.5	0.2
EP2A	0.0	0.1	0.3	24.5	48.9	14	87.6	3	4	3	2	11	1
EP2B	0.3	0.4	1.6	21.3	60.8	11.8	95.9	0.2	1.4	0.6	0.8	3.1	0.7
EP3A	0.1	0.1	9.1	26.1	41.9	10.9	88.0	2.6	3.9	2.6	1.6	10.8	1.1
EP3B	0.0	0.1	1.0	36.4	47.3	6.8	91.6	1.5	2.8	1.8	1.3	7.4	0.9
EP4A	0.6	0.6	5.9	36.1	47.0	5.9	95.5	0.6	1.5	0.8	0.8	3.6	0.2
EP4B	0.0	0.0	1.1	43.5	50.3	5.1	100.0	0.0	0.0	0.0	0.0	0.0	0.0
EP5A T1	0.1	0.2	3.7	36.2	43.2	7.8	91.1	1.9	3.1	1.9	1.3	8.1	0.7
EP5A T2	1.0	0.4	4.8	37.2	41.1	7.3	90.7	1.6	2.6	1.8	1.4	7.3	1.1
EP5A T3	0.0	0.3	3.7	44.3	42.2	5.5	96.0	0.7	1.5	0.9	0.8	3.9	0.1
EP5B	0.0	0.2	2.7	32.9	43.9	9.3	89.0	2.3	3.5	2.4	1.6	9.8	1.1
EP6A	0.2	0.2	1.4	24.9	39.3	12.6	78.3	5.6	6.4	4.6	2.8	19.4	2.1
EP6B	0.0	0.0	1.2	24.0	41.2	12.5	79.0	4.5	6.2	4.6	3.1	18.4	2.6
EP7A	0.3	0.3	1.8	31.2	46.2	10.4	90.0	2.0	3.3	2.1	1.4	8.8	0.9
EP7B	0.0	0.0	0.5	43.2	50.9	5.4	100.0	0.0	0.0	0.0	0.0	0.0	0.0
EP7C	0.0	0.0	0.3	46.4	48.8	4.5	100.0	0.0	0.0	0.0	0.0	0.0	0.0
EP10 A	0.1	0.1	0.4	17.9	37.4	15.9	71.9	7.8	7.9	5.9	3.6	25.2	2.8
EP12 A	0.1	0.3	1.1	34.4	45.5	9.0	90.3	2.1	3.1	2.0	1.4	8.7	0.9
EP13 A	4.6	1.5	3.7	28.1	37.9	9.4	80.6	3.9	4.5	3.1	2.0	13.4	1.3
EP13 B	0.9	0.8	2.3	33.2	42.3	9.5	88.0	3.3	3.5	2.1	1.3	10.2	0.8

Table 6.2 Particle size distribution of channel sediments (% volume within each size range)

	Sediment composition (Wentworth scale)												
	Total gravel	very coarse sand	coarse sand	medium sand	fine sand	very fine sand	**Total sand**	coarse silt	medium silt	fine silt	very fine silt	**Total silt**	**Total clay**
Size (µm)	**>2,000**	1,000–2,000	500–1,000	250–500	125–250	63–125	**63–2000**	31–63	16–31	8–16	4–8	**4–63**	**0–4**
EP8A	0.3	0.2	2.0	37.6	47.5	6.1	93.4	1.2	2.3	1.4	1.0	6.0	0.4
EP9A	9.6	3.5	7.0	30.8	33.3	6.3	80.9	2.3	2.8	2.0	1.3	8.5	1.0
EP11A	1.2	1.3	2.9	26.9	40.8	11.6	83.4	3.9	4.6	3.3	2.1	13.8	1.6
EP14A	0.1	0.1	0.6	30.9	47.2	11.7	90.4	2.4	3.2	2.0	1.3	8.9	0.7
EP15A T1	0.1	0.1	0.6	29.9	53.0	9.7	93.2	1.1	2.4	1.4	1.2	6.0	0.6
EP15A T2	0.0	0.1	0.6	34.2	52.4	7.8	95.1	0.9	2.0	1.0	0.8	4.7	0.2
EP15A T3	0.0	0.1	0.4	33.4	51.1	8.4	93.3	1.1	2.1	1.3	1.2	5.7	1.0
EP15B	0.4	0.5	2.7	32.9	53.1	7.9	97.1	0.3	1.2	0.2	0.5	2.2	0.3
EP15C	2.3	2.1	6.0	19.2	43.1	16.3	86.8	2.2	3.1	2.6	1.7	9.6	1.4
EP16A	0.3	0.5	1.1	28.8	48.2	12.1	90.6	2.0	2.9	1.8	1.3	8.0	1.1
EP17A	5.8	3.0	2.6	12.7	50.6	20.7	89.4	0.4	1.9	1.1	0.8	4.2	0.6
EP18A	5.0	2.7	2.6	18.8	50.5	16.2	90.8	0.2	1.6	0.9	0.8	3.4	0.8
EP18B	4.3	2.6	2.6	19.3	50.7	16.5	91.7	0.2	1.3	0.7	0.7	2.9	1.1

6.1.2 Settling velocity

Finer sediments have the potential to create a greater plume during dredging and disposal as the material takes longer to settle through the water column. The 90% and 50% settling velocities for berth sediments are presented in Table 6.3. For all of the sediments more than 50% of the material would settle through 1 m of water column in less than 1 minute. The time taken for 90% of the sediments to settle through 1 m of water column varied from 1 minute to 2.5 hours (Table 6.3). For all sediments, except those at site EP6 and EP10, more than 90% of the material would settle through the 1 m water column in less than 1 hour. Sites EP6 and EP10 have a higher fraction of silt and clay particles (21–28%) and the settling of these particles will likely involve flocculation (not included in this settling velocity analysis), which would reduce the settling times calculated.

Table 6.3 Particle settling velocities for berth sediments

	90% of particles		50% of particles	
Site	**Minimum settling velocity of 90% of particles (mm/s)**	**Time for 90% of particles to settle over 1 m (min)**	**Minimum settling velocity of 50% of particles (mm/s)**	**Time for 50% of particles to settle over 1 m (min)**
EP1A	0	52	21	1
EP1B	1	14	27	1
EP1C	11	2	34	0
EP2A	1	20	26	1
EP2B	10	2	29	1
EP3A	1	19	33	1
EP3B	9	2	37	0
EP4A	12	1	44	0
EP4B	16	1	47	0
EP5A T1	7	2	37	0
EP5A T2	8	2	43	0
EP5A T3	13	1	49	0
EP5B	1	13	34	0
EP6A	0	76	38	0
EP6B	0	96	37	0
EP7A	4	4	33	1
EP7B	14	1	44	0
EP7C	17	1	49	0
EP10A	0	147	16	1
EP12A	4	4	35	0
EP13A	1	30	34	0
EP13B	2	10	35	0

The 90% and 50% settling velocities for channel sediments are presented in Table 6.4. For all of the sediments more than 50% of the material would settle through 1 m of water column in less than 1 minute. The time taken for 90% of the sediments to settle through 1 m of water column varied from 1 minute to 37 minutes (Table 6.4). For all sediments, except those at site EP11, more than 90% of the material would settle through the 1 m water column in less than 10 minutes.

Table 6.4 Particle settling velocities for channel sediments

	90% of particles		50% of particles	
Site	**Minimum settling velocity of 90% of particles (mm/s)**	**Time for 90% of particles to settle over 1 m (min)**	**Minimum settling velocity of 50% of particles (mm/s)**	**Time for 50% of particles to settle over 1 m (min)**
EP8A	10	2	38	0
EP9A	5	3	54	0
EP11A	0	37	28	1
EP14A	4	4	29	1
EP15A T1	8	2	32	1
EP15A T2	10	2	36	0
EP15A T3	8	2	35	0
EP15B	11	2	37	0
EP15C	2	10	25	1
EP16A	4	4	29	1
EP17A	7	2	20	1
EP18A	13	1	28	1
EP18B	13	1	28	1

6.2 Metals

6.2.1 Sediment metals

To determine if the dredge material was suitable for unconfined ocean disposal the 95% upper confidence limit of the mean total metal concentration was compared to the NAGD guidelines (CA 2009). To determine if the dredge material was suitable for reclamation, the mean total metal concentration was compared to the *WA Assessment Levels for Soils: Health Investigation Levels (HILs)*, Category F. Category F is defined as "commercial/industrial includes premises such as shops and offices as well as factories and industrial sites" (DEC 2010). Comparison of data to HIL requires the mean to meet the assessment level, the standard deviation to be less than 50% of the HIL, and no single value to be greater than 250% of the HIL (DEC 2010). Metal concentrations were also compared to *WA Assessment Levels for Soils: Environmental Investigation Levels (EILs)*, although strictly speaking EILs are intended for assessment of urban areas (DEC 2010), not industrial land. The metrics are not specified for comparison of data to EIL, so the 95% UCL of the mean were used, as for assessment of marine environmental effects.

Berth sites

The 95% upper confidence limits of the mean for all metals in the 0–0.5 m sediments of berth sites were below NAGD screening levels (CA 2009), except for copper and nickel (Appendix F). The 95% upper confidence limits of the mean for all metals in the 0.5–1 m sediments of berth sites were below Screening Levels, except for copper, nickel and lead (Table 6.5, Appendix F). The 95% UCL mean concentrations for nickel in both the 0–0.5 m and 0.5–1 m layers of berth sites also exceeded the NAGD sediment quality high value (CA 2009).

As sediments were sampled from 1–1.5 m at only two sites, the upper confidence limit could not be calculated due to the insufficient sample size. Metal concentrations at each site are individually compared against screening levels in Appendix F. All metal concentrations in the 1–1.5 m layers were below the Screening Levels.

The 95% upper confidence limits of the mean metal concentrations were below the EILs for all metals in the 0–0.5 m sediments at the berth except for nickel. The 95% upper confidence limits of the mean metal concentrations were below the EILs for all metals in the 0.5–1 m sediments at the berth except for copper and nickel. As sediments were sampled from 1–1.5 m at only two sites, the 95% upper confidence limits of the mean and mean was not calculated but individual values did not exceed the guideline and metal concentrations at each site are provided in Appendix F. The HIL criteria for metal concentrations were met in berth sediments at all depths (DEC 2010).

Table 6.5 Total metal concentrations in sediment for berth sites (mg/kg)

Metal	As	Cd	Cr[5]	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
NAGD screening level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
NAGD sediment quality high	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA assessment levels for soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
WA assessment levels for soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**
0–0.5 m (n=10) 95% UCL of the mean	6	0.2	9.56	78.3	**127.8**	46	43.4	0.01[1]
0.5–1 m (n=8) 95% UCL of the mean	4	n/a[3]	10.9	**163.7**[4]	**395.1**[4]	96	127.9	0.01
0–0.5 m (n=10) mean	3	0.1	8.5	30.8	67.5	31	21.5	0.01
0.5–1 m (n=8) mean	3	0.3	9.3	30.8	115.7	29	40.0	0.01

Notes:
1. Most samples were below the limit of reporting (0.01 mg/kg) for mercury
2. Exceedances of screening levels and sediment quality high values (CA 2009) are shown in blue and red. Exceedances of both the screening level and EIL are shown in bold blue and sediment quality high and EIL are shown in bold red
3. n/a = 95% UCL could not be calculated due to an insufficient number of distinct values
4. The 95% UCL value was actually higher than any individual sample result, due to a combination of few data points and considerable variance
5. EIL and HIL for Cr III has been provided as the results of elutriate analysis shows that all chromium concentrations were below reporting limits. Cr III is not soluble however Cr VI is. Cr III is the dominant form in marine sediments, unless considerable chromium contamination is present due to sources such as a tannery, electroplating industry or major discharge of primary treated sewage (CCME 1999). As no major source of Cr contamination is present at Esperance Port (also evident in total Cr results), the total chromium measured in sediments was compared to the Cr III EIL and HIL

Channel sites

The 95% upper confidence limits of the mean for all metals in the 0–0.5 m sediments of channel sites were below NAGD screening levels (CA 2009) (Table 6.6, Appendix F). As sediments were sampled from 0.5–1 m at only two sites and 1–1.5 m at only one site, the upper confidence limits could not be calculated due to the insufficient sample size. Metal concentrations at each site are individually compared against Screening Levels in Appendix F. All metal concentrations in the 0.5–1 m and 1–1.5 m layers were below the Screening Levels.

The 95% upper confidence limits of the mean of metal concentrations were below the EIL for all metals at all sediment depths at the channel sites. The HIL criteria for metal concentrations were met in channel sediments at all depths (DEC 2010).

Table 6.6 Total metal concentrations in sediment for channel sites (mg/kg)

Metal	As	Cd	Cr^3	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
NAGD screening level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
NAGD sediment quality high	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA assessment levels for soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
WA assessment levels for soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**
0–0.5 m (n=8) 95% UCL of the mean	2	0.1	8.0	3.3	15.1	10	5.2	n/a
0–0.5 m (n=8) mean	1	0.1	7.3	2.5	11.2	7	4.3	0.01

Notes:
1. Most samples were below the limit of reporting for mercury (0.01 mg/kg) and cadmium (0.1 mg/kg)
2. n/a = 95% UCL could not be calculated due to an insufficient number of distinct values however the Hg concentrations in all samples were below the screening level
3. EIL and HIL for Cr III has been provided as the results of elutriate analysis shows that all chromium concentrations were below reporting limits. Cr III is not soluble however Cr VI is. Cr III is the dominant form in marine sediments, unless considerable chromium contamination is present due to sources such as a tannery, electroplating industry or major discharge of primary treated sewage (CCME 1999). As no major source of Cr contamination is present at Esperance Port (also evident in total Cr results), the total chromium measured in sediments was compared to the Cr III EIL and HIL

6.2.2 Elutriate metals

The 99% species protection trigger values (ANZECC/ARMCANZ 2000) for water quality are likely to be applied if the dredge material is disposed to the offshore disposal site. If the dredge material is disposed to the EPSL reclamation area, return water will be discharged into marine waters adjacent to Port berths, which is likely to be considered an area of Moderate Ecological Protection under the present State approach, for which ANZECC/ARMCANZ (2000) guidelines for 90% species protection typically apply. As noted in Section 5.3.3, elutriate metals were analysed for six composite areas representative of likely patterns in contamination. Means are presented for samples that were made up of several sites and total values are presented where there was only one site.

Berth sites

The mean concentrations of all elutriate metals in the berth sediments except copper, nickel, lead and zinc were below the 99% species protection trigger value, and the mean copper, lead and zinc concentrations were below the 90% species protection trigger value, so met the required level of protection for disposal to EPSL's reclamation area with discharge to the Port (Table 6.7). The mean nickel concentration of berth sediments requires a 1.4-fold dilution to meet the required level of protection (90% Species Protection). This dilution will easily be achieved by mixing through the water column after return water discharge to Port waters, especially as the water to solids ratio in material pumped to the reclamation area is likely to be higher than the 4:1 mixture used in elutriate tests.

Table 6.7 Mean elutriate metal concentrations in sediment for berth sites (µg/L)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<0.5**	**<0.1**	**<0.2**	**<0.2**	**<0.3**	**<0.1**	**<1**	**<0.0001**
99% Trigger value	n/a	0.7	7.7	0.3	7	2.2	7	0.1
90% Trigger value	n/a	14	48.6	3	200	6.6	23	0.7
EP1A	8.6	0.2	<0.2	2.6	590	2.0	32	<0.0001
EP1B	9.2	0.6	<0.2	3	700	0.8	91	<0.0001
EP1C	7.1	<0.1	0.2	<0.2	34	<0.1	1	<0.0001
EP2-6A	4.3	<0.1	<0.2	0.3	587	9.8	7	<0.0001
EP2-6B	4.2	0.2	<0.2	0.9	780	10.0	13	<0.0001
EP7A	4.8	<0.1	<0.2	0.9	470	5.5	9	<0.0001
EP7B	6.5	0.2	<0.2	1.1	230	0.2	9	<0.0001
EP7C	5.3	0.2	0.2	0.8	59	0.3	10	<0.0001
EP10-13A	3.2	<0.1	<0.2	0.2	12	0.4	5	<0.0001
EP13B	1.6	<0.1	<0.2	<0.2	14	0.5	1	<0.0001
Mean	**5.5**	**0.2**	**0.1**	**1.0**	**348**	**3.0**	**18**	**0.0001**

Note:
1. Exceedances of the 99% species protection trigger value and the 90% species protection trigger value are shown in blue and red, respectively

Channel sites

As the total metal concentrations for channel sites were below Screening Levels there was no requirement to analyse elutriate metals. Elutriate metals were analysed and the results are provided in Appendix G.

6.2.3 Bioavailable metals

Dilute acid extraction of copper, lead and nickel was undertaken on those samples that exceeded the Screening Level only (Section 6.2.1). The bioavailable fractions of copper in both samples tested were below the NAGD Screening Level (CA 2009) (Table 6.8). All samples tested had bioavailable nickel fractions below the Screening Level, except for sample EP6B, which exceeded the Screening Level and sample EP1B, which exceeded the sediment quality high Value. All samples tested for bioavailable lead exceeded the Screening Level except for sample EP5A T1. All samples tested for copper, nickel and lead had values below the EIL and HIL.

Table 6.8 Dilute acid extractable metals (mg/kg)

Metal	Cu	Ni	Pb
Reporting Limit	**<0.2**	**<0.7**	**<1**
NAGD screening level	**65.0**	**21.0**	**50**
NAGD sediment quality high	**270**	**52**	**220**
WA assessment levels for soils: EIL	100	60	600
WA assessment levels for soils: HIL, Category F	**5,000**	**3,000**	**1,500**
EP1A	n/m	10	n/m
EP1B	13	56	n/m
EP2A	n/m	7	53
EP3B	n/m	4.1	n/m
EP4A	n/m	4	n/m
EP5A T1	n/m	3.6	11
EP5A T2	n/m	7.8	140
EP5A T3	n/m	4.2	68
EP5B	n/m	12	140
EP6A	n/m	20	100
EP6B	n/m	24	n/m
EP7A	n/m	6.7	n/m
EP10A	21	7.1	n/m
EP13B	n/m	4.1	n/m

Notes:
1. n/m = not measured because total metal concentration was below the screening level
2. Exceedances of Screening Levels and sediment quality high Values are shown in blue and red, respectively
3. There are no results for EP1C, EP2B, EP3A, EP4B, EP7B, EP7C, EP8A, EP9A, EP11A S1, EP11AS2, EP12A and EP13A as the sediment total metal concentrations did not exceed the NAGD Screening Levels (CA 2009)

6.3 Organics

6.3.1 Hydrocarbons

All sediment samples had PAH, TPH and BTEX concentrations below the reporting limits and below the relevant guidelines (Appendix I).

6.3.2 Tributyltin

Berth sites

The 95% upper confidence limits of the mean for normalised TBT for both the 0–0.5 m and 0.5–1 m sediments of berth sites were above the NAGD screening level and sediment quality high value (CA 2009) (Table 6.9, Appendix H). In the 0–0.5 m samples, the highest concentration of TBT was found at EP10A (2333.3 µg Sn/kg). EP12A had a concentration of 152.2 and all other sites had concentrations below the NAGD sediment quality high (CA 2009) with sites EP3A, EP4A, EP5A, EP6A and EP7A having concentrations below the NAGD screening level (CA 2009). In the 0.5–1 m layer, all samples were below the NAGD screening level except for EP2B (1000), EO6B (136.4) and EP13B (18.2).

As sediments were sampled from 1–1.5 m at only two sites, the upper confidence limit could not be calculated due to the insufficient sample size. TBT concentrations at each site are individually compared against the Screening Level in Appendix H. The TBT concentrations in all 1–1.5 m layers were below the NAGD screening level (CA 2009).

There are no EIL or HIL for TBT levels in the contaminated sites guidelines (DEC 2010).

Table 6.9 95% upper confidence limit (UCL) of the mean TBT concentrations in sediments for berth sites (µg Sn/kg)

	Tributyltin
Reporting Limit	**<0.5**
NAGD screening level	**9**
NAGD sediment quality high	**70**
0–0.5 m (n=10)	2,557
0.5–1 m (n=8)	1,370

Notes:
1. Exceedances of the NAGD sediment quality high value (CA 2009) are shown in red.
2. The 95% UCL value was actually higher than any individual sample result, which were 2333.3 and 1000 µg Sn/kg for the 0–0.5 m and 0.5–1 m depths, respectively, due to a combination of few data points and considerable variance in the data

Channel sites

The 95% upper confidence limit of the mean for TBT in the 0–0.5 m sediments of channel sites was above screening level, but below the sediment quality high value (Table 6.10, Appendix H). As sediments were sampled from 0.5–1 m at only two sites and 1–1.5 m at only one site, the upper confidence limits could not be calculated due to the insufficient sample size. TBT concentrations at each site are individually compared against the screening level in Appendix H. The TBT concentrations in all 0.5–1 m and 1–1.5 m samples were below the screening level.

There are no EIL or HIL for TBT levels in the contaminated sites guidelines (DEC 2010).

Table 6.10 95% upper confidence limit (UCL) of the mean TBT concentrations in sediments for channel sites (µg Sn/kg)

	Tributyltin
Reporting Limit	**<0.5**
NAGD screening level	**9**
NAGD sediment quality high	**70**
0–0.5 m (n=8)	18

Notes:
1. Exceedances of the NAGD screening level (CA 2009) are shown in blue.

6.3.3 Elutriate tributyltin

Berth sites

The mean concentration of elutriate TBT in the berth sediments exceeded the 99% species protection trigger value and the 90% species protection trigger value (Table 6.11). A 1.9-fold dilution is required to meet the required level of protection for disposal to EPSL's reclamation area (90% species protection). This dilution will easily be achieved by mixing through the water column after return water discharge to Port waters, especially as the water to solids ratio in material pumped to the reclamation area is likely to be higher than the 4:1 mixture used in elutriate tests .

There are no EIL or HIL for TBT elutriates in the contaminated sites guidelines (DEC 2010).

Table 6.11 Mean elutriate TBT concentrations in sediment for berth sites (µg/L)

	Tributyltin
Reporting Limit	**<0.002**
99% Trigger value	**0.0004**
90% Trigger value	**0.02**
EP1A	<0.002
EP1B	0.0039
EP1C	<0.002
EP2-6A	0.0047
EP2-6B	0.2600
EP7A	0.0600
EP7B	0.0037
EP7C	<0.002
EP8–9A	0.0061
EP10–13A	0.0740
EP13B	0.0071
Mean	**0.0384**

Note:
1. Exceedances of the 99% species protection trigger value and the 90% species protection trigger value are shown in blue and red, respectively

Channel sites

The mean concentration of elutriate TBT in the channel sediments exceeded the 99% species protection trigger value, which is likely to be applied if the dredge material is disposed to the offshore disposal site (Table 6.12). The mean elutriate TBT concentration meets the protection level required for disposal to the offshore disposal site after allowing for 4 hr of initial dilution (Table 6.13). Initial dilution was calculated for a dredge with a 2,500 m^3 hopper by assuming that the liquid and suspended particulate phases of the waste is evenly distributed after four hours over a water column bounded on the surface by the release zone and extending to a depth of 20 m (as described in the NAGD; CA 2009). The elutriate concentration after initial dilution was also calculated for a 5,000m^3 hopper (to ensure that worst-case had been considered) which resulted in the same initial dilution concentration (as the larger hopper extends over a greater surface area of the sea).

There are no EIL or HIL for TBT in the contaminated sites guidelines (DEC 2010).

Table 6.12 Mean elutriate TBT concentrations in sediment for channel sites (µg/L)

	Tributyltin
Reporting Limit	**<0.002**
99% Trigger value	**0.0004**
90% Trigger value	**0.02**
EP8–9A	0.0061
EP14–16A	0.0022
EP15B	<0.002
EP15C	<0.002
EP17–18A	0.0250
EP18B	<0.002
Mean	**0.0061**

Note:
1. Exceedances of the 99% species protection trigger value and the 90% species protection trigger value are shown in blue and red, respectively

Table 6.13 Elutriate TBT initial dilution calculations for the offshore disposal site

Elutriate TBT concentration in dredge slurry	
Elutriate ratio of solids to water	25%
Slurry ratio of solids to water	70%
Mean elutriate concentration	0.0061 µg/L
Elutriate TBT concentration in dredge slurry (a)	**0.0061 µg/L**
Elutriate TBT concentration after initial dilution	
Volume of slurry disposed every 4 hr	5,000 m^3
Volume of elutriate water disposed every 4 hr (b)	1,500 m3
Hopper capacity	2,5000 m^3
Depth of water column	20 m
Volume of the water column below the release zone (c)	66,667 m^3
Elutriate TBT concentration after initial dilution ($= a \times b/c$)	**0.00014 µg/L**
99% Trigger value	**0.00040 µg/L**

6.4 Acid sulfate soils

The in situ acidity of the sediments may be determined from pH_{KCl} values (Table 6.14). The pH_{KCl} values were greater than 6.5 for all samples analysed, indicating none of the samples exhibited actual acidity (Table 6.14). However, the sulfur values (%S (S_{CR})) of some samples taken exceeded the Action Criteria (0.03%; DEC 2011, taken from the Queensland Environmental Protection Agency) indicating that they are potential acid sulfate soils (PASS).

The net acidity indicates that some of the potential acidity will be buffered by alkaline components within the soils. This neutralising capacity includes the recommended safety factor (fineness factor = 1.5) when calculating neutralisation requirements (Ahern et al. 2004). All samples that had sulfur values above the Action Criteria exhibited sufficient neutralising capacity within the sediments to result in negative net acidity (Table 6.14). This indicates that any acid that may be produced during the dredging and disposal activity will be effectively neutralised by the in situ buffering capacity of the sediments. Results are presented in full in Appendix I.

Table 6.14 Acid base accounting results for core samples

Site	**pH_{kcl}**	**Potential sulfidic acidity**			**Acid neutralising capacity (ANC)**			**Net acidity**
		%S (S_{CR})	**Equivalent acidity (mol H+/tonne)**	**Existing acidity**	**ANCBT (%$CaCO_3$)**	**ANC (mol H+ /tonne)**	**Fineness factor**	**Net acidity (mol H+ /tonne)**
EP1A	9.7	0.07	43.66	None	10	1998	1.5	-1288.34
EP1B	9.5	0.13	81.08	None	11	2197.8	1.5	-1384.12
EP1C	9.8	0.01	6.24	None	n/m	n/m	1.5	n/m
EP2A	9.7	0.04	24.95	None	9.4	1878.12	1.5	-1227.13
EP2B	9.8	0.03	18.71	None	n/m	n/m	1.5	n/m
EP3A	9.8	0.02	12.47	None	n/m	n/m	1.5	n/m
EP3B	9.8	0.02	12.47	None	n/m	n/m	1.5	n/m
EP4A	9.8	0.01	6.24	None	n/m	n/m	1.5	n/m
EP4B	9.8	0.01	6.24	None	n/m	n/m	1.5	n/m
EP5A T1	9.7	0.02	12.47	None	n/m	n/m	1.5	n/m
EP5A T2	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP5A T3	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP5B	9.7	0.04	24.95	None	8.3	1658.34	1.5	-1080.61
EP6A	9.6	0.06	37.42	None	10	1998	1.5	-1294.58
EP6B	9.4	0.2	124.74	None	9	1798.2	1.5	-1074.06
EP7A	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP7B	9.8	0.01	6.24	None	n/m	n/m	1.5	n/m
EP7C	9.9	0.01	6.24	None	n/m	n/m	1.5	n/m
EP8A	9.8	0.02	12.47	None	n/m	n/m	1.5	n/m

Site	pH_{kcl}	Potential sulfidic acidity			Acid neutralising capacity (ANC)			Net acidity
		%S (S_{CR})	Equivalent acidity (mol H+/tonne)	Existing acidity	ANCBT (%$CaCO_3$)	ANC (mol H+ /tonne)	Fineness factor	Net acidity (mol H+ /tonne)
EP9A	9.7	0.02	12.47	None	n/m	n/m	1.5	n/m
EP10A	9.4	0.21	130.98	None	10	1998	1.5	-1201.02
EP11A S1	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP11A S2	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP12A	9.7	0.05	31.19	None	8.8	1758.24	1.5	-1140.98
EP13A	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP13B	9.6	0.09	56.13	None	11	2197.8	1.5	-1409.07
EP14A	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP15A T1	9.7	0.02	12.47	None	n/m	n/m	1.5	n/m
EP15A T2	9.7	0.03	18.71	None	n/m	n/m	1.5	n/m
EP15A T3	9.8	0.02	12.47	None	n/m	n/m	1.5	n/m
EP15B	9.8	0.05	31.19	None	9.8	1958.04	1.5	-1274.18
EP15C	9.7	0.16	99.79	None	7.9	1578.42	1.5	-952.49
EP16A	9.7	0.02	12.47	None	n/m	n/m	1.5	n/m
EP17A	9.7	0.01	6.24	None	n/m	n/m	1.5	n/m
EP18A	9.8	<0.01	<LoR	None	n/m	n/m	1.5	n/m
EP18B	9.8	<0.01	<LoR	None	n/m	n/m	1.5	n/m

Notes:
1. n/m = parameter not measured. ANC and Net Acidity were not measured for sites that did not exceed the Action Criteria for disturbance of >1000 tonnes of sediments (DEC 2011).
2. <LoR = below the laboratory limit of reporting

6.5 QA/QC

6.5.1 Field triplicate samples

Metals in sediments

The field triplicate samples from site EP5 had RSDs below the acceptable level of ±50% for all metals, except for chromium, copper and nickel (Table 6.15). These larger RSDs are due to higher concentrations of chromium, copper and nickel in sample EP5A T2 in comparison to samples EP5A T1 and EP5A T3 (Appendix F). These variations are likely due to small-scale spatial variation in sediment composition.

The field triplicate samples from site EP15 had RSDs below the acceptable level of ±50% for all metals, except for arsenic (Table 6.15). This high RSD was due to two of the replicates being below the LoR and the other replicate being above the LoR (Appendix F). As data below the LoR are given a value of LoR/2, this creates an artificially large difference between the sample concentration values.

Table 6.15 Relative Standard Deviation (RSD) (%) for metals from triplicate sites

Sample	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
EP5A	43	4	55	67	83	31	0	43
EP15A	69	0	5	15	35	24	7	0

Notes:
1. Data below LoR were assigned a value of LoR/2
2. Samples with RSD above the acceptable level of ±50% are shown in blue

Organics in sediments

All three replicates for all PAH species, all TPH species and BTEX were below the laboratory limit of reporting for sites EP5A and EP15A (Appendix I). Tributyltin concentrations at site EP15A had a RSD above the accepted 50% (Table 6.16). The difference was due to two of the three replicates having low concentrations of normalised TBT (3.75 µg/kg) and one replicate having a TBT concentration 12 times higher (9 µg/kg). Large small-scale spatial variability of TBT is common issue as "TBT may be present in paint flakes that may not be randomly distributed" (CA 2009). The overall results are therefore not considered unreliable despite the exceedence of the RSD of 50% for TBT.

Table 6.16 Relative Standard Deviation (RSD) (%) for normalised TBT from triplicate sites

Sample	TBT normalised to 1% TOC
EP5A	46
EP15A	136

Notes
1. Samples with RSD above the acceptable level of ±50% are shown in blue

Elutriates

The field triplicate samples from site EP2–6A and EP14–16A had RSDs below the acceptable level of ±50% for all metals (Table 6.17. All three replicates for elutriate mercury were below reporting limits.

Table 6.17 Relative Standard Deviation (RSD) (%) for elutriate metals from triplicate sites

Sample	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
EP2–6A	3	0	0	17	15	11	31	0
EP14-16A	6	0	0	17	15	18	22	0

The field triplicate sample from E2–6A had an RSD for elutriate TBT below the acceptable level of ±50%. The field triplicate sample from site EP14–16A had a RSD for elutriate TBT above the accepted 50%. The high RSD was largely an artefact of two of the replicates being below the LoR and the other replicate being above the LoR, as often occurs with TBT analysis due to sample inhomogeneity (TBT may be present in paint flakes that may not be randomly distributed; CA 2009). The overall results are therefore not considered unreliable despite the exceedence of the RSD of 50% for elutriate TBT.

Table 6.18 Relative Standard Deviation (RSD) (%) for elutriate TBT from triplicate sites

Sample	Elutriate TBT
EP2–6A	42.5
EP14–16A	95.7

6.5.2 Field split samples

Metals in sediments

RPDs were within the acceptable level of ±50% for all metals (Table 6.19). Inter-laboratory variation was considered acceptable.

Table 6.19 Relative Percentile Differences (RPD) (%) for metals from triplicate sites

Sample	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
EP11A	38	0	11	8	18	11	25	0

Organics in sediments

PAH, TPH and BTEX concentrations were below the LoR for all replicates of sample EP11A. The RPD for normalised TBT (Table 6.20) was within the acceptable level of ±50% and is therefore considered acceptable.

Table 6.20 Relative Percentile Difference (RPD) (%) for normalised TBT

Sample	TBT normalised to 1% TOC
EP11A	14

6.6 Rational for proposed approach to dredge spoil disposal

Contaminant concentrations in material from the channel indicate it is suitable for unconfined ocean disposal. The channel material is also suitable for disposal to the onshore disposal ground, which is EPSL's historical reclamation area.

Elutriate concentrations of TBT and nickel and bioavailable concentrations (by dilute acid extraction) of lead indicate that material adjacent to the berths may be unsuitable for unconfined ocean disposal. However, the contaminant concentrations indicate that the berth sediments are suitable for disposal to the onshore disposal area, with return water discharge into Port waters.

7. Key Potential Impacts

7.1 Assessment of risks

This section describes the potential impacts on relevant environmental factors. Each potential impact of the proposal was rated by likelihood of occurrence (Table 7.1) and consequence of impact (Table 7.2) to give an inherent risk (Table 7.3). Potential impacts of the proposal are presented in Table 7.4. A number of management measures are proposed to reduce the inherent risk and are presented in Table 7.4 and used to determine the residual risk. Most potential impacts were reduced to a low risk after implementation of management measures and no impacts were rated as high risk after management. Further detail is provided on the medium risks and some potential impacts with low risk in the following section. These risks are:

- turbidity and sedimentation
- mobilisation of contaminants
- acid sulfate soils
- hydrocarbon spills
- noise
- vessel movement
- threatened or migratory species
- introduced marine species
- waste management
- impacts to other users
- dust
- aesthetics of onshore disposal site
- exposure to contaminants.

Table 7.1 Risk assessment: likelihood table

Value	Descriptor	Description
1	Rare	Occurs only in exceptional circumstances
2	Unlikely	Could occur but not expected
3	Possible	Should occur at some time
4	Likely	Will probably occur in most circumstances
5	Almost Certain	Is expected to occur in most circumstances

Table 7.2 Risk assessment: consequence table

Value	Description	Natural Environment	Human Environment	Marine Fauna (individuals)
1	Insignificant	Negligible impact with no remediation required No alteration to ecosystems	Very minor disruption to small section of community Insignificant impacts on quality of life No community interest/concern	Behaviour, physiology, and well-being barely or weakly affected
2	Minor	Minor impacts with minimal remediation required Minor alteration to ecosystems Recovery period measured in weeks to months	Appearance of a threat but no actual harm Isolated short-term disruption to some communities Minor reductions in quality of life Limited community interest/concern Possible isolated local and individual concern	Behaviour, physiology, and well-being affected to a degree that minimally influences individual reproductive success
3	Moderate	Moderate impacts with some remediation required Moderate alteration to ecosystems Recovery period measured in months to years	Small number of minor illnesses Significant disruption to some communities Significant short-term or minor long-term reduction in quality of life Moderate community interest/concern and discussion but limited (if any) regional or state interest	Behaviour, physiology, and well-being affected to a degree that individual reproductive success is reduced
4	Major	Major impacts with considerable remediation required Major alteration to ecosystem Recovery period measured in years to decades	Small numbers of illnesses or loss of life Significant, widespread disruption to communities Significant long-term decline in quality of life Widespread community interest/concern - local and regional interest	Behaviour, physiology, and well-being substantially affected with reduction in individual reproductive success
5	Catastrophic	Massive impacts with significant remediation required Irreversible alteration to ecosystems Long term environmental recovery that may take decades or longer	Large numbers of illnesses or loss of life Severe and widespread disruption to communities Severe long-term reductions in quality of life State, national and potential international interest/concern	Behaviour, physiology, and well-being severely (or mortally) affected with individual reproductive success greatly reduced or ceased

Table 7.3 Risk matrix

Likelihood	Rare	Unlikely	Possible	Likely	Almost Certain
Insignificant	1	2	3	4	5
Minor	2	4	6	8	10
Moderate	3	6	9	12	15
Major	4	8	12	16	20
Catastrophic	5	10	15	20	25

Risk Severity	Low (1-4)	Medium (5-10)	High (11-25)

Table 7.4 Risk assessment for EPSL maintenance dredging proposal

Issue	Potential Impacts	Likelihood	Consequence	Inherent Risk Rating	Management measures [1]	Likelihood	Consequence	Residual Risk Rating
Biophysical								

Turbidity and sedimentation from dredging	• Light limitation to benthic flora
	• Smothering of benthic habitat
		4	2	8	• The dredging campaign is of very short duration (anticipated 4 weeks)
					• Any effects will be largely confined to waters within the Port:
					  • there will be no overflow during berth dredging which will reduce turbidity
					  • channel sediments have low fines content so turbidity from dredging and overflow will be minimal
						3	2	6

Turbidity and sedimentation from disposal at offshore disposal ground	• Light limitation to benthic flora • Smothering of benthic habitat	3	2	6	• As the disposal site is sandy substrate at a depth of 35 m there is no significant benthic habitat • The dredge will dump in a different area each trip and as the sediments is predominately sand with little silt or clay fractions the high settling velocity will result in suspended sediments clearing quickly	2	2	4

Issue	Potential Impacts	Likelihood	Consequence	Inherent Risk Rating	Management measures [1]	Likelihood	Consequence	Residual Risk Rating
Turbidity and sedimentation during disposal at onshore disposal ground	• Light limitation to benthic flora • Smothering of benthic habitat	2	2	4	• Dredge material will be pumped to the onshore disposal area • Pipes will be maintained to minimise risk of leakage of dredge material • Within the Port the benthic habitat is sand that has been dredged and no benthic flora is present	1	2	2
Turbidity and sedimentation from settling pond discharge	• Light limitation to benthic flora • Smothering of benthic habitat	4	2	8	• Settling pond will be constructed with internal containment bunds to increase settling time and therefore maximise sediment retention and minimise outflow • A weir box will be present at the discharge point so discharge will be able to be ceased or reduced if required • Discharge water will enter Port waters from the settling pond. There is no benthic habitat within the dredged areas of the Port	2	2	4
Mobilisation of contaminants during dredging	• Deteriorating water quality • Contamination of marine organisms	3	2	6	• Dredge will not overflow during dredging of berth sediments	2	2	4
Mobilisation of contaminants during disposal	• Deteriorating water quality • Contamination of marine organisms	4	2	8	• Berth sediments will be disposed of to land not sea • Sediments meet relevant environmental and health guidelines for their relevant disposal areas (berth sediments on land, channel sediments offshore) • Settling pond will be constructed with internal containment bunds to increase settling time and therefore maximise sediment retention and minimise outflow • Discharge water will enter Port waters from the settling pond. There is no benthic habitat within the dredged areas of the Port • Depth of chosen offshore disposal site results in dilutions that exceed those required	2	2	4
Acid sulfate soils	• Acidification of waters • Deoxygenation of the water column • Release of heavy metals	1	4	4	• Analysis showed that all samples that had sulfur values above the Action Criteria exhibited sufficient neutralising capacity to result in negative net acidity so no management measures are required	1	4	4
Hydrocarbon spill (dredge)	• Contamination of marine environment	4	3	12	• Dredge inspection conducted daily • Conduct scheduled maintenance • Follow refuelling, spill response and clean-up procedures • Ensure spill kits are appropriately located and stocked	2	2	4
Hydrocarbon spill (land based plant)	• Contamination of terrestrial environment • Contamination of marine environment	4	3	12	• Plant inspection conducted daily • Conduct scheduled maintenance • Follow refuelling, spill response and clean-up procedures • Ensure spill kits are appropriately located and stocked	2	2	4
Noise	• Disturbance of marine/terrestrial fauna	2	2	4	• The expected noise level from the dredge is within the frequency and range of background ship noise and below the estimated bandwidth for most marine mammals • Dredge and terrestrial plant will undertake scheduled servicing to ensure that noise levels are minimised	2	1	3
Vessel movement	• Collision with marine mammals	1	4	4	• The timing of the dredging will be chosen to avoid the key period of whale migration of July to November if possible • Monitoring measures will be implemented throughout the dredging programme to avoid potential impacts to large marine fauna during dredging as outlined in Section 8.4.1	1	4	4
Threatened or migratory species	• Significant impact of proposal on threatened or migratory species	1	4	4	• Dredging is not likely to result in a significant impact on threatened or migratory species as outlined in Table 7.5	1	4	4
Introduced marine species	• Introduction of marine pests	3	4	12	• Dredge contractor to confirm that vessel arrives to Port with non-fouled hulls, with adequate hopper washing and ballast water exchanges being performed in accordance with AQIS ballast water requirements • DoF will be notified prior to the dredge arrival of name, previous location, and most recent inspection date of the dredge vessel • Upon arrival, EPSL will coordinate a survey of the hull and onboard inspection for sediment to confirm the fulfilment of contract conditions. • Vessel inspection to be conducted prior to departure from Port of Esperance	1	3	3
Waste management	• Damage to fauna or flora	4	3	12	• Waste management will be implemented in accordance with contractor construction management plans • Segregation of wastes will occurs and wastes will be secured to avoid the potential for wind blown wastes entering the marine environment or terrestrial areas of the Port and surrounds	2	2	4

Issue	Potential Impacts	Likelihood	Consequence	Inherent Risk Rating	Management measures [1]	Likelihood	Consequence	Residual Risk Rating
Social								
Impacts to other users	• Restricted commercial values	4	2	8	• Interruption to shipping movements will be minimised and navigable waters improved on completion • Access to dredge and disposal sites will be controlled for safety reasons • All contaminant concentrations are below the HIL	3	1	3
Dust	• Reduced aesthetics and health of local community • Impacts on Port users	4	2	8	• EPSL will ensure dust emissions are reduced as low as possible during all construction works and operation of the Port • Maintenance coats of a dust binding agent will be applied to the temporary stockpile to prevent dust from being mobilised to the adjacent Power station air intakes and personnel • The road used for transport of soil to the temporary stockpile will be treated with a dust binding agent to reduce dust from truck movements	2	2	4
Turbidity	• Reduced aesthetics and recreational values	4	2	8	• Dredging is occurring within the Port area which is not a favoured recreational area • Community liaison will be undertaken so that they are aware of the dredging	4	1	4
Aesthetics of onshore disposal site	• Reduced aesthetics	3	2	6	• Settling pond is within the industrial area of the Port • On completion of dredging or after use of dredged material for reclamation the settling pond and temporary stockpiles will be returned to the design level of the reclamation area	2	1	3
Exposure to contaminants in dredge material	• Reduced health of local community	2	3	6	• Settling pond is within the industrial area of the Port • Dredge material will be capped with a minimum 1 m depth of previous reclamation fill material that will be stockpiled during dredging • As the reclamation area is in the Port public access is restricted • Dredging of the berth areas will be without overflow reducing the risk of mobilising contaminants • All contaminant concentrations are below relevant health investigation levels	1	3	3
Noise	• Reduced aesthetics and health of local community	3	2	6	• Dredging is taking place within an operating Port and noise levels will be similar to those from current shipping • Dredge and terrestrial plant will undertake scheduled servicing to ensure that noise levels are minimised	2	2	4

Notes
1. DoF: Department of Fisheries
2. EPSL: Esperance Ports, Sea & Land
3. AQIS: Australian Quarantine Inspection Service

7.2 Turbidity and sedimentation

7.2.1 Dredging site

Minimal turbidity during dredging is expected, due to:

- the rapid intake velocity at the dredge head
- the predominantly sandy nature of material to be dredged in the channel (representing 51,500 m^3 of the 63,500 m^3 of sediments to be dredged)
- the predominantly sandy nature of berth sediments, and although their fines content is higher than channel sediments they will also be dredged with no overflow.

It is therefore expected that elevated turbidity will be limited to within and near the Port, while high settling velocities (Section 6.1.2) indicate it will also be transitory.

The main vegetated habitat adjacent to the Port is *Posidonia sinuosa* seagrass meadows (Section 4.3), but these are not expected to experience adverse effects due to the turbidity created by the proposed maintenance dredging. Shading studies have shown that *Posidonia sinuosa* can survive beyond 206 days where there is a 91% reduction in incident light at the canopy (Collier 2006). Potential impacts on seagrass meadows adjacent to the Port are therefore unlikely due to both the limited degree of turbidity expected and the very short duration of the maintenance dredging campaign (4 weeks).

It is noted that seagrass meadows adjacent to the Port have previously tolerated the much larger capital dredging event in 2001 (1,800,000 m^3 of sediment). It is further noted that the Department of Transport carries out maintenance dredging of a similar magnitude to that proposed in this document (~60,000 m^3) in nearby Bandy Creek (see Figure 4.1) every 2–3 years, and turbidity-related impacts on seagrasses in Esperance Bay have been negligible (BMT JFA 2012).

7.2.2 Disposal site

Onshore disposal

There is no significant benthic habitat within the dredged areas of the Port. Dredge material will be pumped to the settlement pond through pipes that will be maintained to minimise risk of leakage of dredge material. The settling pond will be constructed with internal containment bunds to increase settling time and therefore maximise sediment retention and minimise outflow. A weir box will be present at the discharge point so discharge will be able to be ceased or reduced if required. As noted in Section 7.2.1 the berth sediments consist mainly of fine to medium grained sands with very little clay or silt fraction. Discharge water will enter Port waters from the settling pond.

Offshore disposal

The channel sediments to be disposed at the offshore disposal site are composed largely of fine to medium grained sands (Section 6.1.1) that should generate little turbidity during dumping, while high settling velocities (Section 6.1.2) indicate any turbidity will also be transitory. For all of the sediments sampled for offshore disposal more than 50% of the material would settle through 1 m of water column in less than 1 minute. The time taken for 90% of the sediments to settle through 1 m of water column varied from 1 minute to 37 minutes. For all sediments, except those at site EP11, more than 90% of the material would settle through 1 m of the water column in less than 10 minutes.

Turbidity generated at the disposal site has the potential to impact the benthic habitat through light limitation or smothering. Significant impacts at the disposal site due to light limitation or smothering are, however, not expected, as the depth is 35 m and benthic habitat consists largely of bare sand and wrack with only sparse, isolated patches of *Halophila* spp. and *Posidonia coriacea*. These seagrasses are colonising species that do not form dense meadows at the depth of the disposal site (i.e. 35 m). The sparse seagrass present at the disposal site has recolonised the area following previous dredge programs and it is anticipated that a similar degree of natural re-colonisation will occur following the proposed dredging.

7.3 Mobilisation of contaminants

7.3.1 Metals

Berth dredging and onshore disposal

Comparison to relevant guidelines indicates the berth sediments will be suitable for onshore disposal in the Port (Sections 6.2). Concentrations of total metals met all relevant HIL and all EIL except for nickel and copper; however, bioavailable nickel and copper did meet the EIL and it is further noted that EIL are intended for application in urban areas (DEC 2010), not industrial premises (i.e. Port land).

Elutriate data for metals (Section 6.2.2) indicated that the water quality guidelines that typically apply to Port waters (ANZECC/ARMCANZ (2000) 90% species protection guidelines) would be met before any dilution (most metals) or would require only minimal dilution to meet the guidelines (1.4-fold dilution for nickel). As a result, any discharge of return water from the onshore disposal area into Port waters is expected to meet relevant water quality guidelines.

Due to the results above, the berth material is considered suitable for onshore disposal. Dredge material will also be capped with a minimum 1 m depth of previous reclamation fill material that will be stockpiled during dredging.

Minimal release of sediment into the water column surrounding the dredge is expected due to the rapid intake velocity at the dredge head. There will be no overflow during berth dredging which will reduce the risk of mobilisation of contaminants.

Channel dredging and offshore disposal

The 95% UCL mean concentrations for all metals in all channel sediments were below the NAGD screening level (CA 2009). Minimal release of sediment into the water column surrounding the dredge is expected due to the rapid intake velocity at the dredge head. The channel sediments are considered suitable for ocean disposal.

7.3.2 Organics

All sediment samples had PAH, TPH and BTEX concentrations below the relevant guidelines. TBT results are discussed further below.

Berth dredging and onshore disposal

The 95% UCL mean concentrations for TBT in the berth sediments exceeded the NAGD sediment quality high value (CA 2009) in the 0–0.5 m and the 0.5–1 m sediments. All samples from the 1–1.5 m sediments were below the screening level for TBT. Subsequent elutriate testing of these sediments showed that all samples, except for EP1A, EP1B and EP7C which were below the limit of reporting, exceeded the ANZECC/ARMCANZ (2000) trigger value for 99% species protection (expected to be applicable for ocean disposal). Three samples also exceeded the trigger value for 90% species protection (expected to be applicable for onshore disposal adjacent to the harbour). The mean elutriate TBT concentration for berth sites requires a 1.9-fold dilution to meet the trigger value for 90% species protection. This dilution will easily be achieved by mixing through the water column after return water discharge to Port waters. As such the berth sediments are considered suitable for onshore disposal. Dredge material will also be capped with a minimum 1 m depth of previous reclamation fill material that will be stockpiled during dredging.

Minimal release of sediment into the water column surrounding the dredge is expected due to the rapid intake velocity at the dredge head. There will be no overflow during dredging of berth sediments, which will reduce the risk of mobilisation of contaminants.

Offshore disposal

TBT concentrations in channel sediments exceeded the NAGD sediment screening levels (CA 2009) in the 0–0.5 m sediments, but all samples from the 0.5–1 m and 1–1.5 m sediments were below the screening level. Subsequent elutriate testing showed that these sediments were below the ANZECC/ARMCANZ (2000) Trigger Value for 99% Species Protection (expected to be applicable for ocean disposal) after the allowed level of initial dilution at the 35 m deep disposal site. (CA 2009) Therefore, there is not expected to be any impacts to organisms at the disposal site from TBT. The mean elutriate TBT concentration of channel site sediments is below the 90% trigger level applied to the Port area so overflow will be permitted during dredging of the channel.

7.4 Acid sulfate soils

This dredging operation is unlikely to generate actual acid sulfate soils (AASS) at the dredging site or disposal sites due to the low net acidity and high acid neutralising capacity (ANC) of the sediments. The seawater in the harbour will provide further neutralising if required. Analysis of sediment samples showed that the in situ pH were all greater than 9, indicating that the sediments are not actually acidic (Section 7.3.2). Eleven of the 36 samples indicated a limited potential acidity (%S ranged from 0.04 to 0.21), but in all instances the acid neutralising capacity was more than sufficient to neutralise this acidity.

7.5 Hydrocarbons

Release of hydrocarbons has the potential to impact on the environment. Hydrocarbons will be used throughout the proposed dredging and disposal. Potential sources of hydrocarbon release include hydraulic spills, refuelling spills, release of contaminated bilge waters, grease and spills resulting from incorrect storage and handling.

The risk of hydrocarbon spills will be managed by:

- daily onshore plant and dredge inspections
- scheduled maintenance of onshore plant and dredge
- adherence to refuelling, spill response and clean up procedures
- spill kits with appropriate stock and location.

7.6 Noise

A key potential risk of the maintenance dredging to large marine fauna (whales, cetaceans, pinnipeds and sharks) is underwater noise from the dredge causing temporary or permanent harm. Noise from cutter suction dredges has been found to be of low to moderate frequency (around 100 Hz) with some tonal noise, and an acoustic intensity of around 180 dB re 1µPa at 1 m (SKM 2009). Noise levels from a trailer suction hopper dredge would likely be equal or lower than that of a cutter suction dredge. These noise levels are within the frequency and intensity range of ambient background ship noise (approximately 5–100 Hz and 177 dB re 1µPa m^{-1} respectively) (SKM 2009), and below the estimated auditory bandwidth for the majority of marine mammals (Southall et al. 2007).

Impacts to terrestrial fauna are unlikely as the area is an operating Port and the proposed works will not result in significantly increased noise levels.

Scheduled servicing will be undertaken on dredge and terrestrial plant to ensure that noise is minimised. Landside operations will be subject to EPSL's DEC Regulation 17 Noise Approvals.

7.7 Vessel movement

A key potential risk of the maintenance dredging to large marine fauna (whales, pinnipeds and sharks) is dredge collision with an animal (vessel strikes).

Southern right whales and humpback whales are generally sighted in the waters near Esperance between July and November. The timing of the dredging will be chosen to avoid this period if possible, but if unavoidable, there may be potential for interaction between the dredging operation and migrating whales. In general, the risk of collisions is low, as the dredge vessel will be operating at slower speeds than regular shipping traffic, the dredge will only cross the whale migration route when travelling to and from the offshore disposal site and whales and other species are likely to move away from the dredge plant. The expected duration of maintenance dredging is also very brief (4 weeks).

Monitoring measures will be implemented throughout the dredging program to avoid potential impacts to large marine fauna during dredging (Section 8.1).

7.8 Threatened and migratory species

Approval under the EPBC Act is required if a proposal is likely to have a 'significant impact' on a matter of national environmental significance (NES). A 'significant impact' is an impact that is 'important, notable or of consequence' (DEWHA 2009). Whether an action is likely to have a significant impact is dependent on the sensitivity, value and quality of the environment and the intensity, duration, magnitude and geographic extent of the impacts.

The matters of NES relevant to the Port of Esperance maintenance dredging is the presence of threatened and migratory marine fauna (Section 4.4) in the surrounding area. Consideration of the significant impact criteria with regard to the Port of Esperance maintenance dredging (Table 7.5) indicates that the dredging is not likely to result in a significant impact on threatened or migratory species.

Table 7.5 Significant impact criteria for threatened and migratory marine fauna

Significant Impact Criteria[1]	Risk	Notes
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population	None	Short-term operation No direct interaction with marine fauna anticipated Monitoring program in place
Reduce the area of occupancy of the species	Low	Maintenance of existing infrastructure Short-term operation Very small footprint
Fragment an existing population into two or more populations	None	Maintenance of existing infrastructure Short-term operation
Adversely affect habitat critical to the survival of a species	None	Maintenance of existing infrastructure Short-term operation Very small footprint
Disrupt the breeding cycle of a population	Low	Short-term operation
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	None	Maintenance of existing infrastructure Short-term operation Very small footprint
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Low	Introduced marine pests monitoring measures
Introduce disease that may cause the species to decline	Low	Introduced marine pests monitoring measures
Interfere with the recovery of the species	None	Short-term operation
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		

Significant Impact Criteria[1]	Risk	Notes
Lead to a long term decrease in the size of an important population of a species	None	Short-term operation No direct interaction with marine fauna anticipated Monitoring program in place
Reduce the area of occupancy of an important population	Low	Maintenance of existing infrastructure Short-term operation Very small footprint
Fragment an existing important population into two or more populations	None	Maintenance of existing infrastructure Short-term operation
Adversely affect habitat critical to the survival of a species	None	Maintenance of existing infrastructure Short-term operation Very small footprint
Disrupt the breeding cycle of an important population	Low	Short-term operation;
Modify, destroy, remove or isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	None	Maintenance of existing infrastructure Short-term operation Very small footprint
Result in invasive species that are harmful to a vulnerable species becoming estabilished in the vulnerable species' habitat	Low	Introduced marine pests monitoring measures
Introduce disease that may cause the species to decline	Low	Introduced marine pests monitoring measures
Interfere substantially with the recovery of the species	None	Short-term operation
An action is likely to have a significant impact on migratory species if there is a real chance or possibility that it will:		
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrolocial cycles), destroy or isolate an area of important habitat for migratory species	None	Maintenance of existing infrastructure Short-term operation Very small footprint
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	Low	Introduced marine pests monitoring measures
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behavior) or an ecologically significant proportion of the population of a migratory species	Low	Short-term operation No direct interaction with marine fauna anticipated Monitoring program in place

Source: DEWHA (2009)

The Port of Esperance maintenance dredging program is small-scale and of short duration. Significant impacts on listed threatened or migratory species are unlikely as:

- There is a low likelihood of encountering whales and other large marine fauna because the dredge vessel will be operating at slower speeds than regular shipping traffic, the dredge will only cross the whale migration route when travelling to and from the offshore disposal site and whales and other species are likely to move away from the dredge plant. The expected duration of maintenance dredging is also very brief (4 weeks). The dredge vessel will be travelling at very slow speeds, so the risk of vessel strikes is low.
- Noise generated from dredging will be low-level (within the background limits of shipping disturbance).
- Throughout previous similar and larger scale dredging campaigns for EPSL, as well as day-to-day shipping movements, there have not been any reported impacts upon marine fauna.
- A marine fauna monitoring and management (including exclusion zones) program will be adopted to ensure any threatened or migratory protected marine fauna are not impacted by vessel strike or marine noise during the proposed dredging (Section 8.4).

7.9 Introduced marine species

A key risk of dredging programs is the introduction of marine species on dredging vessels. Introduced marine species are marine plants or animals that are not native to Australia but have been introduced by human activities such as shipping (CA 2013a). They have the potential to significantly impact marine industries and the environment. Australia has over 250 introduced marine species, most remain relatively harmless but some have become aggressive pests. These species have had significant impacts on marine ecosystems and marine industries.

The primary ways that foreign marine species are introduced are through ballast water[3] and biofouling[4]. It is anticipated that the dredge vessel will be travelling from another location within Western Australian state waters prior to arriving in the Port. Details on management of marine pests are provided in Section 8.5.

7.10 Waste management

Release of waste material can adversely impact on the environment. Wastes requiring management include solid wastes, hazardous wastes and sewage and grey water.

Waste management will be implemented in accordance with contractor construction management plans. Segregation of wastes will occur and wastes will be secured to avoid the potential for wind blown wastes entering the marine environment or terrestrial areas of the Port and surrounds.

7.11 Impacts to other users

The Port of Esperance is a regional port that handles bulk, solid and liquid cargoes. Navigable access to and from this Port, is critical to ensure the ongoing operation of this industry. It is anticipated that the negative impacts on users will be minor as:

- interruption to shipping movements will be minimised during dredging and navigable waters will be greatly improved on completion
- access to the dredging and disposal sites will be controlled for safety reasons
- all contaminant concentrations fall below the Health Investigation Levels for dredge material so there are no health concerns to the public.

7.12 Dust

Dust can adversely impact on the social and biological values of the environment. It is anticipated that dust impacts will be minor as the following management measures will be in place:

- EPSL will ensure dust emissions are reduced as low as possible during all construction works and operation of the Port.
- Maintenance coats of a dust binding agent will be applied to the temporary stockpile to prevent dust from being mobilised to the adjacent Power station air intakes and personnel.
- The road used for transport of soil to the temporary stockpile will treated with a dust binding agent to reduce dust from truck movements.

[3] *Ballast water refers to water that a ship takes on board at a port before commencing a voyage in order to provide stability in unladen ships, with marine organisms taken on board as well.*

[4] *Biofouling refers to the attachment of biological material (microorganisms, plants, algae and animals) on submerged structures such as ships hulls and internal areas.*

7.13 Principles of environmental protection

This proposal has been developed with consideration of the principles of environmental protection as outlined in Table 7.6.

Table 7.6 Principles of environmental protection and their application to the proposal

Principle (EPA 2004)	Application to Proposal
1. **The precautionary principle**: Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by a) Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and b) An assessment of the risk – weighted consequences of various options.	The need for the proposal has been clearly demonstrated as Cape vessels are no longer able to leave Berth 3 fully laden. The potential impacts on the environment during dredging are minimal. The potential impacts on the environment during operations are well understood from existing operations
2. **The principle of intergenerational equity**: The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	The proposal seeks to minimise impacts to marine water quality, marine fauna and benthic habitats
3. **The principle of the conservation of biological diversity and ecological integrity**: Conservation of biological diversity and ecological integrity should be a fundamental consideration.	The proposal seeks to minimise impacts to marine water quality, marine fauna and benthic habitats and ensures that a high level of ecological protection will be achieved outside the Port area
4. **Principles relating to improved valuation, pricing and incentive integrity**: a) Environmental factors should be included in the valuation of assets and services. b) The polluter pays principles– those who generate pollution and waste should bear the cost of containment, avoidance and abatement. c) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. d) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.	EPSL bears the costs associated with this proposal
5. **The principle of waste minimisation**: All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Any wastes produced by the proposal will be managed through a contractor construction management plan including segregation and appropriate disposal of waste relevant to material type

8. Environmental Monitoring

8.1 Overview

No major environmental impacts from this dredging operation are anticipated and monitoring for this proposal focuses on the key potential impacts that were outlined in Section 7. Management of potential impacts was summarised in Table 7.4 and detailed in Section 7.

8.2 Turbidity

Although impacts due to turbidity are expected to be minimal, daily visual plume monitoring will be conducted at the dredging site to confirm that turbidity is as expected. If excessive turbidity is present over adjacent seagrass meadows (sufficient to visually obscure the nearest adjacent edge of the seagrass meadows, marked by buoys) continuously for over a week, then dredge practices will be altered to alleviate this. No monitoring of seagrass meadows is proposed because the dredging program is too short for impacts to be detected even under conditions of heavy shading (Collier 2006).

8.3 Return water monitoring

Return water monitoring will be undertaken for the contaminants that exceeded guideline values (TBT, nickel, copper, lead and zinc). The levels of contaminants in the return water are not expected to be an issue as the 90% trigger level will be met with minimal dilution. Sampling of the return water for analysis of the contaminants of concern will be undertaken to confirm that the ANZECC/ARMCANZ (2000) trigger levels are not exceeded.

Three samples of return water shall be taken from the settlement pond prior to first overflow. The water samples shall be kept cool (not frozen) and couriered to the laboratory as soon as possible. Results shall be compared against the ANZECC/ARMCANZ (2000) 90% species protection trigger values for marine water. As this dredging program is of short duration, it is likely that the results of the analysis will not be able to be used to inform management of return waters for this dredging campaign. Analysis will be carried out as quickly as possible and if results are received while dredging is taking place these will be used to inform management. The results shall be documented in the close-out report and may be used to inform further dredging programs.

8.4 Marine fauna

These monitoring and management guidelines have been developed to avoid, reduce or mitigate any potential impacts to whales as a result of dredging operations during the maintenance dredging of Port of Esperance. Observations will also be made of other protected marine fauna (e.g. sea lions, seals, dolphins and sharks) during the monitoring programme to inform future dredging operations.

The management guidelines have been developed with reference to DEWHA (2008) *EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales*. However, it should be noted the proposed monitoring and management has been adapted from this policy statement. The policy document has been developed for seismic explorations that generate more noise than dredging, which is similar to the noise of background shipping. A level of conservatism has been adopted and the dredging has been assumed to be an elevated acoustic disturbance due to an absence of noise modelling or measurements of noise generated by the dredge vessel. The plan and measures employed are based on the likelihood of encountering a whale protected by the EPBC Act during the proposed works.

Modifications to the recommendations in the DEWHA (2008) policy statement have been adopted due to the low level of noise generated by the dredge vessel in relation to background shipping noise; the low likelihood of encountering whales (the dredge will only cross the whale migration route when travelling to and from the offshore disposal site) and the inability for a trailer suction hopper dredge to operate at 'low power' or turn off engines. The dredge vessel requires the engine to be running to navigate safely.

Several EPBC listed marine species (sharks, dolphins, turtles and sea lions) may be present in the vicinity of the dredge and disposal area. These species are smaller than whales and able to change direction more quickly in order to avoid impacts. As such the risk from impact during dredging and disposal activities is considered low and sightings of these species will not trigger a delay in dredging.

8.4.1 Whale impact avoidance

Pre-dredging procedures

- Visual observations for the presence of whales are to be undertaken by a suitably trained observer (Section 8.4.2) for at least 5 min before the commencement of dredge suction. This may include the time when drag heads are lowered to the seabed, as the noise generated during this process is similar to background shipping traffic.
- Visual observations will be conducted from the bridge using binoculars in the direction that the dredge will be travelling.
- Dredging may only commence if no whales have been sighted within 300 m (the exclusion zone) during the observation period.
- If any whales are observed within the exclusion zone, dredging may not commence until the animal is observed to leave the exclusion zone, until 20 min of observations have passed since the last sighting or until the dredge moves at least 300 m away from the whale.

Start-up dredging procedures

- Start-up procedures should be used each time dredging is initiated with the dredge suction turned on only after the pre-start up procedure has been followed. The noise of the vessel engine steaming to the site will provide a ramp-up of the acoustic source, which may alert whales in the area to the presence of the dredging and enable animals to move and avoid (or stand off) at distances where injury is unlikely.
- If any whales are spotted within, or are about to enter, the exclusion zone, the dredge vessel should navigate away from the fauna (as the engine cannot be shut down completely for navigation safety); and
- Start-up procedures should only resume after the animal is observed to leave the exclusion zone, until 20 min of observations have passed since the last sighting or until the dredge moves at least 300 m away from the marine fauna.

Dredging procedures

- During dredging, a trained observer will undertake regular visual observations. As a minimum, one observer should scan the exclusion zone for at least 5 min at 1-hour intervals.
- If any whales are spotted within, or are about to enter, the exclusion zone, the dredge vessel should navigate away from the whales (as the engine cannot be shut down completely for navigation safety)
- Dredging should only resume after the animal is observed to leave the exclusion zone, until 20 min of observations have passed since the last sighting or until the dredge moves at least 300 m away from the marine fauna.
- The dredge vessel can navigate at least 300 m away from the marine fauna and continue dredging in a new exclusion zone.

Travelling procedures

- Visual observations will be undertaken during the period of steaming to the dredge location, during dumping and when the dredge is returning to the dredge area.
- When the dredge is travelling, visual observations will be conducted from the bridge using binoculars in the direction that the dredge is be travelling.
- If any protected marine fauna are spotted within, or are about to enter, the 300 m exclusion zone, the dredge vessel should navigate away from the fauna (as the engine cannot be shut down completely for navigation safety);
- Travelling procedures should only resume after the animal is observed to leave the exclusion zone, until 20 min of observations have passed since the last sighting or until the dredge moves at least 300 m away from the marine fauna.

Dumping procedures

- Prior to offshore disposal, the crew will make general observation of the waters around the barge for 10 min. If any whales are sighted within 500 m of the barge, disposal will not commence until the whale has moved beyond 500 m or has not been sighted for 10 min. This 10-min observation period may commence while the dredge is travelling to the disposal area.

Night time and low visibility procedure

Dredging and disposal may take place at night or during low visibility if:

- There have not been three or more whale instigated shut downs during the preceding 24 hours.
- If operations were not underway in the preceding 24 hours, the vessel has been in the vicinity (approximately 10 km) of the proposed start up position for at least 2 hours within the preceding 24-hour period and no whales have been sighted.
- During low visibility, where conditions allow, continuous observations should be maintained with focus on the exclusion zone.

If whales are detected stop work procedures should apply.

8.4.2 Trained observers

EPSL will ensure that there are sufficient trained observers to satisfy the basic requirements outlined above. The trained observers will be briefed prior to the commencement of dredging by a person with proven experience in marine fauna observation, distance estimation and reporting.

A briefing will be provided to all observers on environmental matters, protected marine fauna identification and the environmental legal obligations for companies operating in Australian waters. Appropriate reference materials, visual aids and reporting materials will be provided to the trained observers to assist reporting any protected marine fauna sighted.

8.5 Introduced marine pests

It is anticipated that the dredge vessel will be travelling from another location within Western Australian state waters prior to arriving in the Port.

EPSL will confirm with the contractor that the dredge arrives with non-fouled hulls, with adequate hopper washing and ballast water exchanges being performed in accordance with the Australian Quarantine Inspection Services (AQIS) ballast water management requirements prior to arrival in Port of Esperance. EPSL shall ensure that a vessel inspection is conducted prior to departure from Port of Esperance. The dredge contractor will have all relevant documentation in order to meet AQIS requirements.

The Department of Fisheries (DoF) will be notified prior to dredge arrival of the name; previous location; and most recent inspection date of the dredge vessel.

Upon arrival, EPSL will coordinate a survey of the hull and onboard inspection for sediment to confirm the fulfilment of contract conditions. Following the IMO Ballast Water Protocols and AQIS's Mandatory Ballast Water Requirements it is unlikely that there will be a significant increase in the risk of introductions.

EPSL will notify the DoF and the AQIS if any introduced marine pests are observed.

8.6 Reporting

Reporting will be undertaken in compliance with the requirements of approval documents. A close out report will be prepared follow completion of the proposal. This report will include:

- return water analysis
- marine fauna monitoring results
- documentation of introduced marine species checks
- bathymetric survey results.

9. Stakeholder consultation

Consultation has been undertaken with the Port Consultative Committee, which included representatives from:

- Esperance Regional Tourism Association
- Parents of Esperance Active for Child Health
- Local Environmental Action Forum
- Locals for Esperance Development
- Esperance Office of DEC
- Lessees CBH

EPSL presented details on the maintenance dredging proposal based on the EIA document and there were no questions asked by Port Consultative Committee members.

The Esperance Power Station has been consulted with due to the proximity of the stockpile to their operations and they had no objections but requested to be informed of when the dredging works will occur.

10. References

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Appendix A

OEPA Section 38(1) referral form

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

EPA REFERRAL FORM PROPONENT

Referral of a Proposal by the Proponent to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986*.

PURPOSE OF THIS FORM

Section 38(1) of the *Environmental Protection Act 1986* (EP Act) provides that where a development proposal is likely to have a significant effect on the environment, a proponent may refer the proposal to the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a proponent.

Proponents are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes] before completing this form.

A referral under section 38(1) of the EP Act by a proponent to the EPA must be made on this form. A request to the EPA for a declaration under section 39B (derived proposal) must be made on this form. This form will be treated as a referral provided all information required by Part A has been included and all information requested by Part B has been provided to the extent that it is pertinent to the proposal being referred. Referral documents are to be submitted in two formats – hard copy and electronic copy. The electronic copy of the referral will be provided for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

CHECKLIST

Before you submit this form, please check that you have:

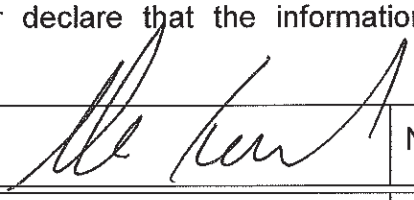
	Yes	No
Completed all the questions in Part A (essential).	✓	
Completed all applicable questions in Part B.	✓	
Included Attachment 1 – location maps.	✓	
Included Attachment 2 – additional document(s) the proponent wishes to provide (if applicable).	✓	
Included Attachment 3 – confidential information (if applicable).		✓
Enclosed an electronic copy of all referral information, including spatial data and contextual mapping but excluding confidential information.	✓	

Following a review of the information presented in this form, please consider the following question (a response is optional).

Do you consider the proposal requires formal environmental impact assessment?		
☐ Yes	✓ No	☐ Not sure
If yes, what level of assessment?		
☐ Assessment on Proponent Information		☐ Public Environmental Review

PROPONENT DECLARATION (to be completed by the proponent)

I, Alex Leonard, *(full name)* declare that I am authorised on behalf of...Esperance Ports Sea & Land (being the person responsible for the proposal) to submit this form and further declare that the information contained in this form is true and not misleading.

Signature 	Name (print): Alex Leonard
Position: Environmental Manager	Company: Esperance Ports Sea & Land
Date 05/04/13	

PART A - PROPONENT AND PROPOSAL INFORMATION
(All fields of Part A must be completed for this document to be treated as a referral)

1 PROPONENT AND PROPOSAL INFORMATION

1.1 Proponent

Name	Esperance Ports Sea and Land (EPSL)
Joint Venture parties (if applicable)	n/a
Australian Company Number (if applicable)	042 152 171
Postal Address (where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State)	PO Box 35 Esperance WA 6450
Key proponent contact for the proposal: • name • address • phone • email	Alex Leonard The Esplanade Esperance WA 6450 9072-3388 aleonard@epsl.com.au
Consultant for the proposal (if applicable): • name • address • phone • email	Oceanica Consulting 353 Cambridge Street, Wembley WA 6014 6272 0000 sarah.scott@oceanica.com.au

1.2 Proposal

Title	Port of Esperance 2013 Maintenance Dredging
Description	Maintenance dredging in the Port of Esperance to return the bathymetry to design depth, with disposal of most sediments to a offshore disposal site and some sediments to an onshore disposal area.
Extent (area) of proposed ground disturbance.	Approximately 10 ha in a 55 ha footprint
Timeframe in which the activity or development is proposed to occur (including start and finish dates where applicable).	The dredging is planned to occur in 2013. The exact timing has not yet been determined as EPSL is hoping to opportunistically secure a dredge that is in transit past Port waters, to reduce mobilisation costs. The dredging is anticipated to take approximately 4 weeks; however, approval will be sought for an 8 week window to allow for contingencies.
Details of any staging of the proposal.	n/a
Is the proposal a strategic proposal?	No

Is the proponent requesting a declaration that the proposal is a derived proposal? If so, provide the following information on the strategic assessment within which the referred proposal was identified: • title of the strategic assessment; and • Ministerial Statement number.	No
Please indicate whether, and in what way, the proposal is related to other proposals in the region.	This proposal is not related to any other projects in the region.
Does the proponent own the land on which the proposal is to be established? If not, what other arrangements have been established to access the land?	Yes. The Port Authority owns ~ 83 ha of land adjacent to the inner harbour area. The majority of the land is vested by the Esperance Town Planning Scheme in the Port Authority and is zoned "Railway and Port Installation".
What is the current land use on the property, and the extent (area in hectares) of the property?	The property is 83 ha and current land use is 'Railway and Port installation'.

1.3 Location

Name of the Shire in which the proposal is located.	Shire of Esperance
For urban areas: • street address; • lot number; • suburb; and • nearest road intersection.	• The Esplanade Esperance WA 6450 • R28207 (land component), P038819 2194 (marine component) • Esperance • Smith Street and Harbour Road
For remote localities: • nearest town; and • distance and direction from that town to the proposal site.	n/a
Electronic copy of spatial data - GIS or CAD, geo-referenced and conforming to the following parameters: • GIS: polygons representing all activities and named; • CAD: simple closed polygons representing all activities and named; • datum: GDA94; • projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA); • format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD.	Enclosed?: Yes

1.4 Confidential Information

Does the proponent wish to request the EPA to allow any part of the referral information to be treated as confidential?	No
If yes, is confidential information attached as a separate document in hard copy?	No

1.5 Government Approvals

Is rezoning of any land required before the proposal can be implemented? If yes, please provide details.		No. Land is zoned Railway and Port Installation.	
Is approval required from any Commonwealth or State Government agency or Local Authority for any part of the proposal? If yes, please complete the table below.		Yes	
Agency/Authority	Approval required	Application lodged Yes / No	Agency/Local Authority contact(s) for proposal
DSEWPaC	Sea Dumping Permit	Yes	Michael Ward

DSEWPaC	EPBC Approval	Yes	

PART B - ENVIRONMENTAL IMPACTS AND PROPOSED MANAGEMENT

2. ENVIRONMENTAL IMPACTS

Describe the impacts of the proposal on the following elements of the environment, by answering the questions contained in Sections 2.1-2.11:

2.1 flora and vegetation;

2.2 fauna;

2.3 rivers, creeks, wetlands and estuaries;

2.4 significant areas and/ or land features;

2.5 coastal zone areas;

2.6 marine areas and biota;

2.7 water supply and drainage catchments;

2.8 pollution;

2.9 greenhouse gas emissions;

2.10 contamination; and

2.11 social surroundings.

These features should be shown on the site plan, where appropriate.

For all information, please indicate:

(a) the source of the information; and

(b) the currency of the information.

2.1 Flora and Vegetation

2.1.1 Do you propose to clear any native flora and vegetation as a part of this proposal?

[A proposal to clear native vegetation may require a clearing permit under Part V of the EP Act (Environmental Protection (Clearing of Native Vegetation) Regulations 2004)]. Please contact the Department of Environment and Conservation (DEC) for more information.

(please tick) ☐ Yes **If yes**, complete the rest of this section.

✓ No **If no**, go to the next section

2.1.2 How much vegetation are you proposing to clear (in hectares)?

2.1.3 Have you submitted an application to clear native vegetation to the DEC (unless you are exempt from such a requirement)?

☐ Yes ☐ No **If yes**, on what date and to which office was the application submitted of the DEC?

2.1.4 Are you aware of any recent flora surveys carried out over the area to be disturbed by this proposal?

☐ Yes ☐ No

If yes, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

If no, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

2.1.5 Has a search of DEC records for known occurrences of rare or priority flora or threatened ecological communities been conducted for the site?

☐ Yes ☐ No

If you are proposing to clear native vegetation for any part of your proposal, a search of DEC records of known occurrences of rare or priority flora and threatened ecological communities will be required. Please contact DEC for more information.

2.1.6 Are there any known occurrences of rare or priority flora or threatened ecological communities on the site?

☐ Yes ☐ No

If yes, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

2.1.7 If located within the Perth Metropolitan Region, is the proposed development within or adjacent to a listed Bush Forever Site? (You will need to contact the Bush Forever Office, at the Department for Planning and Infrastructure)

☐ Yes ☐ No

If yes, please indicate which Bush Forever Site is affected (site number and name of site where appropriate).

2.1.8 What is the condition of the vegetation at the site?

2.2 Fauna

2.2.1 Do you expect that any fauna or fauna habitat will be impacted by the proposal?

(please tick) ✓ Yes **If yes**, complete the rest of this section.

☐ No **If no**, go to the next section.

2.2.2 Describe the nature and extent of the expected impact.

Refer Sections 7.6 to 7.8 of the attached EIA document which documents potential impacts of the proposal.

2.2.3 Are you aware of any recent fauna surveys carried out over the area to be disturbed by this proposal?

☐ Yes ✓ No

If yes, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

If no, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

2.2.4 Has a search of DEC records for known occurrences of Specially Protected (threatened) fauna been conducted for the site?

✓ Yes ☐ No (please tick)

See attachment 1 – NatureMap report.

2.2.5 Are there any known occurrences of Specially Protected (threatened) fauna on the site?

✓ Yes ☐ No

If yes, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

A NatureMap search was undertaken and identified one Priority 1 fauna species, *Geotria australis* or the pouched lamprey, in the vicinity of the project area. Pouched lamprey adults spawn in fresh water and live in muddy burrows in the upper reaches of coastal streams before migrating downstream to the ocean before returning to breed in freshwater (Bray et al 2011). As the proposal is not taking place near the outlet of a stream and is a current operating port it is unlikely that there will be any impact on the pouched lamprey.

Dianne J. Bray & Martin F. Gomon, 2011, Pouch Lamprey, *Geotria australis*, in Fishes of Australia, accessed 11 Mar 2013, http://www.fishesofaustralia.net.au/home/species/3415

An EPBC search of the project area was also undertaken and listed threatened and migratory marine species are outlined in Section 3.4 of the attached EIA. The proposal has been referred to the Department of Sustainability, Environment, Water, Populations and Communities for assessment of 'Listed threatened species and communities' under the *Environmental Protection and Biodiversity Conservation Act 1999.*

2.3 Rivers, Creeks, Wetlands and Estuaries

2.3.1 Will the development occur within 200 metres of a river, creek, wetland or estuary?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

✓ No **If no**, go to the next section.

2.3.2 Will the development result in the clearing of vegetation within the 200 metre zone?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.3 Will the development result in the filling or excavation of a river, creek, wetland or estuary?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.4 Will the development result in the impoundment of a river, creek, wetland or estuary?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.5 Will the development result in draining to a river, creek, wetland or estuary?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.6 Are you aware if the proposal will impact on a river, creek, wetland or estuary (or its buffer) within one of the following categories? (please tick)

Conservation Category Wetland	☐ Yes	☐ No	☐ Unsure
Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998	☐ Yes	☐ No	☐ Unsure
Perth's Bush Forever site	☐ Yes	☐ No	☐ Unsure
Environmental Protection (Swan & Canning Rivers) Policy 1998	☐ Yes	☐ No	☐ Unsure
The management area as defined in s4(1) of the *Swan River Trust Act 1988*	☐ Yes	☐ No	☐ Unsure
Which is subject to an international agreement, because of the importance of the wetland for waterbirds and waterbird habitats (e.g. Ramsar, JAMBA, CAMBA)	☐ Yes	☐ No	☐ Unsure

2.4 Significant Areas and/ or Land Features

2.4.1 Is the proposed development located within or adjacent to an existing or proposed National Park or Nature Reserve?

☐ Yes ✓ No **If yes**, please provide details.

2.4.2 Are you aware of any Environmentally Sensitive Areas (as declared by the Minister under section 51B of the EP Act) that will be impacted by the proposed development?

☐ Yes ✓ No **If yes**, please provide details.

2.4.3 Are you aware of any significant natural land features (e.g. caves, ranges etc) that will be impacted by the proposed development?

☐ Yes ✓ No **If yes**, please provide details.

2.5 Coastal Zone Areas (Coastal Dunes and Beaches)

2.5.1 Will the development occur within 300 metres of a coastal area?

(please tick) ✓Yes **If yes**, complete the rest of this section.

☐ No **If no**, go to the next section.

2.5.2 What is the expected setback of the development from the high tide level and from the primary dune?

The proposal is maintenance dredging so setback is not applicable.

2.5.3 Will the development impact on coastal areas with significant landforms including beach ridge plain, cuspate headland, coastal dunes or karst?

☐ Yes ✓No **If yes**, please describe the extent of the expected impact.

2.5.4 Is the development likely to impact on mangroves?

☐ Yes ✓ No **If yes**, please describe the extent of the expected impact.

2.6 Marine Areas and Biota

2.6.1 Is the development likely to impact on an area of sensitive benthic communities, such as seagrasses, coral reefs or mangroves?

☐ Yes ✓ No **If yes**, please describe the extent of the expected impact.

There are no coral reefs or mangroves in the vicinity of the proposal. See Section 4.3 of the attached EIA for details on benthic habitats and communities.

2.6.2 Is the development likely to impact on marine conservation reserves or areas recommended for reservation (as described in *A Representative Marine Reserve System for Western Australia*, CALM, 1994)?

☐ Yes ✓ No **If yes**, please describe the extent of the expected impact.

Closest candidate area is the Recherche Archipelago which is 15km from the project area.

2.6.3 Is the development likely to impact on marine areas used extensively for recreation or for commercial fishing activities?

☐ Yes ✓ No **If yes**, please describe the extent of the expected impact, and provide any written advice from relevant agencies (e.g. Fisheries WA).

2.7 Water Supply and Drainage Catchments

2.7.1 Are you in a proclaimed or proposed groundwater or surface water protection area?

(You may need to contact the Department of Water (DoW) for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

☐ Yes ✓ No **If yes**, please describe what category of area.

2.7.2 Are you in an existing or proposed Underground Water Supply and Pollution Control area?

(You may need to contact the DoW for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

☐ Yes ✓ No **If yes**, please describe what category of area.

2.7.3 Are you in a Public Drinking Water Supply Area (PDWSA)?

(You may need to contact the DoW for more information or refer to the DoW website. A proposal to clear vegetation within a PDWSA requires approval from DoW.)

☐ Yes ✓ No **If yes**, please describe what category of area.

2.7.4 Is there sufficient water available for the proposal?

(Please consult with the DoW as to whether approvals are required to source water as you propose. Where necessary, please provide a letter of intent from the DoW)

✓Yes ☐ No (please tick)

2.7.5 Will the proposal require drainage of the land?

☐ Yes ✓ No **If yes**, how is the site to be drained and will the drainage be connected to an existing Local Authority or Water Corporation drainage system? Please provide details.

2.7.6 Is there a water requirement for the construction and/ or operation of this proposal?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

✓ No **If no**, go to the next section.

2.7.7 What is the water requirement for the construction and operation of this proposal, in kilolitres per year? n/a

2.7.8 What is the proposed source of water for the proposal? (e.g. dam, bore, surface water etc.) n/a

2.8 Pollution

2.8.1 Is there likely to be any discharge of pollutants from this development, such as noise, vibration, gaseous emissions, dust, liquid effluent, solid waste or other pollutants?

(please tick) ✓ Yes **If yes**, complete the rest of this section.

☐ No **If no**, go to the next section.

2.8.2 Is the proposal a prescribed premise, under the Environmental Protection Regulations 1987?

(Refer to the EPA's *General Guide for Referral of Proposals to the EPA under section 38(1) of the EP Act 1986* for more information)

✓ Yes ☐ No **If yes**, please describe what category of prescribed premise.

Category 58: Bulk material loading and unloading, and Category 82: Boat building and maintenance.

2.8.3 Will the proposal result in gaseous emissions to air?

☐ Yes ✓ No **If yes**, please briefly describe.

2.8.4 Have you done any modelling or analysis to demonstrate that air quality standards will be met, including consideration of cumulative impacts from other emission sources?

☐ Yes ✓ No **If yes**, please briefly describe.

2.8.5 Will the proposal result in liquid effluent discharge?

✓ Yes ☐ No **If yes**, please briefly describe the nature, concentrations and receiving environment.

Refer to 'Section 6: Nature of the material to be dredged' in the attached EIA document

2.8.6 If there is likely to be discharges to a watercourse or marine environment, has any analysis been done to demonstrate that the State Water Quality Management Strategy or other appropriate standards will be able to be met?

✓ Yes ☐ No **If yes**, please describe.

Refer to 'Section 6: Nature of the material to be dredged' in the attached EIA document

2.8.7 Will the proposal produce or result in solid wastes?

✓ Yes ☐ No **If yes**, please briefly describe the nature, concentrations and disposal location/ method.

Refer to 'Section 6: Nature of the material to be dredged' in the attached EIA document

2.8.8 Will the proposal result in significant off-site noise emissions?

☐ Yes ✓ No **If yes**, please briefly describe.

2.8.9 Will the development be subject to the Environmental Protection (Noise) Regulations 1997?

✓ Yes ☐ No **If yes**, has any analysis been carried out to demonstrate that the proposal will comply with the Regulations?

Please attach the analysis.

EPSL activities are subject to the Port of Esperance Noise Approvals (2009) under Regulation 17 of the Noise Regulations (1997). These approvals grant EPSL more generous noise limits on account of doing all that is practicable to reduce noise emissions. The noise approvals would exclude waterside dredging operations that are outside the berth pockets, but would include landside activities.

2.8.10 Does the proposal have the potential to generate off-site, air quality impacts, dust, odour or another pollutant that may affect the amenity of residents and other "sensitive premises" such as schools and hospitals (proposals in this category may include intensive agriculture, aquaculture, marinas, mines and quarries etc.)?

✓ Yes ☐ No **If yes**, please describe and provide the distance to residences and other "sensitive premises".

The temporary stockpile will require maintenance coats of a dust binding agent to prevent dust from being mobilised to adjacent power station air intakes and personnel. The unsealed road will be treated with a dust binding agent. The power station is located within the Port boundaries. See section 7.12 of the EIA.

2.8.11 If the proposal has a residential component or involves "sensitive premises", is it located near a land use that may discharge a pollutant?

☐ Yes ☐ No ✓Not Applicable

If yes, please describe and provide the distance to the potential pollution source

2.9 Greenhouse Gas Emissions

2.9.1 Is this proposal likely to result in substantial greenhouse gas emissions (greater than 100 000 tonnes per annum of carbon dioxide equivalent emissions)?

☐ Yes ✓ No **If yes**, please provide an estimate of the annual gross emissions in absolute and in carbon dioxide equivalent figures.

2.9.2 Further, if yes, please describe proposed measures to minimise emissions, and any sink enhancement actions proposed to offset emissions. n/a

2.10 Contamination

2.10.1 Has the property on which the proposal is to be located been used in the past for activities which may have caused soil or groundwater contamination?

✓ Yes ☐ No ☐ Unsure **If yes**, please describe.

The harbour sediments have historically been contaminated due to the operational use of the Port.

2.10.2 Has any assessment been done for soil or groundwater contamination on the site?

✓ Yes ☐ No **If yes**, please describe.

Refer to 'Section 6: Nature of the material to be dredged' of the attached EIA document

2.10.3 Has the site been registered as a contaminated site under the *Contaminated Sites Act 2003*? (on finalisation of the CS Regulations and proclamation of the CS Act)

☐ Yes ✓ No **If yes**, please describe.

Due to elevated lead levels in sediments of the inner harbour, the area was reported (with other areas within Esperance Port) to the DEC as a potentially contaminated site in May 2007. In 2010, Oceanica completed its risk assessment finding 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. As the contaminated sediments were restricted to a small area and only minimal toxicity was found, which did not appear to be correlated to lead contaminations, the risks to the marine environment were considered to be minor and not sufficient to warrant remediation of the area. DEC has yet to classify any of the area in the Port reported as potentially contaminated.

2.11 Social Surroundings

2.11.1 Is the proposal on a property which contains or is near a site of Aboriginal ethnographic or archaeological significance that may be disturbed?

☐ Yes ✓ No ☐ Unsure **If yes**, please describe.

Aboriginal heritage sites search was undertaken see Attachment 2.

2.11.2 Is the proposal on a property which contains or is near a site of high public interest (e.g. a major recreation area or natural scenic feature)?

☐ Yes ✓ No **If yes**, please describe.

2.11.3 Will the proposal result in or require substantial transport of goods, which may affect the amenity of the local area?

☐ Yes ✓ No **If yes**, please describe.

3. PROPOSED MANAGEMENT

3.1 Principles of Environmental Protection

3.1.1 Have you considered how your project gives attention to the following Principles, as set out in section 4A of the EP Act? (For information on the Principles of Environmental Protection, please see EPA Position Statement No. 7, available on the EPA website)

1. The precautionary principle.	✓ Yes	☐ No
2. The principle of intergenerational equity.	✓ Yes	☐ No
3. The principle of the conservation of biological diversity and ecological integrity.	✓ Yes	☐ No
4. Principles relating to improved valuation, pricing and incentive mechanisms.	✓ Yes	☐ No
5. The principle of waste minimisation.	✓ Yes	☐ No

See Section 7.13 of the attached EIA.

3.1.2 Is the proposal consistent with the EPA's Environmental Protection Bulletins/Position Statements and Environmental Assessment Guidelines/Guidance Statements (available on the EPA website)?

✓ Yes ☐ No

3.2 Consultation

3.2.1 Has public consultation taken place (such as with other government agencies, community groups or neighbours), or is it intended that consultation shall take place?

✓ Yes ☐ No **If yes**, please list those consulted and attach comments or summarise response on a separate sheet.

See Section 9 of the attached EIA

Consultation has been undertaken with the Port Consultative Committee, which included representatives from:

- Esperance Regional Tourism Association
- Parents of Esperance Active for Child Health
- Local Environmental Action Forum
- Locals for Esperance Development
- Esperance Office of DEC
- Lessees CBH

EPSL presented details on the maintenance dredging proposal based on the EIA document and there were no questions asked by Port Consultative Committee members.

The Esperance Power Station has been consulted with due to the proximity of the stockpile to their operations and they had no objections but requested to be informed of when the dredging works will occur.

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 06/03/2013

Current Names Only Yes
Core Datasets Only Yes
Method 'By Polygon'
Group By Conservation Status

Conservation Status	Species	Records
Priority 1	2	4
Priority 3	1	1
Priority 4	1	1
Non-conservation taxon	166	280
TOTAL	**170**	**286**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Priority 1					
1.	32145	*Banksia prolata subsp. calcicola*		P1	
2.	34030	*Geotria australis (Pouched Lamprey)*		P1	
Priority 3					
3.	6804	*Pityrodia chrysocalyx*		P3	
Priority 4					
4.	19661	*Eucalyptus x missilis*		P4	
Non-conservation taxon					
5.	3262	*Acacia cochlearis (Rigid Wattle)*			
6.	3296	*Acacia dermatophylla*			
7.	3453	*Acacia myrtifolia*			
8.	3457	*Acacia nigricans*			
9.	3498	*Acacia pritzeliana*			
10.	30032	*Acacia saligna subsp. saligna*			
11.	3564	*Acacia subcaerulea*			
12.	-16999	*Acanthopagrus butcheri*			
13.	6295	*Acrotriche cordata (Coast Ground Berry)*			
14.	-14418	*Agaue similis*			
15.	-15364	*Aldrichetta forsteri*			
16.	-16923	*Allomycterus pilatus*			
17.	-16684	*Ammotretis elongatus*			
18.	126	*Amphibolis antarctica (Sea Nymph)*			
19.	-15452	*Aracana aurita*			
20.	-18348	*Aracana ornata*			
21.	7838	*Arctotheca calendula (Cape Weed)*	Y		
22.	-18764	*Asymbolus vincenti*			
23.	-18763	*Aulopus purpurissatus*			
24.	1832	*Banksia media (Southern Plains Banksia)*			
25.	32143	*Banksia prolata*			
26.	5386	*Beaufortia interstans*			
27.	3154	*Billardiera coriacea*			
28.	25798	*Billardiera fusiformis (Australian Bluebell)*			
29.	4441	*Boronia spathulata (Boronia)*			
30.	3716	*Bossiaea preissii*			
31.	-15635	*Brachaluteres jacksonianus*			
32.	2995	*Brassica napus*	Y		
33.	3000	*Brassica tournefortii (Mediterranean Turnip)*	Y		
34.	1580	*Caladenia cairnsiana (Zebra Orchid)*			
35.	1594	*Caladenia graminifolia*			
36.	15353	*Caladenia heberleana*			
37.	15362	*Caladenia longicauda subsp. crassa*			
38.	13860	*Caladenia longicauda subsp. rigidula*			
39.	1589	*Caladenia x ericksoniae*			
40.	93	*Callitris drummondii (Drummond's Cypress Pine)*			
41.	96	*Callitris preissii (Rottnest Island Pine)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
42.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
43.	25454	*Canis lupus*			
44.	-17194	*Capropygia unistriata*			
45.	-15517	*Carcharhinus brachyurus*			
46.	11242	*Cassytha racemosa forma pilosa*			
47.	35322	*Centranthus ruber subsp. ruber*	Y		
48.	5489	*Chamelaucium axillare (Esperance Waxflower)*			
49.	5491	*Chamelaucium ciliatum*			
50.	13108	*Chorizema obtusifolium*			
51.	24980	*Christinus marmoratus (Marbled Gecko)*			
52.	10804	*Clematis linearifolia*			
53.	2929	*Clematis pubescens (Common Clematis)*			
54.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
55.	25049	*Ctenotus labillardieri*			
56.	2779	*Cypselocarpus haloragoides*			
57.	5510	*Darwinia diosmoides*			
58.	5533	*Darwinia vestita (Pom-pom Darwinia)*			
59.	26739	*Dasya extensa*			
60.	24052	*Delphinus delphis (Common Dolphin)*			
61.	-19357	*Diodon sp.*			
62.	12941	*Diuris conspicillata*			
63.	33159	*Diuris immaculata*			Y
64.	1634	*Diuris laxiflora (Bee Orchid)*			
65.	4757	*Dodonaea ceratocarpa*			
66.	26823	*Erythroclonium sonderi*			
67.	-15461	*Eubalichthys mosaicus*			
68.	5550	*Eucalyptus angulosa (Ridge-fruited Mallee)*			
69.	5600	*Eucalyptus conglobata (Port Lincoln Mallee)*			
70.	12870	*Eucalyptus densa*			
71.	12377	*Eucalyptus extensa*			
72.	5648	*Eucalyptus flocktoniae (Merrit)*			
73.	5713	*Eucalyptus micranthera (Alexander River Mallee)*			
74.	12891	*Eucalyptus phaenophylla subsp. interjacens*			
75.	18551	*Eucalyptus platypus subsp. platypus*			
76.	5796	*Eucalyptus uncinata (Hook-leaved Mallee)*			
77.	18085	*Eucalyptus utilis*			
78.	8587	*Eucalyptus x erythrandra*			
79.	4648	*Euphorbia terracina (Geraldton Carnation Weed)*	Y		
80.	20214	*Eutaxia myrtifolia*			
81.	11044	*Gastrolobium heterophyllum*			
82.	16311	*Gazania linearis*	Y		
83.	-16561	*Gonorynchus greyi*			
84.	7503	*Goodenia decursiva*			
85.	7537	*Goodenia pterigosperma*			
86.	24056	*Grampus griseus (Risso's Dolphin)*			
87.	1991	*Grevillea disjuncta*			
88.	2139	*Hakea cinerea (Ashy Hakea)*			
89.	2141	*Hakea clavata (Coastal Hakea)*			
90.	12227	*Hakea drupacea*			
91.	2187	*Hakea nitida (Frog Hakea)*			
92.	13335	*Hakea obliqua subsp. obliqua*			
93.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
94.	161	*Halophila australis*			
95.	25117	*Hemiergis peronii subsp. peronii*			
96.	6234	*Hydrocotyle medicaginoides (Trefoil Pennywort)*			
97.	3992	*Isotropis cuneifolia (Granny Bonnets)*			
98.	-16993	*Kathetostoma laeve*			
99.	4044	*Kennedia prostrata (Scarlet Runner)*			
100.	24070	*Kogia breviceps (Pygmy Sperm Whale)*			
101.	25638	*Larus pacificus (Pacific Gull)*			
102.	5030	*Lasiopetalum discolor*			
103.	-16789	*Lepidoblennius marmoratus*			
104.	-15572	*Leptoichthys fistularius*			
105.	5856	*Leptospermum sericeum (Silver Teatree)*			
106.	40940	*Leucopogon obovatus subsp. obovatus*			
107.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
108.	6507	*Logania fasciculata*			
109.	6515	*Logania vaginalis (White Spray)*			
110.	1224	*Lomandra collina (Pale Mat Rush)*			
111.	1241	*Lomandra rigida (Stiff Mat Rush)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
112.	6968	*Lycium ferocissimum (African Boxthorn)*	Y		
113.	34736	*Lysinema pentapetalum*			
114.	-16008	*Makaira sp.*			Y
115.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
116.	15603	*Melaleuca fulgens subsp. fulgens*			
117.	11686	*Melaleuca pentagona var. latifolia*			
118.	15993	*Melaleuca pentagona var. pentagona*			
119.	-15469	*Muraenichthys breviceps*			
120.	24223	*Mus musculus (House Mouse)*	Y		
121.	27092	*Myriodesma tuberosum*			
122.	7348	*Opercularia hispidula (Hispid Stinkweed)*			
123.	18256	*Opercularia spermacocea*			
124.	24665	*Phalacrocorax fuscescens (Black-faced Cormorant)*			
125.	-17621	*Phycodurus eques subsp. glauerti*			Y
126.	4685	*Phyllanthus scaber*			
127.	-18103	*Phyllopteryx taeniolatus*			
128.	5241	*Pimelea drummondii*			
129.	-18293	*Platycephalus speculator*			
130.	6249	*Platysace compressa (Tapeworm Plant)*			
131.	4818	*Pomaderris myrtilloides*			
132.	108	*Posidonia robertsoniae*			
133.	-15543	*Pseudocaranx dentex*			
134.	-16324	*Pseudolabrus parilus*			
135.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
136.	-16888	*Pseudophycis breviuscula*			
137.	10998	*Pterostylis turfosa (Bird Orchid)*			
138.	28286	*Pultenaea heterochila*			
139.	4185	*Pultenaea strobilifera*			
140.	3061	*Raphanus raphanistrum (Wild Radish)*	Y		
141.	3063	*Rapistrum rugosum (Turnip Weed)*	Y		
142.	24243	*Rattus fuscipes (Western Bush Rat)*			
143.	24245	*Rattus rattus (Black Rat)*	Y		
144.	6928	*Salvia reflexa (Mintweed)*	Y		
145.	-17902	*Scobinichthys granulatus*			
146.	-15356	*Scomber australasicus*			
147.	-17349	*Scomberomorus semifasciatus*			
148.	-15604	*Sillago bassensis*			
149.	-18400	*Siphonognathus argyrophanes*			
150.	-15491	*Siphonognathus radiatus*			
151.	4828	*Spyridium globulosum (Basket Bush)*			
152.	1315	*Stawellia gymnocephala*			
153.	7758	*Stylidium macranthum (Crab Claws)*			
154.	7775	*Stylidium pilosum (Silky Triggerplant)*			
155.	7794	*Stylidium rupestre (Rock Triggerplant)*			
156.	20134	*Taxandria marginata*			
157.	4256	*Templetonia retusa (Cockies Tongues)*			
158.	-15738	*Threpterius maculosus*			
159.	6280	*Trachymene pilosa (Native Parsnip)*			
160.	33276	*Triglochin isingiana*			
161.	146	*Triglochin minutissima*			
162.	15757	*Trymalium spatulatum*			
163.	24069	*Tursiops truncatus (Bottlenose Dolphin)*			
164.	-16662	*Upeneichthys lineatus*			
165.	6096	*Verticordia minutiflora*			
166.	12470	*Verticordia vicinella*			
167.	24206	*Vespadelus regulus (Southern Forest Bat)*			
168.	6939	*Westringia dampieri*			
169.	-17933	*Zeus faber*			
170.	4387	*Zygophyllum billardierei (Coast Twinleaf)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Aboriginal Heritage Inquiry System

Aboriginal Sites Database

Search Criteria

0 sites in a search box. The box is formed by these diagonally opposed corner points:

MGA Zone 51	
Northing	Easting
6250396	397775
6252846	402456

Disclaimer

Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

Copyright

Legend

Restriction

N	No restriction
M	Male access only
F	Female access

Access

C	Closed
O	Open
V	Vulnerable

Coordinate Accuracy

Accuracy is shown as a code in brackets following the site coordinates.

[Reliable]	The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
[Unreliable]	The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

Status

L - Lodged		ACMC Decision Made
Information lodged, awaiting assessment	→	R - Registered Site I - Insufficient information S - Stored Data

Spatial Accuracy

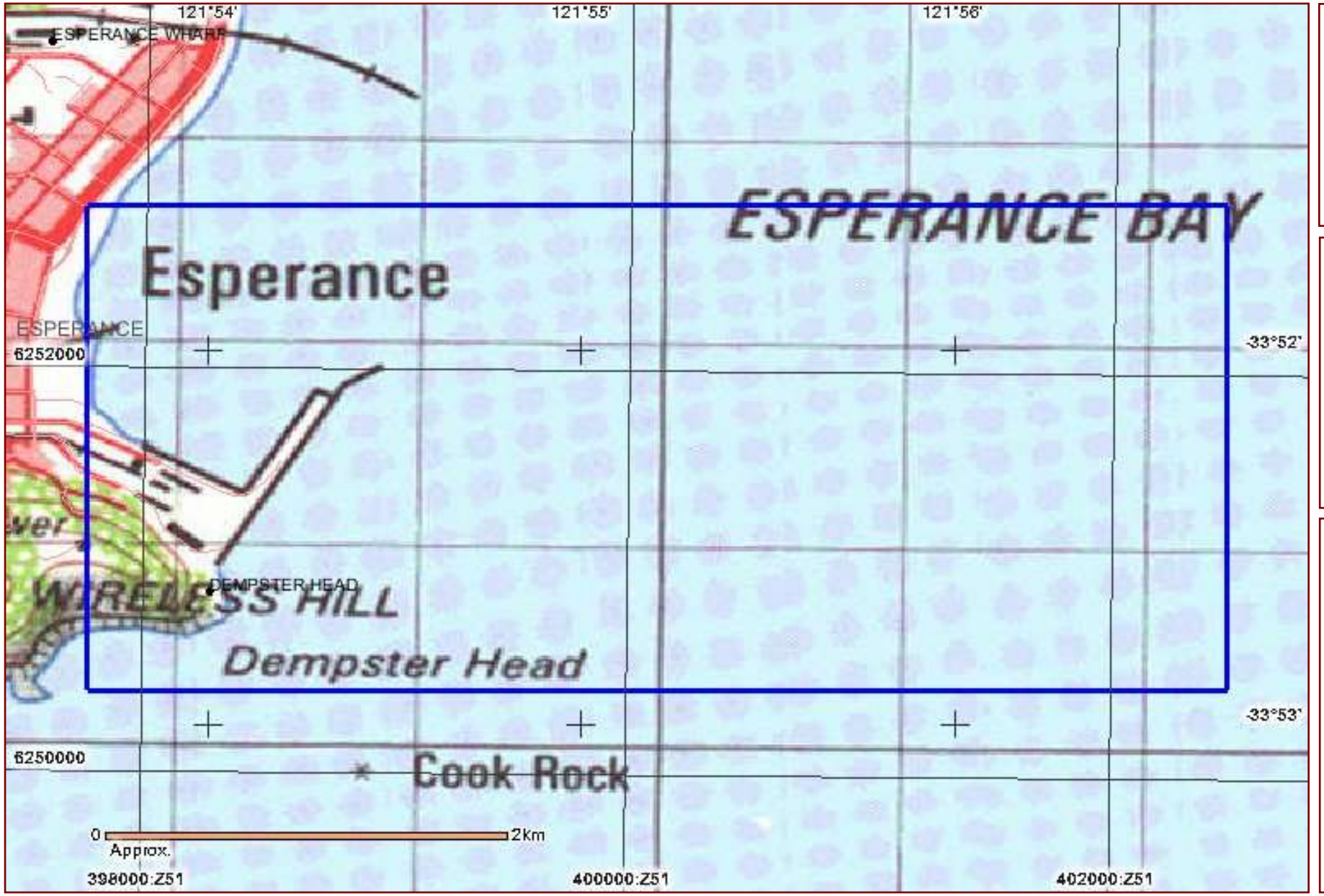
Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code “closed” or “vulnerable”. Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

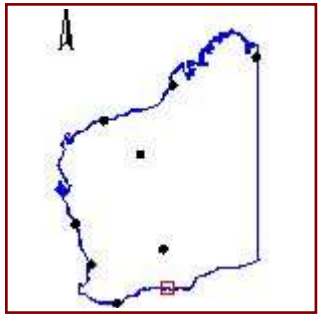
Sites Shown on Maps

Site boundaries may not appear on maps at low zoom levels

List of Registered Aboriginal Sites with Map

No results





Legend

Selected Heritage Sites

Registered Sites

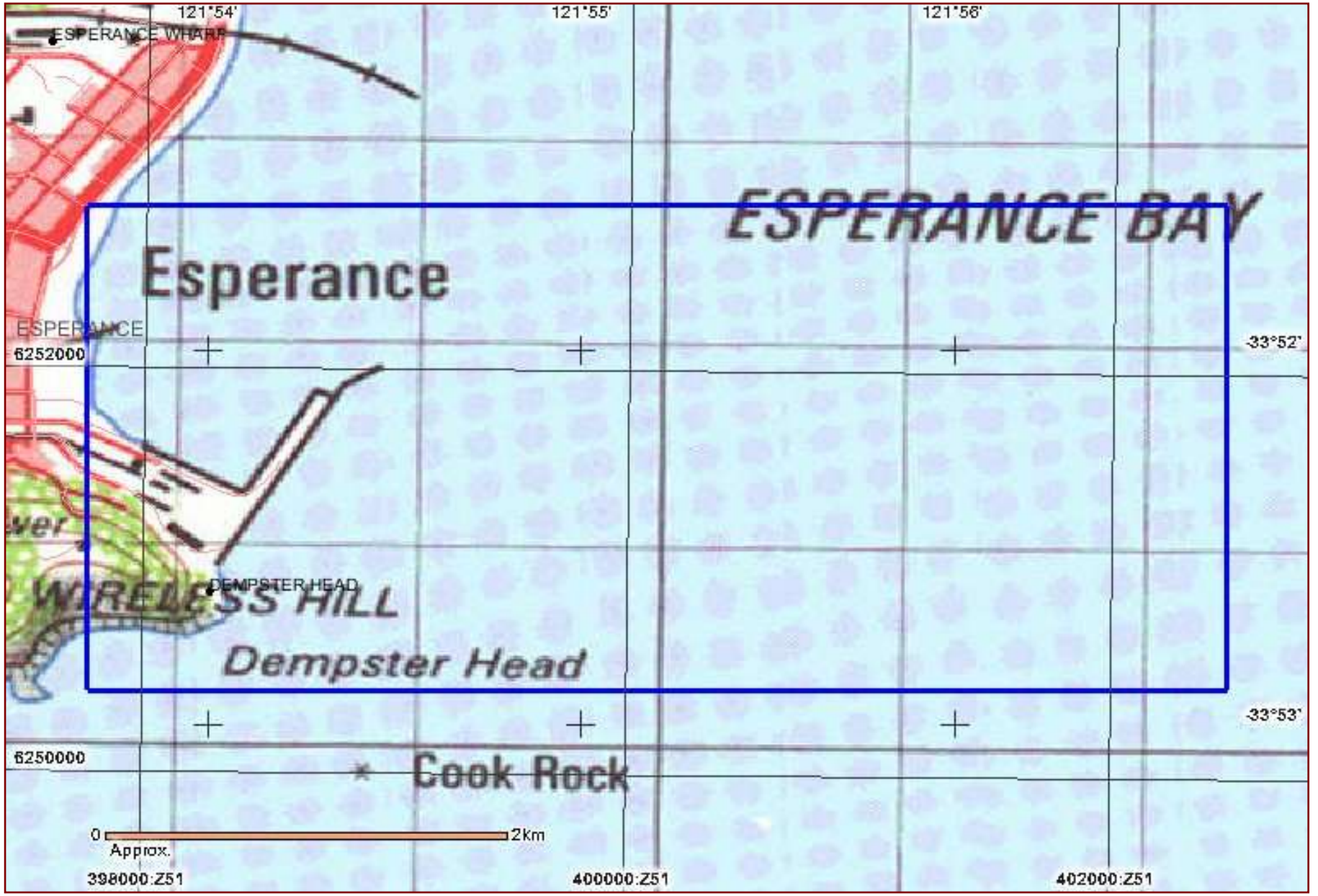
Town

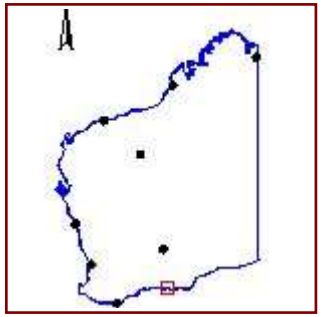
Map Area

Search Area

List of Other Heritage Places with Map

No results





Legend

Selected Heritage Sites

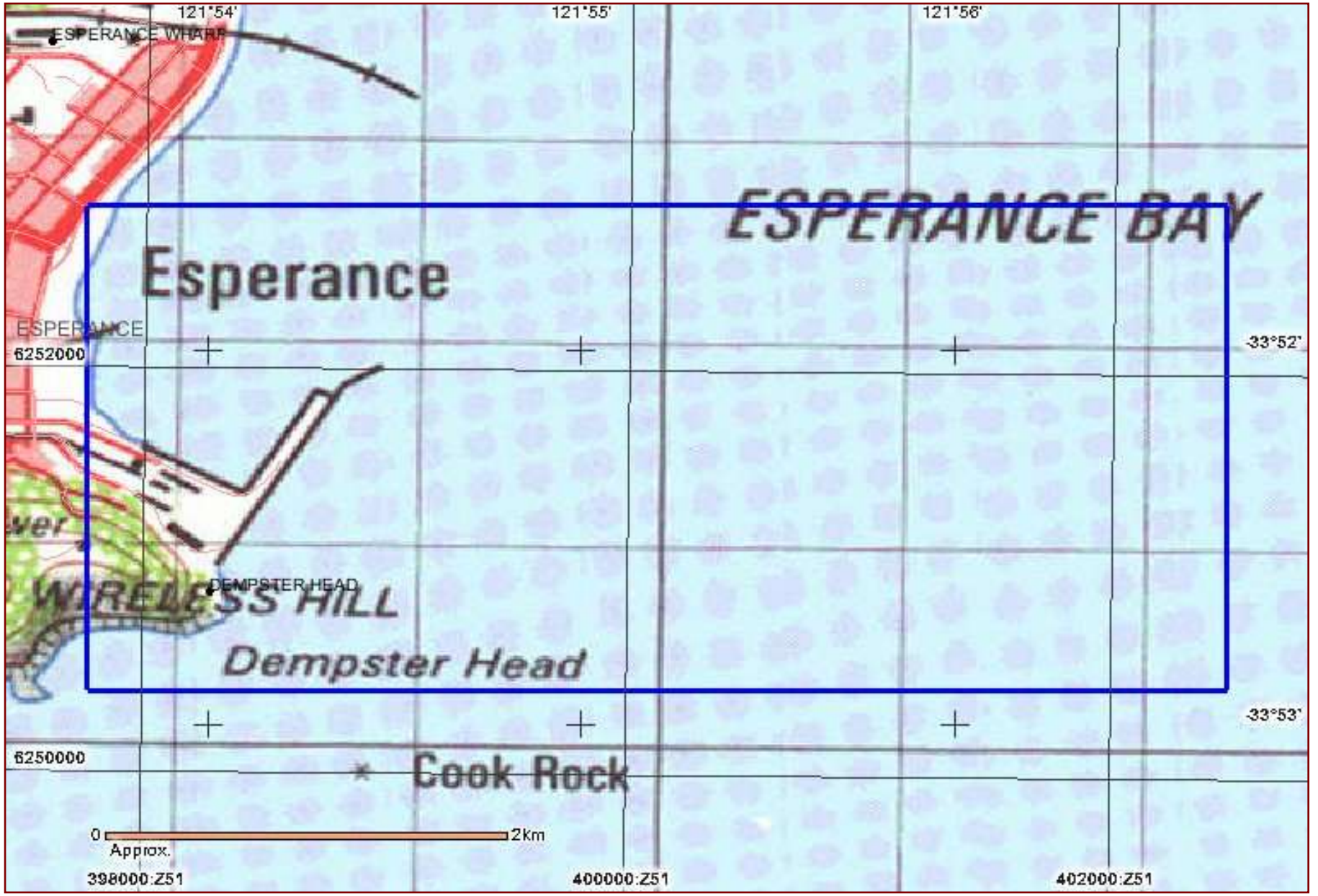
Other Heritage Places

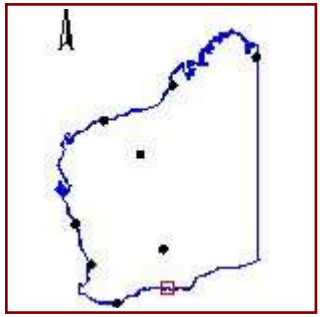
Town

Map Area

Search Area

Map Showing Registered Aboriginal Sites and Other Heritage Places





Legend

Selected Heritage Sites

- Registered Sites
- Other Heritage Places
- Town
- Map Area
- Search Area

Appendix B

EPBC referral form

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Referral of proposed action

What is a referral?

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the matters of NES without approval from the Australian Government Environment Minister or the Minister's delegate. (Further references to 'the Minister' in this form include references to the Minister's delegate.) To obtain approval from the Environment Minister, a proposed action should be referred. The purpose of a referral is to obtain a decision on whether your proposed action will need formal assessment and approval under the EPBC Act.

Your referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be undertaken. These decisions are made within 20 business days, provided that sufficient information is provided in the referral.

Who can make a referral?

Referrals may be made by or on behalf of a person proposing to take an action, the Commonwealth or a Commonwealth agency, a state or territory government, or agency, provided that the relevant government or agency has administrative responsibilities relating to the action.

When do I need to make a referral?

A referral must be made for actions that are likely to have a significant impact on the following matters protected by Part 3 of the EPBC Act:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Wetlands of international importance (sections 16 and 17B)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A)
- Protection of the environment from nuclear actions (sections 21 and 22A)
- Commonwealth marine environment (sections 23 and 24A)
- Great Barrier Reef Marine Park (sections 24B and 24C)
- The environment, if the action involves Commonwealth land (sections 26 and 27A), including:
    - actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land);
    - actions taken on Commonwealth land that may have a significant impact on the environment generally;
- The environment, if the action is taken by the Commonwealth (section 28)
- Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C)

You may still make a referral if you believe your action is not going to have a significant impact, or if you are unsure. This will provide a greater level of certainty that Commonwealth assessment requirements have been met.

To help you decide whether or not your proposed action requires approval (and therefore, if you should make a referral), the following guidance is available from:

- the Policy Statement titled Significant Impact Guidelines 1.1 – Matters of National Environmental Significance. Additional sectoral guidelines are also available.
- the Policy Statement titled Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies.

- the interactive map tool (enter a location to obtain a report on what matters of NES may occur in that location).

Can I refer part of a larger action?

In certain circumstances, the Minister may not accept a referral for an action that is a component of a larger action and may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (Section 74A, EPBC Act). If you wish to make a referral for a staged or component referral, read 'Fact Sheet 6 Staged Developments/Split Referrals' and contact the Referral Business Entry Point (1800 803 772).

Do I need a permit?

Some activities may also require a permit under other sections of the EPBC Act or another law of the Commonwealth. Information is available on the Department's web site.

Is your action in the Great Barrier Reef Marine Park?

If your action is in the Great Barrier Reef Marine Park it may require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If a permission is required, referral of the action under the EPBC Act is deemed to be an application under the GBRMP Act (see section 37AB, GBRMP Act). This referral will be forwarded to the Great Barrier Reef Marine Park Authority (the Authority) for the Authority to commence its permit processes as required under the Great Barrier Reef Marine Park Regulations 1983. If a permission is not required under the GBRMP Act, no approval under the EPBC Act is required (see section 43, EPBC Act). The Authority can provide advice on relevant permission requirements applying to activities in the Marine Park.

The Authority is responsible for assessing applications for permissions under the GBRMP Act, GBRMP Regulations and Zoning Plan. Where assessment and approval is also required under the EPBC Act, a single integrated assessment for the purposes of both Acts will apply in most cases. Further information on environmental approval requirements applying to actions in the Great Barrier Reef Marine Park is available from http://www.gbrmpa.gov.au/ or by contacting GBRMPA's Environmental Assessment and Management Section on (07) 4750 0700.

The Authority may require a permit application assessment fee to be paid in relation to the assessment of applications for permissions required under the GBRMP Act, even if the permission is made as a referral under the EPBC Act. Further information on this is available from the Authority:

Great Barrier Reef Marine Park Authority

2-68 Flinders Street PO Box 1379
Townsville QLD 4810
AUSTRALIA

Phone: + 61 7 4750 0700
Fax: + 61 7 4772 6093

www.gbrmpa.gov.au

Do I have to pay for my referral or assessment / what are the fees?

Currently the department does not impose fees for environmental impact assessments referred and assessed under the EPBC Act. However, new fees are proposed as part of cost recovery reforms to the EPBC Act from 1 December 2012. Final cost recovery arrangements will be subject to an amending Bill being passed by Parliament and the making of regulations. Fees for environmental impact assessments are proposed to apply to:

- all proposed actions referred after 8 May 2012 that are still undergoing assessment, decision on approval or that may be subject to post approval management plans after 1 December 2012 (fees will only apply to the work undertaken by the department after 1 December 2012); and
- all referrals on or after 1 December 2012.

For projects that are referred after 8 May 2012, that may be subject to fees, the department will inform proponents of their liability for potential fees prior to the introduction of cost recovery arrangements on 1 December 2012. Further details on the proposed cost recovery arrangements can be found here http://www.environment.gov.au/epbc/publications/consultation-draft-cost-recovery.html.

What information do I need to provide?

Completing all parts of this form will ensure that you submit the required information and will also assist the Department to process your referral efficiently. If a section of the referral document is not applicable to your proposal enter N/A.

You can complete your referral by entering your information into this Word file.

Instructions

Instructions are provided in green text throughout the form.

Attachments/supporting information

The referral form should contain sufficient information to provide an adequate basis for a decision on the likely impacts of the proposed action. You should also provide supporting documentation, such as environmental reports or surveys, as attachments.

Coloured maps, figures or photographs to help explain the project and its location should also be submitted with your referral. Aerial photographs, in particular, can provide a useful perspective and context. Figures should be good quality as they may be scanned and viewed electronically as black and white documents. Maps should be of a scale that clearly shows the location of the proposed action and any environmental aspects of interest.

Please ensure any attachments are below two megabytes (2mb) as they will be published on the Department's website for public comment. To minimise file size, enclose maps and figures as separate files if necessary. If unsure, contact the Referral Business Entry Point for advice. Attachments larger than two megabytes (2mb) may delay processing of your referral.

Note: the Minister may decide not to publish information that the Minister is satisfied is commercial-in-confidence.

How do I submit a referral?

Referrals may be submitted by mail, fax or email.

Mail to:

Referral Business Entry Point
Environment Assessment Branch
Department of Sustainability, Environment, Water, Population and Communities
GPO Box 787
CANBERRA ACT 2601

- If submitting via mail, electronic copies of documentation (on CD/DVD or by email) are appreciated.

Fax to: 02 6274 1789

- Faxed documents must be of sufficiently clear quality to be scanned into electronic format.
- Address the fax to the mailing address, and clearly mark it as a 'Referral under the EPBC Act'.
- Follow up with a mailed hardcopy including copies of any attachments or supporting reports.

Email to: epbc.referrals@environment.gov.au

- Clearly mark the email as a 'Referral under the EPBC Act'.
- Attach the referral as a Microsoft Word file and, if possible, a PDF file.
- Follow up with a mailed hardcopy including copies of any attachments or supporting reports.

What happens next?

Following receipt of a valid referral (containing all required information) you will be advised of the next steps in the process, and the referral and attachments will be published on the Department's web site for public comment.

The Department will write to you within 20 business days to advise you of the outcome of your referral and whether or not formal assessment and approval under the EPBC Act is required. There are a number of possible decisions regarding your referral:

The proposed action is NOT LIKELY to have a significant impact and does NOT NEED approval

No further consideration is required under the environmental assessment provisions of the EPBC Act and the action can proceed (subject to any other Commonwealth, state or local government requirements).

The proposed action is NOT LIKELY to have a significant impact IF undertaken in a particular manner

The action can proceed if undertaken in a particular manner (subject to any other Commonwealth, state or local government requirements). The particular manner in which you must carry out the action will be identified as part of the final decision. You must report your compliance with the particular manner to the Department.

The proposed action is LIKELY to have a significant impact and does NEED approval

If the action is likely to have a significant impact a decision will be made that it is a *controlled action*. The particular matters upon which the action may have a significant impact (such as World Heritage values or threatened species) are known as the *controlling provisions*.

The controlled action is subject to a public assessment process before a final decision can be made about whether to approve it. The assessment approach will usually be decided at the same time as the controlled action decision. (Further information about the levels of assessment and basis for deciding the approach are available on the Department's web site.)

The proposed action would have UNACCEPTABLE impacts and CANNOT proceed

The Minister may decide, on the basis of the information in the referral, that a referred action would have clearly unacceptable impacts on a protected matter and cannot proceed.

Compliance audits

If a decision is made to approve a project, the Department may audit it at any time to ensure that it is completed in accordance with the approval decision or the information provided in the referral. If the project changes, such that the likelihood of significant impacts could vary, you should write to the Department to advise of the changes. If your project is in the Great Barrier Reef Marine Park and a decision is made to approve it, the Authority may also audit it. (See "*Is your action in the Great Barrier Reef Marine Park,"* p.2, for more details).

For more information

- call the Department of Sustainability, Environment, Water, Populations and Communities Community Information Unit on 1800 803 772 or
- visit the web site www.environment.gov.au/epbc

All the information you need to make a referral, including documents referenced in this form, can be accessed from the above web site.

Referral of proposed action

Project title:

1 Summary of proposed action

NOTE: You must also attach a map/plan(s) showing the location and approximate boundaries of the area in which the project is to occur. Maps in A4 size are preferred. You must also attach a map(s)/plan(s) showing the location and boundaries of the project area in respect to any features identified in 3.1 & 3.2, as well as the extent of any freehold, leasehold or other tenure identified in 3.3(i).

1.1 **Short description**

The objective of this proposal is to conduct maintenance dredging in the Port of Esperance, thus ensuring safe navigability and continued use of the Port. A hydrographic survey in March 2013 showed that some areas of the Port have accreted by up to 2 m, posing risk to navigation. In particular, the accretion north of Berth 3 is restricting the departure of fully laden Cape vessels from Berth 3. Esperance Ports Sea and Land (EPSL) propose to dredge the channel and basin back to design levels to restore navigable depths. It is proposed to dispose some of the material to an existing offshore spoil ground and to dispose some material into EPSL's existing reclamation area.

1.2 **Latitude and longitude**

Latitude and longitude details are used to accurately map the boundary of the proposed action. If these coordinates are inaccurate or insufficient it may delay the processing of your referral.

	Latitude			Longitude		
location point	degrees	minutes	seconds	degrees	minutes	seconds
	33°	52′	37″	121°	57′	04″
	33°	52′	37″	121°	57′	44″
	33°	53′	09″	121°	57′	04″
	33°	53′	09″	121°	57′	44″

Please note that the above coordinates are provided in AGD 84 as they were on the original sea dumping permit. All coordinates provided within the EIA are in GDA94.

The Interactive Mapping Tool may provide assistance in determining the coordinates for your project area.

If area less than 5 hectares, provide the location as a single pair of latitude and longitude references. If area greater than 5 hectares, provide bounding location points.

There should be no more than 50 sets of bounding location coordinate points per proposal area.

Bounding location coordinate points should be provided sequentially in either a clockwise or anticlockwise direction.

If the proposed action is linear (eg. a road or pipeline), provide coordinates for each turning point.

Do not use AMG coordinates.

1.3 **Locality and property description**

The Port of Esperance is located on The Esplanade, Esperance, Western Australia, 6450 within the town of Esperance. The closest intersection is Smith Street and Harbour Road.

1.4 **Size of the development footprint or work area (hectares)**

Dredge footprint: 10 ha within a 55 ha envelope
Spoil ground: 100 ha

1.5 **Street address of the site**

The Esplanade, Esperance,
Western Australia, 6450

1.6 **Lot description**
Describe the lot numbers and title description, if known.

The Port Authority owns ~ 83 ha of land adjacent to the inner harbour area. The majority of the land is vested by the Esperance Town Planning Scheme in the Port Authority and is zoned "Railway and Port Installation". The lot numbers are R28207 (land component), P038819 2194 (marine component)

1.7 **Local Government Area and Council contact (if known)**
n/a

1.8 **Time frame**
The timing of the maintenance dredging has not yet been determined as EPSL are hoping to opportunistically secure a dredge that is in transit past port waters, to reduce mobilisation costs. The dredging is anticipated to take approximately four weeks to complete, with dredging occurring 24 hours/day; however, approval will be sought for an 8 week window to allow for contingencies. It is anticipated that the dredging will be carried out in 2013.
.

1.9	**Alternatives to proposed action** Were any feasible alternatives to taking the proposed action (including not taking the action) considered but are not proposed?		No
		✓	Yes, you must also complete section 2.2
1.10	**Alternative time frames etc** Does the proposed action include alternative time frames, locations or activities?		No
		✓	Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment** Is the action subject to a state or territory environmental impact assessment?		No
		✓	Yes, you must also complete Section 2.5
1.12	**Component of larger action** Is the proposed action a component of a larger action?	✓	No
			Yes, you must also complete Section 2.7
1.13	**Related actions/proposals** Is the proposed action related to other actions or proposals in the region (if known)?	✓	No
			Yes, provide details:
1.14	**Australian Government funding** Has the person proposing to take the action received any Australian Government grant funding to undertake this project?	✓	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park** Is the proposed action inside the Great Barrier Reef Marine Park?	✓	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

NOTE: It is important that the description is complete and includes all components and activities associated with the action. If certain related components are not intended to be included within the scope of the referral, this should be clearly explained in section 2.7.

2.1 Description of proposed action

This should be a detailed description outlining all activities and aspects of the proposed action and should reference figures and/or attachments, as appropriate.

Refer to 'Section 2: Project Description' of the attached EIA.

2.2 Alternatives to taking the proposed action

This should be a detailed description outlining any feasible alternatives to taking the proposed action (including not taking the action) that were considered but are not proposed (note, this is distinct from any proposed alternatives relating to location, time frames, or activities – see section 2.3).

Refer to 'Section 2.1.1: Alternative options' of the attached EIA.

2.3 Alternative locations, time frames or activities that form part of the referred action

If you have identified that the proposed action includes alternative time frames, locations or activities (in section 1.10) you must complete this section. Describe any alternatives related to the physical location of the action, time frames within which the action is to be taken and alternative methods or activities for undertaking the action. For each alternative location, time frame or activity identified, you must also complete (where relevant) the details in sections 1.2-1.9, 2.4-2.7, 3.3 and 4. Please note, if the action that you propose to take is determined to be a controlled action, any alternative locations, time frames or activities that are identified here may be subject to environmental assessment and a decision on whether to approve the alternative.

The timing of the maintenance dredging has not yet been determined as EPSL are hoping to opportunistically secure a dredge that is in transit past port waters, to reduce mobilisation costs. The dredging is anticipated to take approximately four weeks to complete, with dredging occurring 24 hours/day; however, approval will be sought for an 8 week window to allow for contingencies. It is anticipated that dredging will be undertaken in 2013.

2.4 Context, planning framework and state/local government requirements

Explain the context in which the action is proposed, including any relevant planning framework at the state and/or local government level (e.g. within scope of a management plan, planning initiative or policy framework). Describe any Commonwealth or state legislation or policies under which approvals are required or will be considered against.

The design depth of the Port of Esperance's Berths 1 and 2 is 14.6 m CD, Berth 3 and the inner channel is 19.1 m CD, the middle channel is 19.5 m CD and the outer channel is 19.9 m CD. A hydrographic survey in March 2013 shows that some areas of the Port have accreted by up to 2 m, posing risk to navigation. In particular, the accretion north of Berth 3 is restricting the departure of fully laden Cape vessels from Berth 3. EPSL proposes to dredge the channel and basin back to design levels to restore navigable depths.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

If you have identified that the proposed action will be or has been subject to a state or territory environmental impact statement (in section 1.11) you must complete this section. Describe any environmental assessment of the relevant impacts of the project that has been, is being, or will be carried out under state or territory legislation. Specify the type and nature of the assessment, the relevant legislation and the current status of any assessments or approvals. Where possible, provide contact details for the state/territory assessment contact officer.

Describe or summarise any public consultation undertaken, or to be undertaken, during the assessment. Attach copies of relevant assessment documentation and outcomes of public consultations (if available).

The attached document constitutes an environmental impact assessment which will be submitted along with a referral to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986,* and with an application for a sea dumping permit under the

Commonwealth Environmental Protection (Sea Dumping) Act 1981. These two applications will be submitted concurrent to this application.

2.6 Public consultation (including with Indigenous stakeholders)

Your referral must include a description of any public consultation that has been, or is being, undertaken. Where Indigenous stakeholders are likely to be affected by your proposed action, your referral should describe any consultations undertaken with Indigenous stakeholders. Identify the relevant stakeholders and the status of consultations at the time of the referral. Where appropriate include copies of documents recording the outcomes of any consultations.

Consultation has been undertaken with the Port Consultative Committee, which included representatives from:

- Esperance Regional Tourism Association
- Parents of Esperance Active for Child Health
- Local Environmental Action Forum
- Locals for Esperance Development
- Esperance Office of DEC
- Lessees CBH

EPSL presented details on the maintenance dredging proposal based on the EIA document and there were no questions asked by Port Consultative Committee members.

The Esperance Power Station has been consulted with due to the proximity of the stockpile to their operations and they had no objections but requested to be informed of when the dredging works will occur.

2.7 A staged development or component of a larger project

If you have identified that the proposed action is a component of a larger action (in section 1.12) you must complete this section. Provide information about the larger action and details of any interdependency between the stages/components and the larger action. You may also provide justification as to why you believe it is reasonable for the referred action to be considered separately from the larger proposal (eg. the referred action is 'stand-alone' and viable in its own right, there are separate responsibilities for component actions or approvals have been split in a similar way at the state or local government levels).

n/a

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest.

Your assessment of likely impacts should refer to the following resources (available from the Department's web site):

- specific values of individual World Heritage properties and National Heritage places and the ecological character of Ramsar wetlands;
- profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;
- *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*; and
- associated sectoral and species policy statements available on the web site, as relevant.

Note that even if your proposal will not be taken in a World Heritage area, Ramsar wetland, Commonwealth marine area, the Great Barrier Reef Marine Park or on Commonwealth land, it could still impact upon these areas (for example, through downstream impacts). Consideration of likely impacts should include both direct and indirect impacts.

3.1 (a) World Heritage Properties

Description

n/a

Nature and extent of likely impact

Address any impacts on the World Heritage values of any World Heritage property.

n/a

3.1 (b) National Heritage Places

Description

n/a

Nature and extent of likely impact

Address any impacts on the National Heritage values of any National Heritage place.

n/a

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

The Lake Warden system was identified in the EPBC search as being within 10 km of the proposal area.

Nature and extent of likely impact

Address any impacts on the ecological character of any Ramsar wetlands.

This dredging proposal will not have any impact on the wetland as it is occurring in the waters of an operating Port.

3.1 (d) Listed threatened species and ecological communities

Description

A search of the online EPBC Act Protected Matters Search Tool revealed that a number of threatened marine species may occur within the waters near Esperance including whales, pinnipeds and sharks. A full list of threatened species, their status and type of presence is given in Section 4.4 of the attached EIA report. Threatened species known to be present include the endangered southern right whale (*Eubalaena australis*), the vulnerable humpback whale (*Megaptera novaeangliae*), the vulnerable Australian sea-lion (*Neophoca cinerea*) and the vulnerable great white shark (*Carcharodon carcharias*).

Nature and extent of likely impact

Address any impacts on the members of any listened threatened species (except a conservation dependent species) or any threatened ecological community, or their habitat.

Potential impacts on threatened species are addressed in Sections 7.6-7.8 of the attached EIA report, particularly with reference to the significant impact guidelines outlined by DSEWPC.

3.1 (e) Listed migratory species

Description

A search of the online EPBC Act Protected Matters Search Tool revealed that a number of migratory marine species may occur within the waters near Esperance including whales, turtles and sharks. A full list of migratory species, their status and type of presence is given in Section 4.4 of the attached EIA report. Migratory species known to be present include the endangered southern right whale (*Eubalaena australis*), the vulnerable humpback whale (*Megaptera novaeangliae*) and the vulnerable great white shark (*Carcharodon carcharias*).

Nature and extent of likely impact

Address any impacts on the members of any listed migratory species, or their habitat.

Potential impacts on migratory species are addressed in Section 7.6-7.8 of the attached EIA report, particularly with reference to the significant impact guidelines outlined by DSEWPC

3.1 (f) Commonwealth marine area

(If the action is in the Commonwealth marine area, complete 3.2(c) instead. This section is for actions taken outside the Commonwealth marine area that may have impacts on that area.)

Description

n/a

Nature and extent of likely impact

Address any impacts on any part of the environment in the Commonwealth marine area.

n/a

3.1 (g) Commonwealth land

(If the action is on Commonwealth land, complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land.)

Description

If the action will affect Commonwealth land also describe the more general environment. The Policy Statement titled *Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies* provides further details on the type of information needed. If applicable, identify any potential impacts from actions taken outside the Australian jurisdiction on the environment in a Commonwealth Heritage Place overseas.

n/a

Nature and extent of likely impact

Address any impacts on any part of the environment in the Commonwealth land. Your assessment of impacts should refer to the *Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies* and specifically address impacts on:

- ecosystems and their constituent parts, including people and communities;
- natural and physical resources;
- the qualities and characteristics of locations, places and areas;
- the heritage values of places; and
- the social, economic and cultural aspects of the above things.

n/a

3.1 (h) The Great Barrier Reef Marine Park

Description

n/a

Nature and extent of likely impact

Address any impacts on any part of the environment of the Great Barrier Reef Marine Park.

Note: If your action occurs in the Great Barrier Reef Marine Park you may also require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If so, section 37AB of the GBRMP Act provides that your referral under the EPBC Act is deemed to be an application under the GBRMP Act and Regulations for necessary permissions and a single integrated process will generally apply. Further information is available at www.gbrmpa.gov.au

n/a

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

You must describe the nature and extent of likely impacts (both direct & indirect) on the whole environment if your project:

- is a nuclear action;
- will be taken by the Commonwealth or a Commonwealth agency;
- will be taken in a Commonwealth marine area;
- will be taken on Commonwealth land; or
- will be taken in the Great Barrier Reef marine Park.

Your assessment of impacts should refer to the *Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies* and specifically address impacts on:

- ecosystems and their constituent parts, including people and communities;
- natural and physical resources;
- the qualities and characteristics of locations, places and areas;
- the heritage values of places; and
- the social, economic and cultural aspects of the above things.

3.2 (a)	**Is the proposed action a nuclear action?**	✓	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment		

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))		

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))		

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	✓	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))		

3.3 Other important features of the environment

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed above). If at Section 2.3 you identified any alternative locations, time frames or activities for your proposed action, you must complete each of the details below (where relevant) for each alternative identified.

3.3 (a) Flora and fauna

Refer to 'Section 4.4: Listed threatened species and ecological communities' and 'Section 3.5: Biological characteristics in the attached EIA document.

3.3 (b) Hydrology, including water flows

n/a

3.3 (c) Soil and Vegetation characteristics

n/a

3.3 (d) Outstanding natural features

n/a

3.3 (e) Remnant native vegetation

n/a

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

Refer to Section 4.1: Bathymetry of the attached EIA report.

3.3 (g) Current state of the environment

Include information about the extent of erosion, whether the area is infested with weeds or feral animals and whether the area is covered by native vegetation or crops.

Refer to 'Section 3.2: Previous sediment surveys' in the attached EIA document.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are six areas on the RNE that were identified in the EPBC search.

- Tommy Windich's Grave
- Espernace New Jetty
- Esperance School (former)
- Railway Goods Shed and Bonded Store and Customs Shed (former)
- Dempster Homestead (former)
- Recherche Archipelago

None of these places will be impacted by the proposal. The first five areas are within Esperance and there is no potential to impact them by dredging and disposal and the Recherche Archipelago refers to the islands of the Archipelago that are significantly important due to flora and fauna distribution. The proposal does not have any potential to impact on these islands.

3.3 (i) Indigenous heritage values

Tommy Windichs Grave

There is no potential for the dredging program to impact on Tommy Windich's Grave.

3.3 (j) Other important or unique values of the environment

Describe any other key features of the environment affected by, or in proximity to the proposed action (for example, any national parks, conservation reserves, wetlands of national significance etc).

Refer to 'Section 4: Existing environment' in the attached EIA document.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

The Port Authority owns ~ 83 ha of land adjacent to the inner harbour area. The majority of the land is vested by the Esperance Town Planning Scheme in the Port Authority and is zoned "Railway and Port Installation".

3.3 (l) Existing land/marine uses of area

Refer to 'Section 1: Introduction' in the attached EIA document.

3.3 (m) Any proposed land/marine uses of area

n/a

4 Measures to avoid or reduce impacts

Note: If you have identified alternatives in relation to location, time frames or activities for the proposed action at Section 2.3 you will need to complete this section in relation to each of the alternatives identified.

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

For any measures intended to avoid or mitigate significant impacts on matters protected under the EPBC Act, specify:
- what the measure is,
- how the measure is expected to be effective, and
- the time frame or workplan for the measure.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

Provide information about the level of commitment by the person proposing to take the action to implement the proposed mitigation measures. For example, if the measures are preliminary suggestions only that have not been fully researched, or are dependent on a third party's agreement (e.g. council or landowner), you should state that, that is the case.

Note, the Australian Government Environment Minister may decide that a proposed action is not likely to have significant impacts on a protected matter, as long as the action is taken in a particular manner (section 77A of the EPBC Act). The particular manner of taking the action may avoid or reduce certain impacts, in such a way that those impacts will not be 'significant'. More detail is provided on the Department's web site.

For the Minister to make such a decision (under section 77A), the proposed measures to avoid or reduce impacts must:
- clearly form part of the referred action (eg be identified in the referral and fall within the responsibility of the person proposing to take the action),
- be must be clear, unambiguous, and provide certainty in relation to reducing or avoiding impacts on the matters protected, and
- must be realistic and practical in terms of reporting, auditing and enforcement.

More general commitments (eg preparation of management plans or monitoring) and measures aimed at providing environmental offsets, compensation or off-site benefits CANNOT be taken into account in making the initial decision about whether the proposal is likely to have a significant impact on a matter protected under the EPBC Act. (But those commitments may be relevant at the later assessment and approval stages, including the appropriate level of assessment, if your proposal proceeds to these stages).

The Port of Esperance maintenance dredging is of very short duration and is unlikely to cause significant impact upon threatened or migratory species (refer to 'Section 7.7-7.9 of the attached EIA report. However, an environmental monitoring program will be in place for the duration of dredging to avoid, reduce and mitigate potential impacts to threatened and migratory species (refer to 'Section 8.4: Marine fauna' of the attached EIA report.

5 Conclusion on the likelihood of significant impacts

Identify whether or not you believe the action is a controlled action (ie. whether you think that significant impacts on the matters protected under Part 3 of the EPBC Act are likely) and the reasons why.

5.1 Do you THINK your proposed action is a controlled action?

✓	No, complete section 5.2
	Yes, complete section 5.3

5.2 Proposed action IS NOT a controlled action.

Specify the key reasons why you think the proposed action is NOT LIKELY to have significant impacts on a matter protected under the EPBC Act.

The Port of Esperance maintenance dredging programme is small-scale and of short duration. Significant impacts on listed threatened or migratory species are unlikely because:

- There is a low likelihood of encountering whales and other large marine fauna because the dredge vessel will be operating at slower speeds than regular shipping traffic, the dredge will only cross the whale migration route when travelling to and from the offshore disposal site and whales and other species are likely to move away from the dredge plant. The expected duration of maintenance dredging is also very brief (four weeks). The dredge vessel will also be travelling at very slow speeds, so the risk of vessel strikes is low.
- Noise generated from dredging will be low-level (within the background limits of shipping disturbance);
- Throughout previous dredging campaigns for EPSL, as well as day-to-day shipping movements, there have not been any reported impacts upon marine fauna; and
- A marine fauna monitoring and management (including exclusion zones) programme will be adopted to ensure any threatened or migratory protected marine fauna are not impacted by vessel strike or marine noise during the proposed dredging.

5.3 Proposed action IS a controlled action

Type 'x' in the box for the matter(s) protected under the EPBC Act that you think are likely to be significantly impacted. (The 'sections' identified below are the relevant sections of the EPBC Act.)

	Matters likely to be impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

Specify the key reasons why you think the proposed action is likely to have a significant adverse impact on the matters identified above.

6 Environmental record of the responsible party

NOTE: If a decision is made that a proposal needs approval under the EPBC Act, the Environment Minister will also decide the assessment approach. The EPBC Regulations provide for the environmental history of the party proposing to take the action to be taken into account when deciding the assessment approach.

		Yes	No
6.1	**Does the party taking the action have a satisfactory record of responsible environmental management?** **Provide details** EPSL is committed to delivering best practice environmental management through implementation of the Ports environmental management system. The Environmental Management Plan documents the strategy for identification and assessment of environmental risks, and the implementation of controls/procedures to reduce risk. EPSL uses this process to drive continuous improvement. Each year EPSL develops an environmental management program identifying actions to enable legislative reporting requirements, reduce key environmental risks from Port activities and maintain the environmental management system. The Port is required to operate under the requirements of its environmental licence L5099/1974/13, its three Ministerial Statements, MS325, MS570, MS681, its Noise Approval, National Pollutant Inventory, waste legislation and other statutory environmental requirements. The Port is audited annually by the Department of Environment and Conservation for compliance with the conditions of its Environmental Licence.	✓	
6.2	**Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?** **If yes, provide details** Yes - Esperance Port Authority was involved in proceedings during 2009 for breaches of the Environmental Protection Act, 1986 relating to lead contamination and emitting a nickel odour.	✓	
6.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?**	✓	

	If yes, provide details of environmental policy and planning framework EPSL has a comprehensive environmental management plan in place which includes an environmental policy as sdetailed below. The Esperance Ports Sea & Land is committed to managing its operations in an environmentally and sustainably responsible manner. These operations include the transit of commercial vessels in Port waters and product handling into and out of the Port. Operational risks of EPSL to the environment will be minimised by: • Developing and maintaining Port infrastructure with best practice emission reduction technology; • Implementing and/or interpreting monitoring to ensure emission controls are effective; • Implementing sustainability initiatives, including the practice of waste minimisation through responsible purchasing, reuse and recycling; • Developing and maintaining an effective, environment management system including a risk register under the guiding principals of AS/NZS ISO14001; • Seeking continual improvement to improve long term outcomes for the environment; • Making open and transparent decisions based on data, information and knowledge; • Complying with all legislative requirements; • Protecting social, community and workplace values; • Taking responsibility for the environment across all employees, contractors and lessees; • Communicating this policy to the employees, community, and relevant stakeholders. • Providing sufficient resources to implement this policy.		
6.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)**		✓

7 Information sources and attachments

(For the information provided above)

7.1 References

- List the references used in preparing the referral.
- Highlight documents that are available to the public, including web references if relevant.

Oceanica (2013) Port of Esperance 2013 Maintenance Dredging – Environmental Impact Assessment. Prepared for Esperance Port Sea and Land by Oceanica Consulting Pty Ltd, Report No 922_001/2, Perth, Western Australia, 2013

EPBC search 20130311

7.2 Reliability and date of information

For information in section 3 specify:

- source of the information;
- how recent the information is;
- how the reliability of the information was tested; and
- any uncertainties in the information.

Details of the above are provided in the attached references.

7.3 Attachments

Indicate the documents you have attached. All attachments must be less than two megabytes (2mb) so they can be published on the Department's website. Attachments larger than two megabytes (2mb) may delay the processing of your referral.

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)		Included in EIA document
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)		Included in EIA document
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)	NA	
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	NA	
	copies of any flora and fauna investigations and surveys (section 3)	NA	
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)		Included in EIA document
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		Included in EIA document

8 Contacts, signatures and declarations

NOTE: Providing false or misleading information is an offence punishable on conviction by imprisonment and fine (s 489, EPBC Act).

Under the EPBC Act a referral can only be made by:

- the person proposing to take the action (which can include a person acting on their behalf); or
- a Commonwealth, state or territory government, or agency that is aware of a proposal by a person to take an action, and that has administrative responsibilities relating to the action[1].

Project title: Port of Esperance Maintenance Dredging

8.1 Person proposing to take action

This is the individual, government agency or company that will be principally responsible for, or who will carry out, the proposed action.

If the proposed action will be taken under a contract or other arrangement, this is:

- the person for whose benefit the action will be taken; or
- the person who procured the contract or other arrangement and who will have principal control and responsibility for the taking of the proposed action.

If the proposed action requires a permit under the Great Barrier Reef Marine Park Act[2], this is the person requiring the grant of a GBRMP permission.

The Minister may also request relevant additional information from this person.

If further assessment and approval for the action is required, any approval which may be granted will be issued to the person proposing to take the action. This person will be responsible for complying with any conditions attached to the approval.

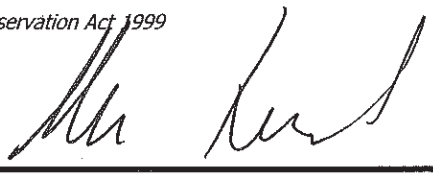
If the Minister decides that further assessment and approval is required, the Minister must designate a person as a proponent of the action. The proponent is responsible for meeting the requirements of the EPBC Act during the assessment process. The proponent will generally be the person proposing to take the action[3].

Name	Alex Leonard
Title	Environment Manager
Organisation	Esperance Ports Sea & Land
ACN / ABN (if applicable)	89 042 152 171
Postal address	PO Box 35 Esperance **WA 6450**
Telephone	9072-3388
Email	**aleonard@epsl.com.au**
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence. I agree to be the proponent for this action. I acknowledge that I may be liable for fees related to my proposed action following the introduction of cost recovery under the EPBC Act.

[1] *If the proposed action is to be taken by a Commonwealth, state or territory government or agency, section 8.1 of this form should be completed. However, if the government or agency is aware of, and has administrative responsibilities relating to, a proposed action that is to be taken by another person which has not otherwise been referred, please contact the Referrals Business Entry Point (1800 803 772) to obtain an alternative contacts, signatures and declarations page.*

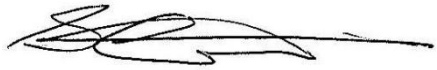
[2] *If your referred action, or a component of it, is to be taken in the Great Barrier Reef Marine Park the Minister is required to provide a copy of your referral to the Great Barrier Reef Marine Park Authority (GBRMPA) (see section 73A,* EPBC Act*). For information about how the GBRMPA may use your information, see http://www.gbrmpa.gov.au/privacy/privacy_notice_for_permits.*

[3] *If a person other than the person proposing to take action is to be nominated as the proponent, please contact the Referrals Business Entry Point (1800 803 772) to obtain an alternative contacts, signatures and declarations page.*

Signature  Date 5 APRIL 2013

8.2 Person preparing the referral information (if different from 8.1)

Individual or organisation who has prepared the information contained in this referral form.

Name	Sarah Scott
Title	Senior Consultant, Marine Ecologist
Organisation	Oceanica Consulting Pty Ltd
ACN / ABN (if applicable)	89 093 752 811
Postal address	PO Box 462, Wembley WA 6913
Telephone	+61 8 6272 0000
Email	sarah.scott@oceanica.com.au
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.
Signature	 Date 05/04/13

REFERRAL CHECKLIST

NOTE: This checklist is to help ensure that all the relevant referral information has been provided. It is not a part of the referral form and does not need to be sent to the Department.

HAVE YOU:

- ✓ Completed all required sections of the referral form?
- ✓ Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- ✓ Provided a map showing the location and approximate boundaries of the project area?
- ✓ Provided a map/plan showing the location of the action in relation to any matters of NES?
- ✓ Provided complete contact details and signed the form?
- ✓ Provided copies of any documents referenced in the referral form?
- ✓ Ensured that all attachments are less than two megabytes (2mb)?
- ✓ Sent the referral to the Department (electronic and hard copy preferred)?

EPBC Act Protected Matters Report

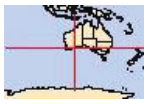
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 11/03/13 16:13:19

Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	29
Listed Migratory Species:	35

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	55
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	6
State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	5
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Lake warden system	Within 10km of Ramsar

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans amsterdamensis Amsterdam Albatross [82330]	Endangered	Species or species habitat may occur within area
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Foraging, feeding or related behaviour may occur within area
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat may occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Neophoca cinerea Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Anigozanthos bicolor subsp. minor Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat likely to occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat may occur within area
Kennedia glabrata Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Foraging, feeding or related behaviour may occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche chlororhynchos Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross, Indian Yellow-nosed Albatross [66481]	Vulnerable*	Foraging, feeding or related behaviour may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris tenuirostris		
Great Knot [862]		Species or species habitat known to occur within area
Heteroscelus brevipes		
Grey-tailed Tattler [59311]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Calidris alba		
Sanderling [875]		Species or species habitat known to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]		Species or species habitat known to occur within area
Catharacta skua		
Great Skua [59472]		Species or species habitat may occur within area
Cereopsis novaehollandiae grisea		
Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat likely to occur within area
Charadrius ruficapillus		
Red-capped Plover [881]		Species or species habitat known to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered*	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Foraging, feeding or related behaviour may occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Breeding likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche chlororhynchos Yellow-nosed Albatross, Atlantic Yellow-nosed	Vulnerable*	Foraging, feeding or

Name	Threatened	Type of Presence
Albatross, Indian Yellow-nosed Albatross [66481]		related behaviour may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black		Species or species

Name	Threatened	Type of Presence
Pipefish [66277]		habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri New Zealand Fur-seal [20]		Species or species habitat likely to occur within area
Neophoca cinerea Australian Sea-lion [22]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area

Name	Status	Type of Presence
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Recherche Archipelago	WA	Registered
Indigenous		
Tommy Windichs Grave	WA	Indicative Place
Historic		
Esperance New Jetty	WA	Indicative Place
Esperance School (former)	WA	Indicative Place
Railway Goods Shed and Bonded Store and Customs Shed (former)	WA	Indicative Place
Dempster Homestead (former)	WA	Registered

State and Territory Reserves [Resource Information]

Name	State
Recherche Archipelago	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides		
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area

Coordinates

-33.890214 121.890767,-33.852523 121.891224,-33.852523 121.891224,-33.851533 121.96691,-33.889605 121.968128,-33.890214 121.890767

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of Sustainability, Environment, Water, Population and Communities
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix C

Sea dumping application

Sea Disposal Application
Dredged or Excavated Material

Important Information

ABOUT THIS FORM

Important – Please read this information carefully before you complete your application. Once you have completed your application we strongly advise that you keep a copy for your records.

WHO SHOULD USE THIS FORM?

This application form was approved on 26 June 2012, pursuant to subsection 18(2) of the *Environment Protection (Sea Dumping) Act 1981* (the Sea Dumping Act). If you propose to dispose of dredged or excavated material at sea then you must complete this form.

COMPLETE APPLICATIONS

The department encourages the lodgement of complete applications. If further information is required to assess your sea disposal application, then the time within which the Minister is required to assess your application will be paused and reset pursuant to section 18 of the *Environment Protection (Sea Dumping) Act 1981* (Sea Dumping Act).

You should read this application in conjunction with the **National Assessment Guidelines for Dredging 2009** (NAGD). The NAGD detail the procedures which should be followed in sampling, testing and assessing the suitability of material to be disposed of at sea. The guidelines also detail how disposal sites are to be evaluated and monitored. The NAGD are available at:
www.environment.gov.au/coasts/pollution/dumping/guidelines.html

Where you require a specialist report to fulfil the requirements set out in the NAGD, then you should attach the specialist report to your application. You should also provide brief answers to the questions provided, cross-referenced to the relevant sections of the report.

Your application must clearly:

- demonstrate that you have considered alternatives to sea disposal;
- describe the material to be disposed of at sea including how it will be transported from the origin to the disposal site and how it will be disposed of at sea;
- identify the origin and quantity of the material to be disposed of at sea;

- provide details of the physical and chemical composition of the material to be disposed of at sea;
- detail any toxicity characteristics of the material to be disposed of at sea; and
- provide details regarding the disposal locality and any potential environmental impacts at the disposal site.

OBLIGATION TO COOPERATE WITH INSPECTORS

Sections 26 to 32 of the Sea Dumping Act provide amongst other things that the Minister may appoint inspectors for the purpose of policing the Sea Dumping Act. An inspector may board vessels, aircraft or platforms or stop and detain vessels or aircraft.

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places, the Commonwealth marine area and the Great Barrier Reef Marine Park — defined in the EPBC Act as matters of national environmental significance. For a detailed discussion of assessment under the EPBC Act and how it interacts with the Sea Dumping Act refer to Section 2.1.2 of the NAGD.

The EPBC Act affects any group or individual (including companies) whose actions may have a significant impact on a matter of national environmental significance. Persons who may have a significant impact on a matter of national environmental significance must refer their proposed action pursuant section 68 of the EPBC Act.

Section 160 of the EPBC Act requires the a decision maker in some circumstances to seek advice under the EPBC Act prior to making a decision with respect to a sea disposal permit. To ensure efficient co-ordination of the assessment process, it is important that the department is aware of any referrals the proponent has made under the EPBC Act. As such, it is advisable that proponents discuss proposed actions with the department prior to submitting a sea disposal application.

Please note that if the project has been referred under the EPBC Act that a decision on a sea disposal permit application cannot be made until the project has either been determined to be "not a controlled action" or the Minister has approved the proposal.

APPLICATION FEE

The *Environment Protection (Sea Dumping Regulations) 1983* (the Sea Dumping Regulations) prescribe the fee payable for a sea disposal application. For an application for a permit to dispose of dredged or excavated material into any part of the sea, the following fees are prescribed pursuant to clause 5(2) of the Sea Dumping Regulations as follows:

(a) if the volume of the material exceeds 100 000 m^3 -- $23 500;

(b) if the volume of the material does not exceed 100 000 m^3 -- $10 000.

Clause 5B of the Sea Dumping Regulations requires the application fee to be paid no later than 30 days after the application is submitted. A failure to pay the application fee within the prescribed timeframe will result in the application been invalid. This means that if your application is invalid you will need to submit a new application to the Department if you wish to pursue an application.

METHOD OF PAYMENT

To make a payment, the department's preferred methods of payment are by credit card, bank cheque, money order or by electronic funds transfer (EFT).

Cheques

You must make your payment payable to "Department of Sustainability, Environment, Water, Population and Communities". You should include a remittance advice.

EFT Payments

EFT Payments can be made to:

BSB: 092-009
Bank Account No. 115859
Amount: $
Account Name: Department of Sustainability, Environment, Water, Population and Communities
Bank: Reserve Bank of Australia
Bank Address: 20-22 London Circuit Canberra ACT 2601
Reference: Cost Centre 12106, GL A/c 52300
Description: Sea Disposal Permit Application – Name of Project

LODGING YOUR APPLICATION

You may lodge your application at the following address:

Director
Ports and Marine Section
Department of Sustainability, Environment, Water, Population and Communities
GPO Box 787
Canberra ACT 2601

WHAT HAPPENS NEXT?

Your application will be considered and you may be asked to provide additional information to enable a decision to be made.

FURTHER INFORMATION

Further information may be obtained from: portsandmarine@environment.gov.au

PART A – APPLICATION SUMMARY

What is the legal name of the business, organisation or company?

Esperance Ports Sea and Land

Contact Person:

Alex Leonard

Type of Material Requiring Disposal:

☐	Capital	☐	Dredge
✓	Maintenance	☐	Excavation

WGS84 co-ordinates of disposal site:

Easting (UTM51 WGS84)	Northing (UTM51 WGS84)
404159	6251159
404169	6250173
403141	6250163
403131	6251148

Dates of proposed disposal operations:

Approximately 4 weeks in 2013. Refer to 'Section 2.1: Dredging' of the attached EIA.

Volume (cubic metres) of material to be disposed of:

63,500 m^3

Length of permit applied for in this application:

8 weeks. The dredging is anticipated to take approximately 4 weeks; however, EPSL is seeking approval for an 8 week window to allow for contingencies. Refer to 'Section 2.1: Dredging' of the attached EIA.

Details of previous sea disposal permits that you have been granted:

Permit number	Volume approved for disposal (cubic metres)
No permit number given. Permit was issued on 6/06/1988	1.5 million cubic metres

PART B - APPLICANT

2.0 Identity of applicant

2.1 Applicant Details

What is the legal name of the business, organisation or company?

Esperance Ports Sea and Land

What is the registered business name or trading name under which you operate? (if different from legal name)
na

Australian Business Number (ABN)

89 042 152 171

Australian Company Number (ACN) (if applicable)

042 152 171

Street address of the business (where the business is physically located)

The Esplanade, Esperance WA 6450

Postal address of the business (If same as street address, write 'AS ABOVE')
PO Box 35, Esperance, WA 6450

2.2 Contact Person

Contact person for enquiries: Alex Leonard

Phone: (08) 9072 3388

Email: aleonard@epsl.com.au

3.0 Identity of the owner of the material to be disposed of at sea
(if different to 2.0)

3.1 Owner Details

What is the legal name of the business, organisation or company?

What is the registered business name or trading name under which you operate? (if different from legal name)

Australian Business Number (ABN)

Australian Company Number (ACN) (if applicable)

Street address of the business (where the business is physically located)

Postal address of the business (If same as street address, write 'AS ABOVE')

3.2 Contact Person

Contact person for enquiries:

Phone:

Email:

PART C – ALTERNATIVES TO SEA DISPOSAL

4.0 Consider alternatives to sea disposal

4.1 You should identify alternative options for the disposal of dredged or excavated material other than sea disposal. These options should include:

- not dredging or excavating;
- re-use (e.g. land creation, beach nourishment, offshore berms, fill);
- off-site recycling (for example, as construction material);
- treatment to destroy or remove hazardous constituents for beneficial use; and
- disposal on land.

Please specify the options you have considered.

Not dredging or delaying the dredging was not considered feasible as it would reduce the operability of the Port Refer to 'Section 2.1.1: Alternative options' of the attached EIA. Disposal to the Esperance foreshore and the Port's reclamation area were considered as alternative options for disposal of the dredge material. However, sediment analyses showed that some elutriate metal concentrations were above the relevant water quality guidelines. Disposal to the foreshore would not achieve the dilutions required to meet these guidelines, whereas disposal to the offshore disposal ground would. Disposal to the offshore disposal ground was therefore considered a more environmentally acceptable option. Refer to 'Section 2.2.1: Alternative options' of the attached EIA.

4.2 Explain why your preferred option for disposal of the dredged or excavated material is sea disposal. In explaining why sea disposal is your preferred option you should provide:

- comparative cost estimates of the above alternatives (including sea disposal);
- detail any risk(s) to human health of the above alternatives (including sea disposal); and
- detail any risks to the environment of the above alternatives (including sea disposal).

Sea disposal is the preferred option for disposal of the dredged material due to risks to the environment from alternative options, as described above and in 'Section 2.2.2: Alternative options' of the attached EIA).

Ports' operations and adjacent Port users would be further impacted if all 60,000 m^3 of dredge material was stockpiled in the limited area next to the power station. Strict management of the dust bind coating on the 12,000m^3 stock pile will be undertaken to ensure that there are no significant dust impacts.

PART D – DETAILS OF TESTING AND MONITORING PREVIOUS TO THIS APPLICATION

5.0 Testing and Monitoring

5.1 Details of previous permits

Permit Number	Testing Conducted	Monitoring Conducted
No permit number given. Permit was issued on 6/06/1988	Y	N

Note: for the purpose of question 5.1 “testing” means testing of sediment undertaken in the course of being granted a previous sea disposal permit and “monitoring” means any monitoring required as a condition of that sea disposal permit.

Please attach any information on testing (for example a Sampling and Analysis Plan (SAP) Implementation Report) and/or monitoring that was conducted in relation to previous sea disposal permits.

Refer to the attached April 1988 Sea Dumping Application

6.0 Exemptions

Has an exemption from detailed testing requirements been given? (refer to section 4.2.1 of the NAGD for grounds for exemption).

If yes, attach a copy of the exemption notice.

No

PART E - DESCRIPTION AND ANALYSIS OF MATERIAL TO BE DISPOSED OF AT SEA

7.0 Description of the material to be disposed of at sea

7.1 Type of Material Requiring Disposal:

☐	Capital	☐	Dredge
✓	Maintenance	☐	Excavation

7.2 What is the volume of material (in situ) in cubic metres to be disposed of?

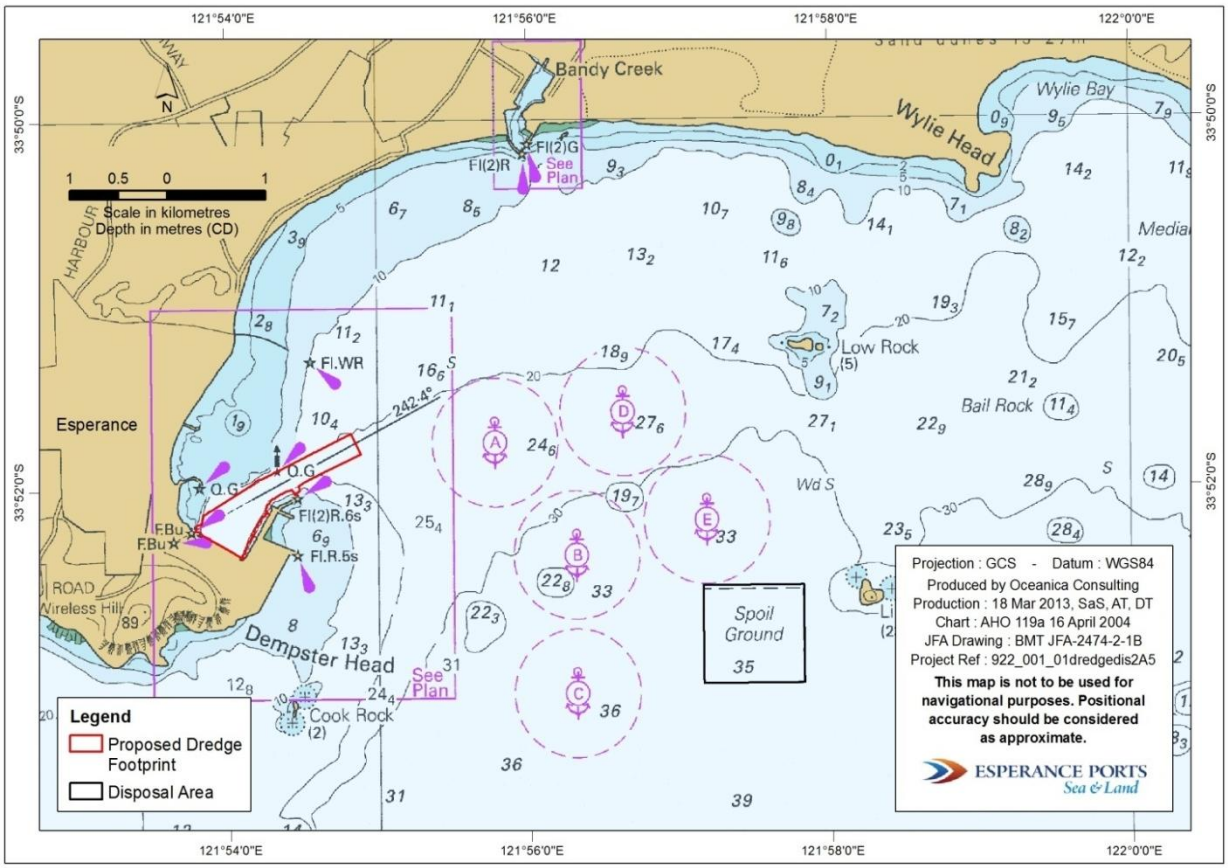
63,500 m^3

7.3 Describe the project that will generate the dredged or excavated material.

The Port of Esperance is sheltered from the south and east by a 1,200 m breakwater. The Port has two adjacent land backed berths (Berths 1 and 2) and a third dolphin-type berth (Berth 3) located on the main breakwater. Berths 1 and 2 face north-east and Berth 3 faces north-west. The dredged entrance channel is approximately 350 m long and adjoins a swing basin with an approximate diameter of 550 m. A hydrographic survey (March 2013) shows that some areas of the Port have accreted by up to 2 m, posing risk to navigation. In particular, the accretion north of Berth 3 is restricting the departure of fully laden Cape vessels from Berth 3. EPSL are proposing to dredge approximately 63,500 m^3 of material from the Port of Esperance's berths and channel to return the seabed to the 2001 design levels. The type of dredging plant has not yet been determined as EPSL is hoping to opportunistically secure one that is in transit past Port waters, to reduce mobilisation costs. The dredging is anticipated to take approximately 4 weeks; however, approval will be sought for an 8 week window to allow for contingencies. Refer to 'Section 2: Project Description' of the attached EIA.

7.4 .Attach a location and site plan including WGS84 co-ordinates and street address (where relevant). For dredged material include bathymetric contours. For excavated material, specify the location where the material can be inspected.

Esperance Port: The Esplanade, Esperance WA 6450



7.5 Physical description of material

Characterise the material (for example, gravel, sand, mud, clay, peat, rock or mixtures of these) and provide a brief summary of the geological features (such as, rock types, sediments found in dredge area, thicknesses of individual strata).

The material to be dredged is fine to medium grained sands. Some shaly sediment was sampled at site EP8. Refer to 'Section 6. 1: 'Physical composition' of the attached EIA.

7.6 Chemical description of material

Provide data on the average composition of the material to be disposed of at sea (expressed as percentage of dry weight).

Refer to 'Section 6: Nature of the material to be dredged' of the attached EIA.

In addition, for this application to be considered for a permit, the following sediment quality questions must be answered (refer to section 4.2 of the NAGD). If any of these questions are not applicable due to an exemption being given (refer to 6.0 above) please state 'Exempt'.

7.6.1 Is the concentration of <u>any</u> chemical constituent <u>above</u> the Screening Levels in Table 2 of the NAGD?

☑ Yes ☐ No

If ‘No’, go to question 7.10.

If ‘Yes’, list the chemical constituents and their levels.

The chemical constituents that were above the Screening Levels and their levels are provided in tables below. Refer to ‘Section 6: Nature of the material to be dredged’ of the attached EIA for a discussion of these results. Note that following analysis of sediment it was decided that berth sediments would be disposed of to land and channel sediments would be disposed of to sea. None of the channel sediments exceeded the guidelines.

95% upper confidence limit (UCL) of the mean total metal concentrations in sediment for berth sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
0-0.5 m (n=10)	6	0.2	9.56	78.3	127.8	46	43.4	0.01[1]
0.5-1 m (n=8)	4	n/a[3]	10.9	163.7	395.1[4]	96	127.9	0.01

Notes:

1. Most samples were below the limit of reporting (0.01 mg/kg) for mercury

2. Exceedances of Screening Levels and Sediment Quality High Values are shown in blue and red respectively.

3. n/a = 95% UCL could not be calculated due to an insufficient number of distinct values

4. The 95% UCL value was actually higher than any individual sample result, due to a combination of few data points and considerable variance

95% upper confidence limit (UCL) of the mean total metal concentrations in sediment for channel sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
0-0.5 m (n=8)	2	0.1	8.0	3.3	15.1	10	5.2	n/a

Notes:

1. Most samples were below the limit of reporting for mercury (0.01 mg/kg) and cadmium (0.1 mg/kg),

2. n/a = 95% UCL could not be calculated due to an insufficient number of distinct values however the Hg concentrations in all samples were below the screening level.

95% upper confidence limit (UCL) of the mean TBT concentrations in sediments for berth sites (µg Sn/kg

	Tributyltin
Reporting Limit	**<0.5**
Screening Level	**9**
Sediment Quality High	**70**
0-0.5 m (n=10)	2,557
0.5-1 m (n=8)	1,370

Notes:

1. Exceedances of the Sediment Quality High Value are shown in red.
2. The 95% UCL value was actually higher than any individual sample result, which were 2333.3 and 1000 µg Sn/kg for the 0-0.5 m and 0.5-1 m depths respectively , due to a combination of few data points and considerable variance

7.6.2 Are any of the chemical constituents listed in 7.6.1 (that is, those above Screening Levels) also above the background levels at the disposal site?

☑ Yes ☐ No

If 'No', go to question 7.10.

If 'Yes', list the chemical constituents and their background levels at the disposal site.

Disposal site metal concentrations (mg/kg)

Site	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
Screening Level	**20**	**1.5**	**80**	**65**	**21**	**50**	**200**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
D1	<2	<0.1	7.7	0.2	<0.7	<1	0.8	<0.01
D2	<2	<0.1	8.8	<0.2	<0.7	<1	0.6	<0.01
D3	<2	<0.1	7.0	0.3	<0.7	<1	0.6	<0.01
D4	<2	<0.1	4.1	<0.2	<0.7	<1	<0.5	<0.01
D5	2	<0.1	8.7	<0.2	<0.7	<1	0.6	<0.01
D6	<2	<0.1	8.9	<0.2	<0.7	<1	0.7	<0.01

Refer to 'Section 4.6.1: Sediment characteristics' of the attached EIA.

7.7 Elutriate testing

If you answered 'Yes' to question 7.6.2, elutriate testing may be required to be carried out. Refer to Section 4.2.3 and Appendix A of the NAGD for further information.

7.7.1 Are all results of elutriate testing below the *ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality* marine water quality criteria for any chemical parameter after allowable dilution?

☑ Yes ☐ No

If 'Yes, go to question 7.8.

If 'No', you should consult the department on further actions that maybe required. You have the option of carrying out detailed toxicity and bioavailability testing, and evaluating control measures to minimise the impact (such as treatment of the waste or confined disposal). It is important to note that if control measures are unlikely to be effective, the material may be considered unacceptable for sea disposal

7.8 Bioavailability testing

7.8.1 Has bioavailability testing been undertaken for all chemical constituents listed at 7.6.2?

☑ Yes ☐ No

If "No", go to question 7.9.

7.8.2 Are all chemical constituents below relevant bioavailability criteria?

☐ Yes ☑ No

See section 6.2.3 Bioavailable metals of the attached EIA.

If "Yes", go to question 7.10.

7.9 Sediment toxicity testing (refer to 4.2.4 of the NAGD)

If you answered 'No' to question 7.8.1 and/or question 7.8.2, sediment toxicity testing is required to be carried out, unless an exemption has been granted.

The sediments that had chemical constituents above relevant bioavailability criteria will not be disposed to sea. Refer to 'Section 6.6: Rationale for proposed approach to dredge spoil disposal' of the attached EIA.

7.9.1 Are the sediments to be dredged highly toxic? (refer to page 42 of the NAGD)

☐ Yes ☐ No

7.9.2 Are the sediments to be dredged significantly toxic? (refer to page 42 of the NAGD)

☐ Yes ☐ No

If 'No' to both 7.9.1 and 7.9.2, go to question 7.10.

If Yes to either question, the material is most likely unsuitable for unconfined sea disposal. You should consult the department to discuss further actions, including the investigation of control measures to minimise the impact (such as treatment of the waste or confined disposal). It is important to note that if the control measures are likely to be ineffective, it is likely that the material will not be suitable for sea disposal.

7.10 Biological Assessment

7.10.1 Have any introduced marine organism surveys been undertaken at or near the dredging location.

☑ Yes ☐ No

An introduced species survey was undertaken in March 2002 at the Port of Esperance (Campbell 2003). A summary of the findings of this survey and others in the region as reported in Huisman et al. (2008) have been included in Section 4.5 Introduced Marine Species of the attached EIA. Sections 7.9 and 8.5 of the attached EIA contain details on the risks and management of introduced marine species during the project.

Campbell, M.L. (2003). Introduced species port baseline survey. Esperance, Western Australia. Final Survey Report. Corporate Process Management, Perth, Western Australia. 55 pp.

Huisman JM, Jones DS, Wells FE, Burton T (2008) Introduced marine biota in Western Australian waters. Records of the Western Australian Museum 24:323–366

If "No", go to question 8.0.

7.10.2 Have any introduced marine organisms (including micro-organisms) been identified at or near the dredging location?

☑ Yes ☐ No

If "Yes", please provide details.

See Section 4.5 of the attached EIA

If "No", go to question 8.0.

7.10.3 Has the potential for these organisms to be transported in the dredged material been assessed?

☐ Yes ☑ No

If “Yes”, please provide details.

7.10.4 Has the potential for these organisms to become established at the disposal site been assessed?

☐ Yes ☑ No

If “Yes”, please provide details.

8.0 Contamination Management

8.1 Provide details of any recent contamination management audit(s) undertaken to identify the potential source(s) of contamination at or near the dredging or excavation location. Include an evaluation of the:

- types, amounts and cumulative physical impacts of contaminants generated;
- point and diffuse sources of contaminants to which material is exposed; and
- feasibility of strategies to prevent further contamination.

In late 2006 and early 2007 almost 800 bird deaths occurred in around Esperance, and were attributed to lead concentrate handled at Esperance Port. Investigations into the potential source and impact of the contamination were subsequently carried out as described in Section 3.2.3: Detailed lead and nickel surveys, 2007’ of the attached EIA. Lead concentrate out of the Port of Esperance has not been handled at the Port since March 2007.

PART F - DESCRIPTION OF DISPOSAL SITE AND PROCEDURES

9.0 Dredging or loading procedures

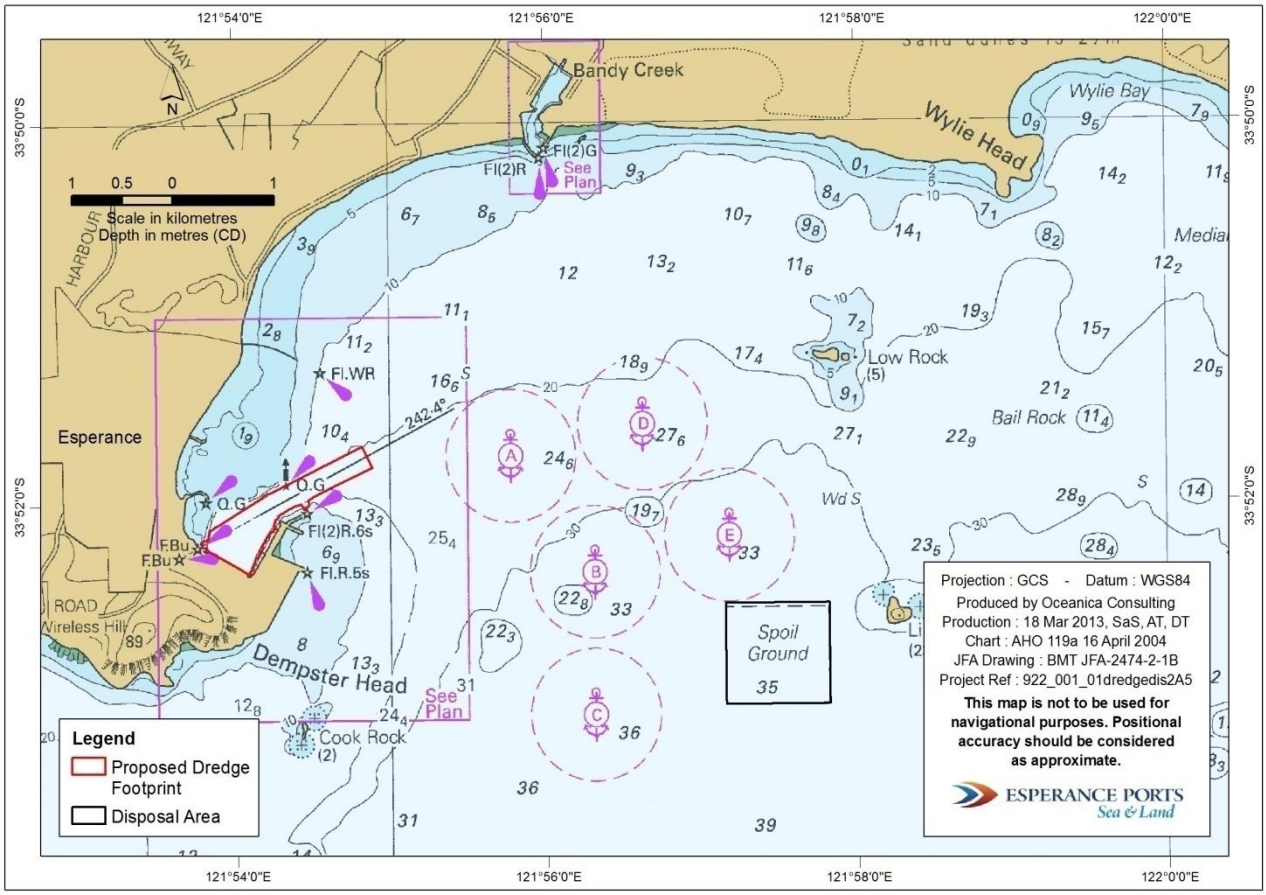
Briefly describe the dredging procedure, or for excavation, the loading procedure. In doing so you should provide details of the type of dredger or equipment to be used and the date, time period or stages over which dredging or excavation will take place.

Refer to 'Section 2.1: Dredging' of the attached EIA.

10.0 Description of Proposed Disposal Site

10.1 Location of site

Attach a suitably scaled map of the proposed disposal site, including WGS84 co-ordinates and showing bathymetric contours, the boundaries of the disposal site and distance from land.

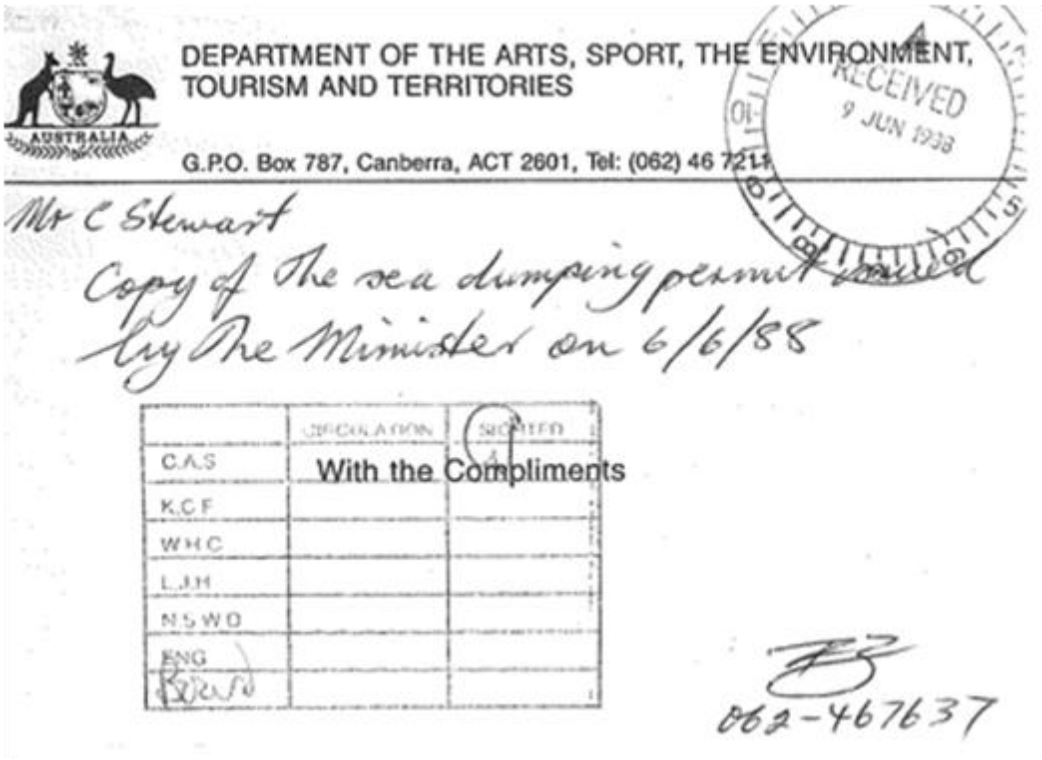


Has approval previously been granted for disposal at this site?

☑ Yes ☐ No

If "Yes", provide sea disposal permit number(s).

No permit number was given. The permit was issued on 6/06/1988 (see figure below)


DEPARTMENT OF THE ARTS, SPORT, THE ENVIRONMENT, TOURISM AND TERRITORIES

G.P.O. Box 787, Canberra, ACT 2601, Tel: (062) 46 7211

RECEIVED 9 JUN 1988

Mr C Stewart

Copy of the sea dumping permit issued by the Minister on 6/6/88

	SPECULATION	SIGNED
C.A.S	With the Compliments	
K.C.F		
W.H.C		
L.J.H		
N.S.W.D		
ENG		
[illegible]		

062-467637

10.2 Position fixing

Describe method to be used in positioning the disposal vessel.

Position fixing will use a DGPS, with an accuracy of ±1 m horizontally and ±100 mm vertically.

10.3 Is the disposal site located within the boundaries of or in the vicinity of a Marine Protected Area?

For the purpose of this application form, 'Marine Protected Area' refers to waters declared to be marine parks, aquatic reserves or any other type of zoning or planning for the purpose of management, protection and development of marine resources or areas including wildlife and their habitats and for scientific, educational, or recreational purposes. Typically, Marine Protected Areas are declared under legislation enacted by the Commonwealth (eg the *Environment Protection and Biodiversity Conservation Act 1999; Great Barrier Reef Marine Park Act 1975),* or a State or Territory Government.

☐ Yes ☑ No

If "Yes", provide details.

10.4 Describe any sensitive areas in the vicinity of the proposed disposal site. Sensitive areas include, but are not limited to, seabed communities within which algae (e.g. macroalgae, turf and benthic microalgae), seagrass, mangroves, corals or mixtures of these groups are prominent components.

There are no sensitive areas in the vicinity of the disposal site, see Section 4.6.2 of the attached EIA.

10.5 Provide information on the physical and any other relevant characteristics of the disposal site. Include the:

- water depth; 35 m Chart datum
- sea-bed topography; Refer to 'Section 4.1: Bathymetry' of the attached EIA
- sediment characteristics; The sediments at the disposal site are clean, fine to medium grained sands. Refer to 'Section 4.6.1: Sediment characteristics' of the attached EIA
- biological characteristics;\
- Refer to 'Section 4.6.2: Biological characteristics' of the attached EIA
- information as to whether the site is expected to be dispersive or retentive; The disposal site is retentive. It is in approximately 35 m of water and has previously been used for disposal of dredge material. and
- other relevant information. Refer to 'Section 4.6: Offshore disposal site' of the attached EIA

10.6 Describe the history of the disposal site if previously used for sea disposal of dredged, excavated and/or other waste material. If the site is retentive and has been used previously for sea disposal, provide an estimate of the remaining capacity at the disposal site.

The disposal site was previously used for the 1988 dredging (Refer to 'Section 3.1: Previous dredging programs' of the attached EIA. 1.4 million m^3 was disposed over the 1 million m^2 disposal site, adding a 1.4 m layer of sediment to the disposal site. As the proposed dredge program is for 51,500 m^3 this will only raise the seabed by an average of 5 cm over the entire disposal area.

11.0 Disposal Procedures

11.1 Describe the anticipated period and frequency of sea disposal operations and the quantities of dredged and/or excavated material involved for each.

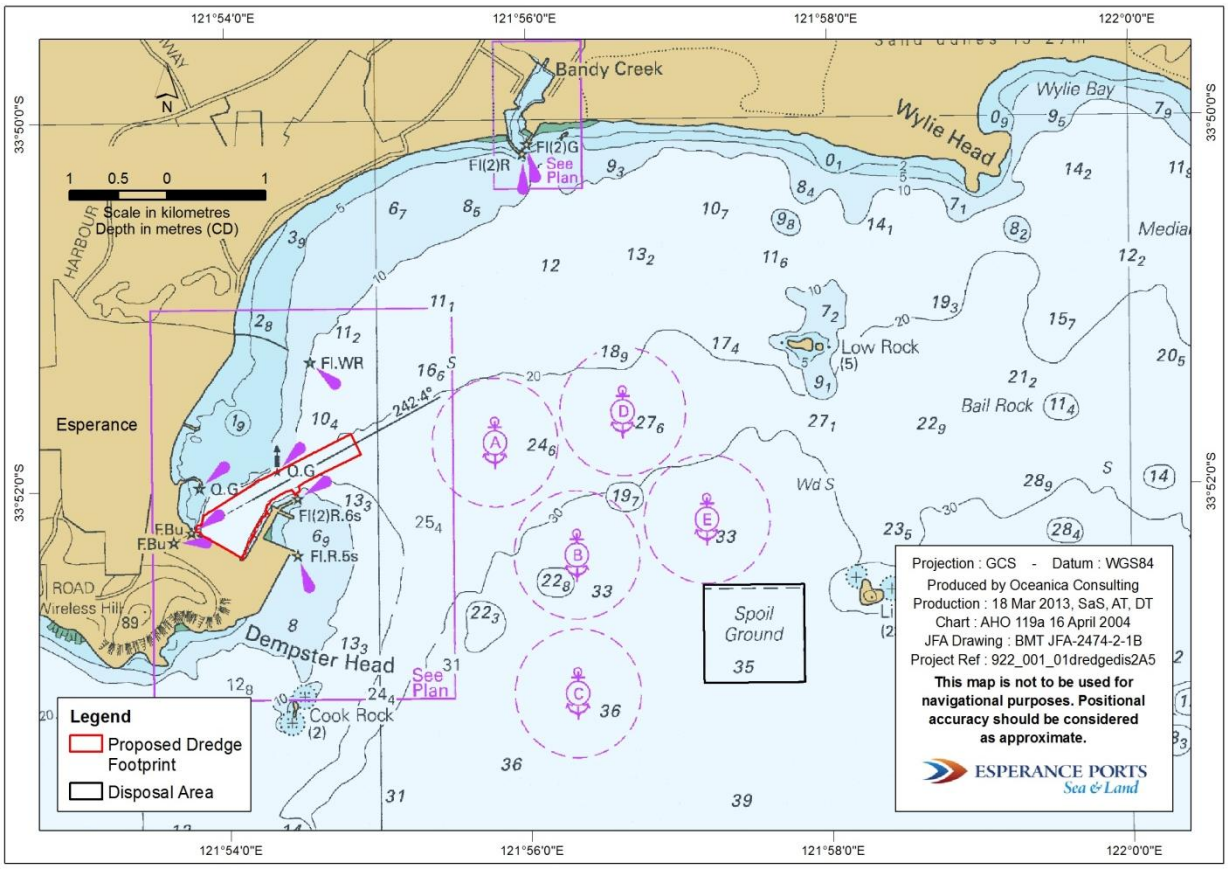
It is most likely that dredging will be undertaken with a small TSHD with a capacity of 2,500m^3. It is possible that a large dredge may be used, if available, however details have been provided for the smaller dredge to be conservative. If a larger dredge is used, this will result in fewer runs and a greater average quantity of material disposed per run.

Period of Proposed Sea Disposal	Number of Runs	Average quantity of dredged material to be disposed of per Run	Quantity of excavated material to be disposed of per Run
2013	24	1,750m3	

Note: For the purpose of question 11.1, 'number of runs' means the total number of vessel movements from the loading point to the disposal site.

11.2 Describe the route from loading to the disposal site.

See Figure below



11.3 Provide details of how the material will be disposed of at sea, in doing so you must provide information on the rate and duration of the disposal, the proposed method of disposal, the intended heading and speed of the vessel.

Refer to ‘Section 2.1: Dredging” of the attached EIA.

PART G - IMPACT HYPOTHESIS

12.0 Projected Impact of Disposal

12.1 Describe the projected physical, chemical and biological impacts on the disposal site and surrounding areas (see Section 4.3 of the NAGD).

- Predict the turbidity levels and dispersal of disposed material in the water column;
- Delineate the area of sea bed that will be substantially impacted (the zone of impact) and the movement of disposed dredged material;
- Assess physical impacts such as smothering of biota, change in substrate, light attenuation for sea grasses;
- Assess the severity of impacts on marine life, including possible translocation of species, increased predation and loss of available habitat. Also consider the existence and cumulative impacts of other disposal at the site or other nearby disposal sites;

- Assess changes in the concentration of nutrients, oxygen depletion, and any increased bio-availability of contaminants; and

- Assess possible effects on other users of the area.

Refer to ‘Section 7: Key potential impacts” of the attached EIA.

12.2 Describe and provide details of any intended investigations or studies of the possible impacts on the environment of the proposed action.

n/a

PART H - MONITORING

13.0 Proposed Monitoring Program

It is essential that monitoring programs have clearly defined and stated objectives.

13.1 Within the predicted zone of impact, describe your proposed monitoring program to determine the actual extent of change. In doing so you must address the specific effect(s) on the benthic community. You must also include boundary measurements that demonstrate the reliability of your impact hypothesis with respect to the impact on the zone of impact.

Your proposed monitoring program(s) should detail both your compliance and effects monitoring programs.

13.2 Outside the predicted zone of impact, describe any proposed monitoring program to determine whether:

- the actual zone of impact is as predicted; and
- the projected extent of change is within the scale projected.

Refer to ‘Section 8: Environmental monitoring” of the attached EIA.

PART I – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

14.0 Referring Actions under the EPBC Act

14.1 Has the proposed action been referred to the Commonwealth Environment Minister under the EPBC Act?

☑ Yes ☐ No

If 'Yes, please provide the EPBC identification number.

The proposed action is being referred to the Commonweath at the same time as this Sea Dumping Application so not identification number had been issued when this form was completed.

14.2 Has a decision on this proposed action been reached?

☐ Yes ☑ No

If 'Yes, please provide details of the decision.

14.3 Will the dredging, excavation, disposal or a related activity significantly impact upon:

☐ a declared World Heritage property

☐ a declared Ramsar wetland

☐ a Commonwealth marine area

☐ Great Barrier Reef Marine Park

☐ a listed threatened species

☐ a listed threatened ecological community

☐ a listed migratory species

☐ a national heritage place

PART J - CONSULTATION

15.0 Consultation with advisory bodies

Applicants should consult with relevant stakeholders prior to submitting an application. Section 3.6 of the NAGD outlines the guidelines for stakeholder consultation.

15.1 List the organisation or parties that you have consulted with on your proposed sea disposal activity.

15.2 Attach any record of consultation and any responses received.

Consultation has been undertaken with the Port Consultative Committee, which included representatives from:

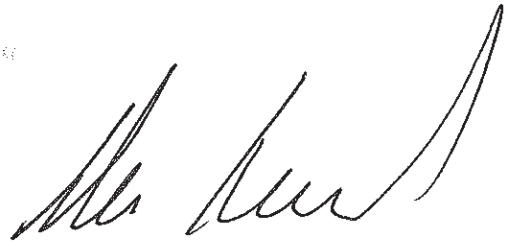
- Esperance Regional Tourism Association
- Parents of Esperance Active for Child Health
- Local Environmental Action Forum
- Locals for Esperance Development
- Esperance Office of DEC
- Lessees CBH

EPSL presented details on the maintenance dredging proposal based on the EIA document and there were no questions asked by Port Consultative Committee members.

The Esperance Power Station has been consulted with due to the proximity of the stockpile to their operations and they had no objections but requested to be informed of when the dredging works will occur.

PART K – DECLARATION

I declare that to the best of my knowledge the information I have given on, or attached to, this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.



Signed:

Name: Alex Leonard

Date: 5 April 2013

ESPERANCE PORT AUTHORITY

P.O. BOX 35

ESPERANCE W.A. 6450

Telephone 090 712111
Telex 91057

COVER SHEET - FAX TRANSMISSION

TRANSMISSION BY AUTOMATIC FACSIMILE MACHINE
GROUP III - (090) 713 765

RECEIVERS FACSIMILE NO: 062 475 615

FROM: COLIN STEWART

PLEASE DELIVER THE FOLLOWING PAGES TO: JOHN ARMSTEAD

ORGANISATION: DEPT OF ARTS, SPORT EC

CITY: CANBERRA

TOTAL NUMBER OF PAGES: 2

SUBJECT: SEA DUMPING APPLICATION

PLEASE ADVISE AS SOON AS POSSIBLE IF YOU HAVE ANY TROUBLE IN RECEIVING THIS MESSAGE. CALL THE SENDER AT THE ABOVE OFFICE ON (090) 712 111

ESPERANCE PORT AUTHORITY

P.O. BOX 35

ESPERANCE W.A. 6450

Telephone 090 712111
Telex 91057
Fax: (090) 713765

PLEASE ADDRESS ALL LETTERS TO THE MANAGING SECRETARY

Your Ref:

Our Ref: 1912.88:0701

John Armstead
Marine Programs Section
Department of Arts, Sport etc

Dear John

SEA DUMPING APPLICATION

Re your Fax of 28 April 1988.

1 Chem Labs W.A. have calculated the density of the spoil to be 1.32 tonnes per cubic metre.

2 The co-ordinates for the four points of the dump site are:

33^0 52' 37" Lat
121^0 57' 04" Long

33^0 52' 37" Lat
121^0 57' 44" Long

33^0 53' 09" Lat
121^0 57' 04" Long

33^0 53' 09" Lat
121^0 57' 44" Long

Regards

Colin Stewart
MANAGING SECRETARY

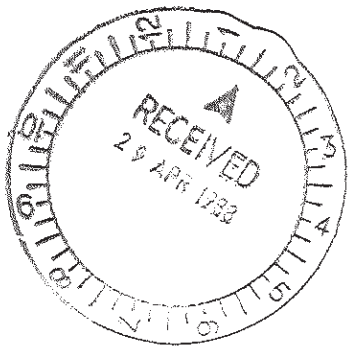
2 May 1988

Department of

THE ARTS, SPORT, THE ENVIRONMENT, TOURISM and TERRITORIES

88/1338

Mr Colin Stewart
Managing Secretary
Esperance Port Authority
P O Box 35
ESPERANCE WA 6450



Dear Mr Stewart

APPLICATION FOR A SEA DUMPING PERMIT

We acknowledge receipt of your sea dumping application of 22 April 1988 under the Environment Protection (Sea Dumping) Act 1981 and the application fee of $2,500.

Yours sincerely

F Ziolkowski
for Secretary

26 April 1988

	CIRCULATION	SIGHTED
C.A.S		
K.C.F		
W.H.C		
L.J.H		
N.S.W.D		
ENG		

APPLICATION FOR A PERMIT UNDER THE ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

INTRODUCTION

The purpose of this form is to enable the assessment of the need for and potential environmental impacts of a proposal to dump material at sea. On the basis of this assessment the Minister for Home Affairs and Environment may issue a permit for the proposed dumping under Section 19 of the Environment Protection (Sea Dumping) Act 1981. The form is designed to serve also as a Notice of Intention if supplementary action is necessary under the Environment Protection (Impact of Proposals) Act 1974.

The application should describe clearly what is proposed to be dumped, where, when, and by what method. It should describe the origin, quantity and composition of material and indicate why dumping at sea is the preferred means of disposal. Alternative strategies, including the non-generation of the waste and other possible means of disposal, should be indicated and the reasons for the rejection of alternatives outlined. Sufficient information on the dumping locality proposed and on the potential effects of the operation should be provided to allow environmental impacts to be assessed.

The questions listed in the form should be completed wherever appropriate. Certain groups of questions relate to specific classes of dumping operations as indicated in the form. Answers to particular questions may be supplemented if necessary to meet the general objective as set out above.

General and Special permits are defined in Article III of Schedule 1 to the Act. A Special permit refers to substances and materials requiring special care, as listed in Annex II to Schedule 1, a General permit refers to substances and materials which are not otherwise covered in Annex I or Annex II.

Under the Environment Protection (Sea Dumping) Regulations of 1983, an application fee of $2,500 for a General Permit or $5000 for a Special Permit must be forwarded before a permit may be issued. The Minister may waive the requirement for payment of all or part of such fee where he considers it necessary or desirable to do so.

Advice or guidance on the completion of an application for a Sea Dumping Permit may be obtained by writing to the Department of Home Affairs and Environment (GPO Box 1252 Canberra, ACT 2601) marking the enquiry "Sea Dumping", or by telephone (062-467211).

March 1984

FORM OF APPLICATION FOR A PERMIT UNDER THE ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

1. Identity of Applicant -
(name, address, postal address if different, telephone number).

Esperance Port Authority
The Esplanade
PO Box 35
ESPERANCE WA 6450

Phone No: 090 712111
Fax: 090 713765

Contact: Colin A Stewart

2. Identity of the owner of the material intended to be dumped -
(name, address, postal address if different, telephone number).

As Above

3. Description of material intended to be dumped -

(a) general description, including chemical composition (where known) and whether solid, liquid, sludge, solution etc.;

Medium to fine sand of calcareous origin.

See Attachment 1.

(b) total quantity, dry weight or otherwise (sufficient information should be given to allow the dry weight to be derived);

1.5 million cubic metres.

(c) source of material and description of the process or activity involved in producing it;

Dredged from the sea floor of the Esperance Harbour by a trailing suction hopper dredge.

(d) location where the material can be inspected;

Esperance Port
ESPERANCE WA

(e) physical properties-

(i) solubility or miscibility in seawater, including percentage by weight insoluble in seawater;

(ii) volatility; See Attachment 2 Chemistry Centre (WA) analysis.

(iii) density;

(iv) colour;

(v) smell;

(vi) viscosity, if liquid;

(vii) particle size and settling rate of insoluble fraction.

(viii) level of radioactivity;

Less than 10 Bg - g -1 See Attachment 3

(f) chemical and biochemical properties-

(i) pH,

(ii) composition as percentage dry weight in terms of major and reasonably identifiable minor components (high toxicity materials present in "significant amount" as defined by the London Dumping Convention should be listed*);

See Attachment 2

(iii) components which are listed in Annex I and Annex II of Schedule 1 of the Act should be listed and their concentration in percentage dry weight stated;

---

* The Scientific Group on Dumping has recommended, "In the context of Article VI(1)(a), substances listed in Section A of Annex II shall be regarded as contained in wastes as "significant amounts" if:

1. the concentrations of the following are of 0.1% or more by weight:

   1.1 arsenic and its compounds;
   1.2 zinc and its compounds;
   1.3 copper and its compounds;
   1.4 organosilicon compounds;
   1.5 cyanides; and
   1.6 fluorides;

2. the concentrations of the following substances are of 0.05% or more by weight:

   2.1 lead and its compounds; and
   2.2 pesticides and their by-products not covered in Annex I."

Article VI and Annex II are part of Schedule 1 of the Act.

(iv) reactivity with seawater;

(v) chemical oxygen demand (COD);

Refer to Attachment 2 (vi) bio-chemical oxygen demand (BOD);

(vii) biodegradability;

(viii) products of decay.

(g) biological properties-

(i) presence of viruses, bacteria, yeasts or other organisms;

(ii) toxicity to marine organisms (any known toxicity testing data should be provided);

(iii) accumulation and transformation in biological or sedimentary material;

(iv) known data relating the material to the production of taints in commercial species of marine life which might be found in the vicinity of proposed dumping zone;

(h) persistence in the marine environment (show half-life if appropriate);

(i) hazards to human health;

(i) toxicity by oral intake of material or of contaminated biota;

Nil

(ii) toxicity by skin contact;

Nil

(iii) toxicity by inhalation.

Nil

4. Alternatives to dumping at sea-

(a) possible modification of the activity, as a consequence of which waste is produced, which might minimise the quantity of material to be disposed or render it more suitable for disposal other than by dumping at sea;

(b) alternative means of disposal considered and reasons for non-adoption;

The possibility of using the sand for land reclamation was examined. The lack of a suitably protected site rendered the proposition unworkable.

(c) previous means of disposal, if any;

Previous dredging of the harbour took place in 1969/70. Sand was pumped ashore for reclamation and foreshore stabilisation purposes. There is no further requirement for such sand.

(d) possible means of mitigating potentially or actually harmful effects of the material before or after dumping;

N/A

(e) Summary of reasons for proposal to dispose by dumping at sea;

Dumping at sea is believed to be the only alternative. Impact on the environment will be minimal. A trailing suction hopper dredge is considered to be the most suitable piece of equipment for the operation.

5. Carrier of material -

(a) name, address, postal address if different and telephone number of owner of vessel, aircraft or platform proposed to be employed for dumping operation;

The dredging contract will be put out to tender. Successful tenderer is expected to be known by May 1988.

(b) person to be in charge of dumping vessel, aircraft or platform;

As Above

(c) name and port of registration of vessel; type, model, serial number, nationality of aircraft; name or number of platform (whichever applies);

As Above

6. Loading procedures -

(a) intended place of loading;

Esperance Harbour

(b) packaging or presentation of material;

(c) method of storage and loading;

Trailing suction hopper dredge.

(d) date(s) of proposed loading.

To be determined - likely to be June through to October 1988.

7. Characteristics of proposed disposal site(s) - (a map may be included)

(a) geographical position (latitude and longitude);

Latitude $34^{o}52'$ Longitude $121^{o}57'$ - see Attachment 4

(b) method of determination of position in course of dumping operation;

Dredge operator will be required to use sophisticated navigational equipment such as SatNav. Dumping operations will be regularly monitored by Port Authority.

(c) depth of water; 35-40 metres.

(d) distance from nearest land; 2-75 nautical miles.

(e) relevant hydrographic, biological and meteorological characteristics of the site, including characteristics of the sea bottom at the site, effect of material on biota at disposal site or other areas potentially affected by dumping operations;

See Attachment 5 and 6. The site has been discussed with the State Environmental Protection Authorities Marine Impact Branch and is considered to pose no significant environmental problems.

(f) relation of proposed site to features of importance for amenity, navigation, resource investigation or exploitation, cultural, historic or scientific interest, fishing, endangered or rare or migratory species, and to other dump sites;

The location of the site was selected following discussions with State Marine Authorities. The Esperance Harbour Master was consulted to ensure the site posed no threat to navigation. There is no known resource investigation cultural or scientific interest in the area. Commercial fishing is not undertaken in the vicinity as it is too close to the major shipping channel.

(g) **data on ocean currents, upwelling, etc. relevant to dispersal of material;**

See Attachment 4. There is a weak NNE current in the bay. It is anticipated that some of the fines may will drift in this direction.

(h) **expected fate of material;**

99% of the material is expected to settle on the bottom at the dredge spoil site.

(i) **summary of reasons for selection of proposed site;**

The site is
i) deep water
ii) of no commercial or recreational interest to fisheries.
iii) sea floor consists of almost identical material to that to be dredged.
iv) is in close proximity to dredge site.

(j) **availability of, or intended program for, collection of baseline data on site characteristics to enable consequences of dumping operations to be monitored.**

Data has been collected via hydrographic and diving survey. The site will be subjected to further hydrographic survey before, during and after the dumping.

8. Dumping procedures -

(a) **route from loading to dumping site;**

On bearing 286^0 from the end of harbour breakwater.

(b) **method of dumping including rate, speed and heading (if relevant);**

Spoil will be dumped via hydraulically operated bolton dump doors from the dredge's hopper.

(c) **procedure for clean-up, tank washing, etc.;**

N/A

(d) if proposal is to dump more than once, quantity per disposal and proposed frequency.

Dredging is anticipated to take up to 16 weeks. Dredge will operate on a 1½ - 2 hour cycle carrying a load of 2500-3000 cubic metres of spoil.

Additional information in case of containers or bulky objects

9. Number and dimensions of items-

N/A

10. Construction materials of items and anticipated period during which structural integrity will be maintained when sunk-

N/A

Additional information in case of disposal of vessels, aircraft or platforms

11. For vessels -

name of vessel; Not Currently Available.

port of registration;

nature and weight of ballast left on board;

age;

history of use, including usual and last cargo;

details of any residues including oil which may remain on board.

For aircraft -

type and model;

nationality; N/A

serial number;

age;

history of use, including usual and last cargo;

details of any residues including oil which may remain on board.

For platforms or other structures -

name or number;

country of registration;

age; N/A

history of use;

details of any residues including oil which may remain on board.

12. Means of transfer to disposal site -

Via trailing suction hopper dredge.

13. Steps to be taken to ensure that the object will sink and that signficant fragments or residues will not be dispersed -

14. Steps to be taken to confirm position on the sea bed after sinking -

Hydrographic survey.

Additional information on proposals for ocean incineration

15. Reason for proposal to dispose of material by incineration at sea -

N/A

16. Composition and properties of the material -

(a) principal organic components;

(b) organohalogen content;

(c) main inorganic components;

(d) (i) % halogen content;
(ii) % moisture content;
(iii) nature and size of solids in suspension;

(iv) ash content;
(v) heavy metals content;

(vi) other relevant constituents;

(vii) calorific value.

17. Characteristics of incineration site -

(a) atmospheric dispersal characteristics, including seasonal variation;

(i) wind speed and direction;

(ii) atmospheric stability;

(iii) frequency of inversions and fog;

(iv) precipitation types and amounts;

(v) humidity;

(vi) from meteorological records, average number of stormy days per year and number expected during the period of proposed incineration;

(b) oceanic dispersal characteristics;

(c) relationship to shipping and aviation routes, and to fishing grounds;

(d) availability and type of navigational aids on incineration vessel.

18. Certification that the incineration system complies with the provisions of the Regulation for the Control of Incineration of Wastes and Other Matter At Sea under Annex I to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (See Schedule 2 to the Environment Protection (Sea Dumping) Act 1981) -

A copy of the survey of the marine incineration facility should be attached.

Further information

19. Any further information (including information on consultations with State authorities) relevant to the proposal or to possible alternatives considered, including potential environmental impacts of the proposal and of possible alternative means of disposal -

The dredging proposal has been discussed with State Authorities who in the case of the Department of Marine and Harbours, assisted in choosing the disposal site.

The dredging operations will consist of the loose sediments that have been deposited in the Esperance Bay over the centuries by the lateral drift along the coast. The sediments will be disposed off at a spoil site where the sea bottom consists of identical sediments located in 35-40 metres of water.

The State Environmental Protection Authority have assessed the proposal and consider that the enviromental impact will be minimal.

Also attached (Attachments 7,8 & 9) is an aerial photo of the harbour, a plan of the harbour showing the layout and sample sites and a plan showing cross-sections taken along the leads and the beacons.

ESPERANCE PORT DEVELOPMENT

CLIENT: VAN DER PEYL *MARINE CONSULTANTS*

PROJECT: SUBMITTED SAMPLES

SHEET No.: 7 OF: 7

JOB No.: 1909 / S1966A

DATE TESTED: 26/11/87

PARTICLE SIZE DISTRIBUTION TEST RESULT

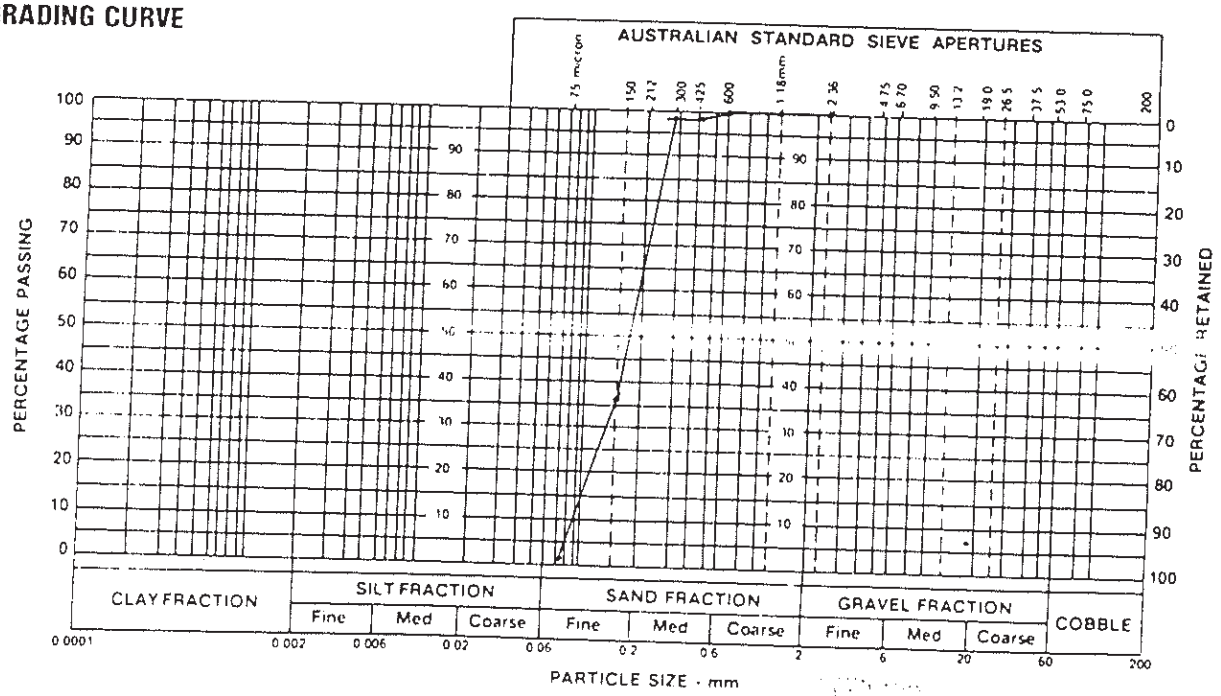
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
Hole No. 13	Light olive grey (5Y6/1)* SAND minor silt	SP

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.1.

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	FINER	DIAMETER	FINER
75.0mm	–	1.18mm	100				
37.5mm	–	600 micron	100				
19.0mm	–	425 micron	99				
9.5mm	–	300 micron	99				
4.75mm	–	150 micron	36				
2.36mm	100	75 micron	1				

GRADING CURVE



TESTED BY: AB CHECKED BY: LK DATE: 1/12/87

* Denotes use of Rock Colour Chart

ESPERANCE PORT DEVELOPMENT

VAN DER PEYL

CLIENT: *MARINE CONSULTANTS*

PROJECT: SUBMITTED SAMPLES

SHEET No.: 4 OF: 7

JOB No.: 1909 / S1966A

DATE TESTED: 26/1/187

PARTICLE SIZE DISTRIBUTION TEST RESULT

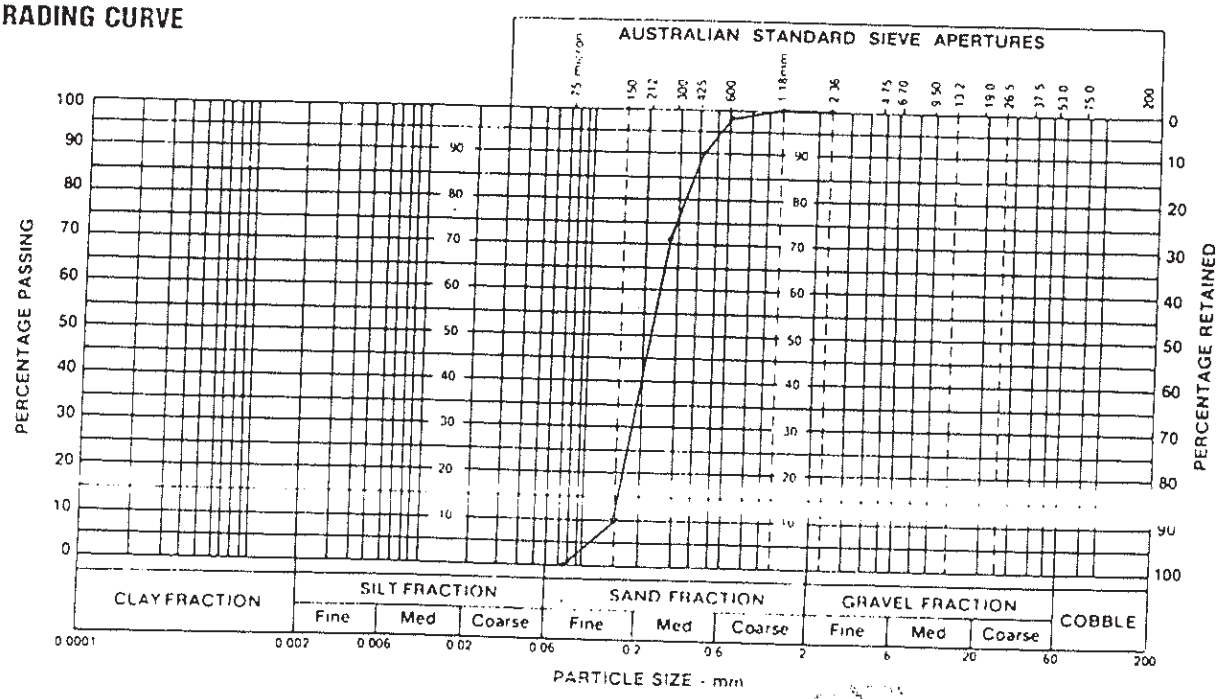
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
Hole No. 2	Light olive grey (5Y6/1)* SAND minor silt	SP

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.1.

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
75.0mm	–	1.18mm	100				
37.5mm	–	600 micron	98				
19.0mm	–	425 micron	90				
9.5mm	–	300 micron	71				
4.75mm	–	150 micron	10				
2.36mm	100	75 micron	0				

GRADING CURVE



TESTED BY: AB CHECKED BY: LK DATE: 1/12/87

* Denotes use of Rock Colour Chart

ESPERANCE PORT DEVELOPMENT

VAN DER PEYL
MARINE CONSULTANTS

CLIENT:

PROJECT: SUBMITTED SAMPLES

SHEET No.: 5 OF: 7

JOB No.: 1909 / S1966A

DATE TESTED: 26/1/187

PARTICLE SIZE DISTRIBUTION TEST RESULT

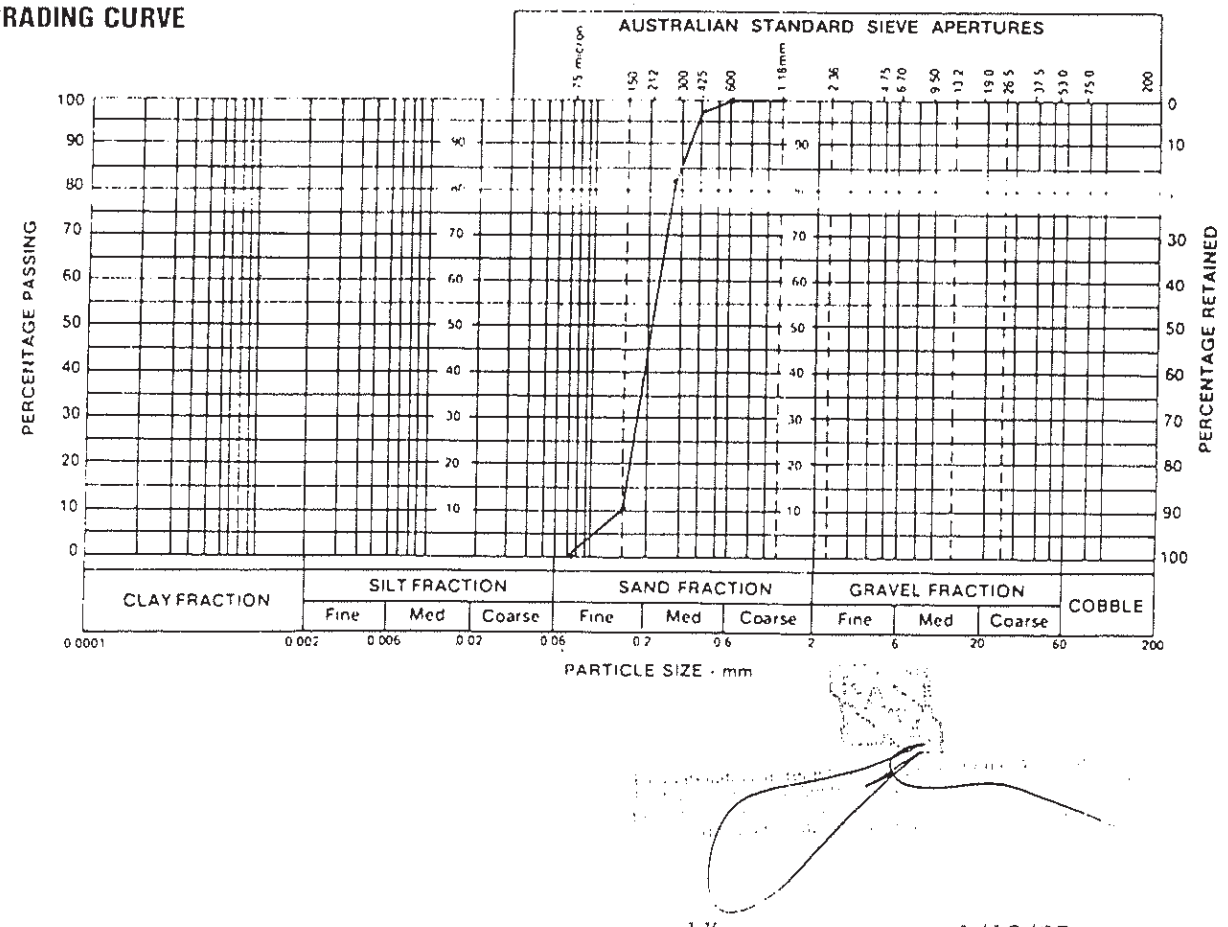
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
Hole No. 5	Light olive grey (5Y6/1)* SAND minor silt	SP

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.1.

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
75.0mm	–	1.18mm	100				
37.5mm	–	600 micron	100				
19.0mm	–	425 micron	97				
9.5mm	–	300 micron	82				
4.75mm	–	150 micron	10				
2.36mm	–	75 micron	0				

GRADING CURVE



TESTED BY: AB CHECKED BY: LK DATE: 1/12/87

* Denotes use of Rock Colour Chart

ESPERANCE PORT DEVELOPMENT

VAN DER PEYL

CLIENT: *MARINE CONSULTANTS*

PROJECT: SUBMITTED SAMPLES

SHEET No.: 6 OF: 7

JOB No.: 1909 / S1966A

DATE TESTED: 26/11/87

PARTICLE SIZE DISTRIBUTION TEST RESULT

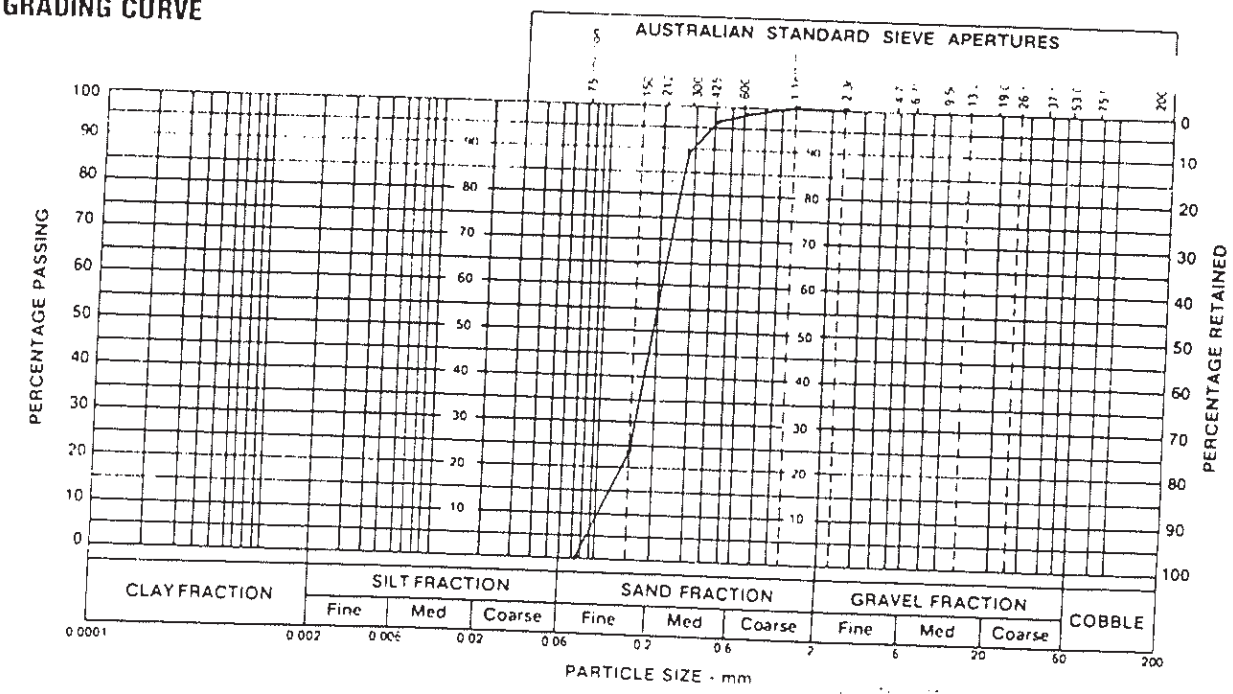
VISUAL CLASSIFICATION (A.S.1726)

SAMPLE IDENTIFICATION/DEPTH	DESCRIPTION	SYMBOL
Hole No. 10	Light olive grey (5Y6/1)* SAND minor silt	SP

PARTICLE SIZE DISTRIBUTION (A.S. 1289) C6.1.

SIEVING				HYDROMETER			
SIEVE SIZE	% PASSING	SIEVE SIZE	% PASSING	DIAMETER	% FINER	DIAMETER	% FINER
75.0mm	–	1.18mm	100				
37.5mm	–	600 micron	98				
19.0mm	–	425 micron	96				
9.5mm	–	300 micron	89				
4.75mm	–	150 micron	24				
2.36mm	100	75 micron	0				

GRADING CURVE



TESTED BY: AB CHECKED BY: LK DATE: 1/12/87

* Denotes use of Rock Colour Chart

CHEMISTRY CENTRE (W.A.)
~~GOVERNMENT CHEMICAL LABORATORIES~~
125 Hay Street, Perth, Western Australia 6000
Telephone: 325 5544
Address all correspondence to the Director

Managing Secretary
Esperance Port Authority
P.O. Box 35
ESPERANCE 6450

OUR REF 1825.88.0701
YOUR REF
ENQUIRIES TO
21 April 1988 dc.

ATTACHMENT 2

Four samples of sediment; Marked: As below.

MATERIAL

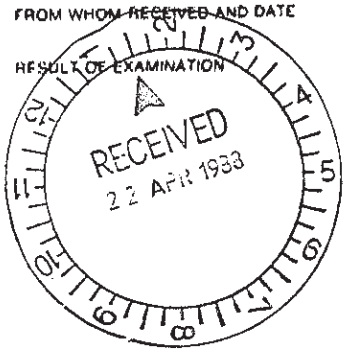
88F2770-3

LAB No

Esperance Port Authority on 18.2.88

FROM WHOM RECEIVED AND DATE

RESULT OF EXAMINATION



Description of samples:

Marks	Lab No. 88F	Description
Sediment Sample		
1	2770	Mainly sand
2	2771	Mainly sand
3	2772	Mainly sand
4	2773	Mainly sand

...2/-

2. Lab No.88B2770-3

Marks	1	2	3	4
Lab No. 88F	2770	2771	2772	2773
	mg/kg (dry basis)			
Hydrocarbons (as diesel)	nd	nd	nd	nd
Organohalogens (PCBs etc)	nd	nd	nd	nd
Pesticides				
Organochlorine	nd	nd	nd	nd
Organophosphorus	nd	nd	nd	nd
Metals				
Arsenic, As	0.9	0.9	0.8	0.9
Cadmium, Cd	0.5	0.4	0.4	0.4
Copper, Cu	20	10	4	2
Lead, Pb	4	4	3	2
Mercury, Hg	<0.5	<0.5	<0.5	<0.5
Zinc, Zn	40	30	7	5
Biochemical Oxygen Demand (BOD)				
5 day	40	30	30	<15
Chemical Oxygen Demand	5200	3300	3300	7600
	millimetres			
Particle Size 50	0.175	0.18	0.155	0.145
Particle Size 90	0.125	0.14	0.125	0.125
	millimetres per second			
Settling Rate 50	28	30	22	20
Settling Rate 90	14	18	14	14

nd denotes not detected
NA denotes not applicable

Particle Size 50 denotes the diameter at which 50 percent of the sample is coarser.
Particle Size 90 denotes the diameter at which 90 percent of the sample is coarser.
Settling Rate 50 is the calculated settling rate for material of Particle Size 50.
Settling Rate 90 is the calculated settling rate for material of Particle Size 90.

* The values for Particle Size 90 and Settling Rate 90 were obtained from suspensions of these materials in tap water. In practice, sea water will cause the finer silt and clay particles to flocculate, vastly shortening their settling times.

The settling rate of a flocculated sediment cannot be measured satisfactorily in the laboratory and if such measurements were possible they would have no relationship to settling rates in the ocean which will be affected by currents, disturbance by wave action and the like.

3. Lab No.2770-3

Limits of Detection

	mg/kg (dry basis)
Hydrocarbons (as diesel)	1
Organohalogens - PCBs (as Aroclor 1254)	0.1
Pesticides	
Organochlorine including Aldrin, Chlordane, DDT and Metabolites, Dieldrin, Heptachlor and its Epoxide and Lindane.	0.1
Organophosphorus including Chlorpyrifos, Diazinon, Fenamiphos, Fenitrothion Maldison and Parathion.	0.1

Methods of Analysis

Hydrocarbons : Solvent extraction and analysis by gas chromatography with flame ionization and ion trap detection systems.

Organohalogens and Pesticides : Solvent extraction with hexane/acetone and dichloromethane and analysis by capillary gas chromatography with electron capture and thermionic specific detectors. Confirmation by analysis on second capillary column.

Metals : Mixed acid digestion, with nitric/perchloric acids (Cd, Cu, Pb, Zn), nitric/sulphuric/perchloric acids (As) and nitric/sulphuric/hydrochloric acids (Hg), and analysis by atomic absorption spectrophotometry. Hydride generation used for mercury and arsenic.

BOD and COD according to 'Standard Methods for the Examination of Water and Wastewater', APHA, 1985.

Particle Size : In accordance with Australian Standard AS 1289, C6.1 and C6.3.

Settling Rates : Calculated from particle sizes using the Stokes Law equation. It was assumed that the particles were of uniform composition and specific gravity.

P.N. JACK
ACTING CHIEF
ENVIRONMENTAL CHEMISTRY LABORATORY

G.F. EBELL
ACTING PRINCIPAL CHEMIST PESTICIDES
ENVIRONMENTAL CHEMISTRY LABORATORY

L88F2770122

ATTACHMENT 3

HEALTH DEPARTMENT OF WESTERN AUSTRALIA

Your ref:
Our ref: LT:DLH
Enquiries: TOUSSAINT EXT 3317

RADIATION HEALTH BRANCH
Verdun Street
Nedlands W.A. 6009
Telephone: (09) 389 3333
Telex: AA 93110

RADIATION HEALTH BRANCH
G.P.O. Box X2307
PERTH 6001

The Esperance Port Authority
PO Box 35
ESPERANCE WA 6450

24 February 1988

Attention: Mr Colin A Stewart

Dear Sir

ANALYSIS OF ESPERANCE HARBOUR SEDIMENT SAMPLES FOR RADIOACTIVITY

We have now completed the analyses of your four samples. ESPER1.DAT, ESPER2.DAT, ESPER3.DAT, ESPER4.DAT.

The samples were analysed by gamma radiation spectrometry.

For each of the samples, the radioactivity was less than 10 Bq g^{-1}.

Yours faithfully

B E King
Director of Radiation Health

lt240288.dlh

	CIRCULATION	SIGNED
C.A.S		
K.C.F		
W.H.C		
L.J.H		
N.S.W.D		
ENG		

ATTACHMENT 5

SEALINC ESPERANCE
Marine Consultants

On instruction from the Esperance Port Authority an area suggested for deposition of dredge spoil from the Esperance Harbour proposed deepening was examined.

The area was defined as one kilometer square centred on a point 2.75 nautical miles with Esperance breakwater beacon bearing 285° being Lat 34°52' Longitude 121°57'.

The positions location was determined by radar and confirmed by bearings off Wylie Head, Cull Island, Dempster Head and Rabbit Island. The area was traversed as shown on the accompanying chart using an AWA Aquaprobe 600.

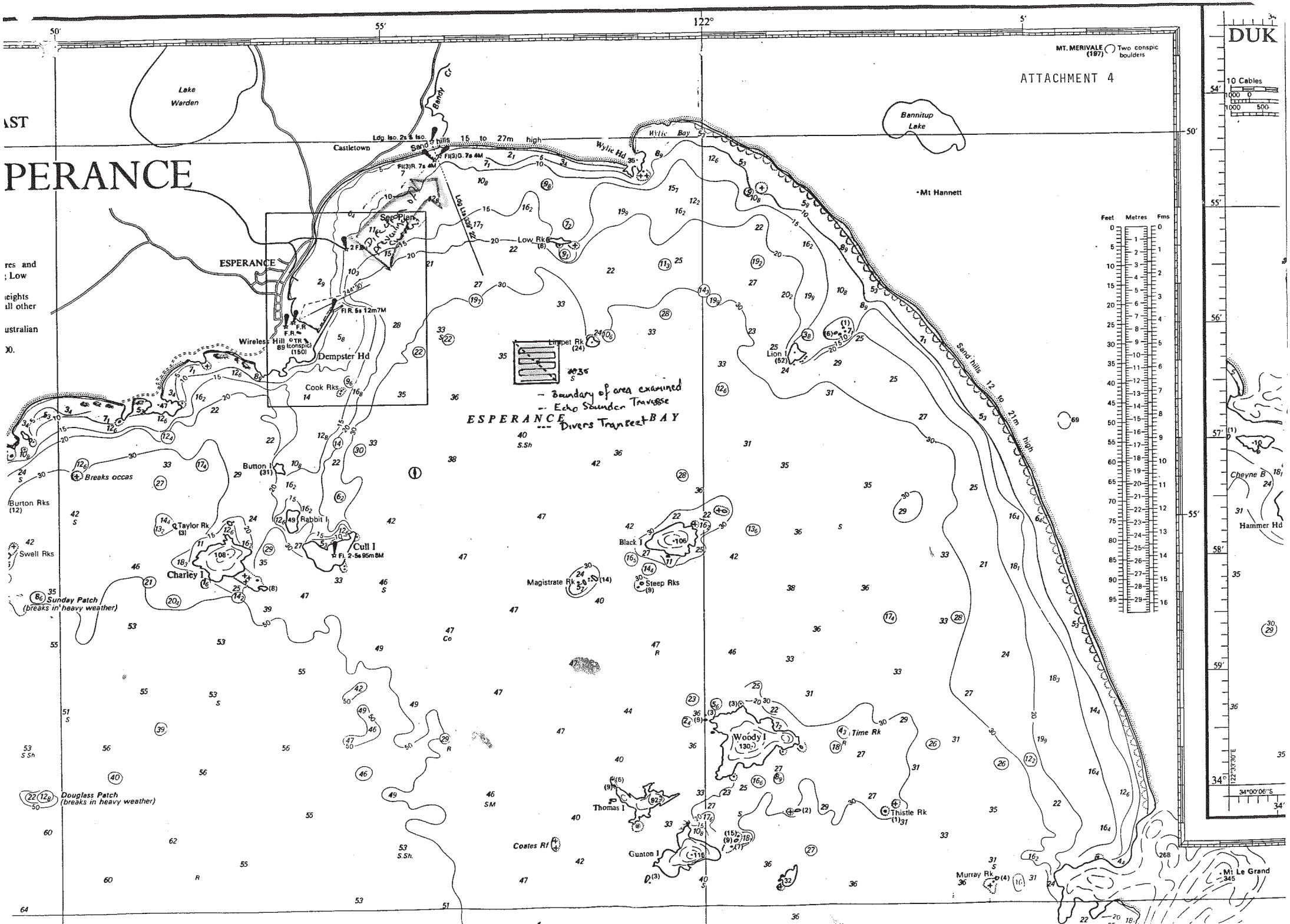
The soundings showed a very uniform bottom profile of between 35 and 36 meters when traversed between 1200 - 1300 hours on 24 January 1988. Interpretation of the soundings suggested a sand bottom.

To confirm this interpretation divers were sent down to sample the bottom type and execute a 500 meter transect of the area.

The bottom proved to be fine white sand devoid of seaweed, sponge coral or other sedentary marine organisms over the entire length of the transect.

In view of the results of examination of this area it can be assumed that the deposition of dredge spoil of largely similar fine white sand in this area in the manner proposed should have neglible effect on the environment.

R H Stewart


ATTACHMENT 4
PERANCE
ESPERANCE
Lake Warden
Bandy Cr
Castletown
Ldg lso. 2s & lso.
Sand hills 15 to 27m high
Wylie Bay
Wylie Hd
Bannitup Lake
Mt Hannett
MT. MERIVALE (187) Two conspic boulders
Sand hills 12 to 21m high
See Plan
Low Rk (6)
Wireless Hill (conspic) (150)
Dempster Hd
Cook Rks
Limpet Rk (24)
Lion I (52)
Button I (31)
Breaks occas
Burton Rks (12)
Taylor Rk (3)
Rabbit I
Cull I
Fl. 2·5s 95m 8M
Charley I
Swell Rks
Sunday Patch (breaks in heavy weather)
Magistrate Rk
Steep Rks
Black I
Woody I 130
Time Rk
Thomas I
Thistle Rk
Douglass Patch (breaks in heavy weather)
Coates Rf
Gunton I
Murray Rk
Mt Le Grand 345
Cheyne B
Hammer Hd
- Boundary of area examined
-- Echo Sounder Traverse
--- Divers Transect
ESPERANCE BAY
Feet Metres Fms
DUK
10 Cables
122°
34°00'06"S
122°33'30"E

Reg No.....

Department of

THE ARTS, SPORT, THE ENVIRONMENT, TOURISM and TERRITORIES

FACSIMILE TRANSMISSION

TO: COLIN STEWART
ESPERANCE PORT AUTHORITY

RECEIVED 3 JUN 1988

FROM: F ZIOLKOWSKI

TITLE OF MESSAGE:
AS DISCUSSED WITH DR J GORDON-SMITH, COPY OF UNSIGNED DRAFT PERMIT IS ATTACHED

NO. OF PAGES: 4 FOLLOWING **DATE:** 3-6-88

CONTACT OFFICER: F. Z. **TELEPHONE NO:** 062-467637

COMMENTS:

	CIRCULATION	SIGHTED
C.A.S		✓
K.C.F		
W.H.C		
L.J.H		
N.S.W.D		
ENG		

090-713765

Attachment A

Esperance Port Authority, Esperance, WA

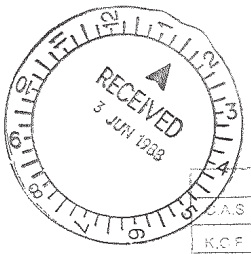
ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981

GENERAL PERMIT

I, Graham Frederick Richardson, Minister of State for the Arts, Sport, the Environment, Tourism and Territories, having had regard to the matters referred to in Section 19 of the Environment Protection (Sea Dumping) Act 1981 and pursuant to my powers under the Act, grant a general permit to the Esperance Port Authority, PO Box 35, Esperance, WA, 6450 and any person contracted by them for the same purpose, for the period of twelve months commencing on the date of approval, to load and to dump up to 2.2 million tonnes of dredge spoil of the kind specified in Clause 5 of Appendix 1 attached, arising from the dredging of the shipping channel and berthing basin at the Port of Esperance subject to the terms and conditions which are described and specified in Appendix 1.

Dated ..... day of 1988

GRAHAM RICHARDSON
Minister of State for the Arts,
Sport, the Environment, Tourism
and Territories



	CIRCULATION	SIGHTED
C.A.S		
K.C.F		
W.H.C		
L.J.H		
N.S.W.D		
ENG		

Appendix 1

CONDITIONS FOR DUMPING AT SEA OF SPOIL ARISING FROM THE DREDGING OF THE PORT OF ESPERANCE BY THE ESPERANCE PORT AUTHORITY (EPA)

1. It is a condition of this permit that any requirements lawfully imposed by State Departments and agencies in areas under their jurisdiction relative to the dredging, transport and handling of dredge spoil are met.

2. The period of the permit is for twelve months commencing on the date of approval.

3. Matters relating to operation of vessels and handling of dredge spoil are to be to the satisfaction of both the Western Australia Department of Marine and Harbours and the Commonwealth Department of Transport and Communications.

4. Vessels used in the loading, carrying and dumping of the dredge spoil are to comply with all relevant provisions of international conventions.

5. The dredge spoil to be loaded and dumped comprises medium to fine calcareous sand and is to be in accordance with that described in the permit application of 22 April 1988. In the case of any departure from this description, the Department of the Arts, Sport, the Environment, Tourism and Territories (the Department) is to be consulted immediately regarding possible changes in requirements prior to the loading of such material.

6. The material to be disposed of is to be derived from dredging operations at the Port of Esperance as indicated in the permit application. No other material additional to that referred to above is to be loaded or dumped.

7. The total quantity of dredge spoil to be dumped under this permit is not to exceed 2.2 million tonnes.

8. Dumping of all dredge spoil and washing of vessels is to take place within a rectangular area described by corners as follows:

33°52'37"S	121°57'04"E
33°52'37"S	121°57'44"E
33°53'09"S	121°57'04"E
33°53'09"S	121°57'44"E

During the dredging operations, vessels are to comply with instructions by the EPA to avoid as far as practicable obstructions to shipping or interference with normal port procedures.

9. No later than seven days prior to the commencement of loading and dumping of the dredged material, the following information concerning the carrier(s) of the material is to be provided to The Secretary, Department of the Arts, Sport, the Environment, Tourism and Territories, GPO Box 787, Canberra, ACT 2601 (the Secretary).

   - name(s) of vessel(s)
   - name(s) and address(es) of owner(s) of vessel(s)
   - name(s) and address(es) of master(s) of vessel(s)
   - port(s) of registration
   - type(s) of vessel(s)
   - expected date of commencement of loading
   - expected frequency of dumping and amounts (eg per day/week)

10. The Department is to be advised promptly of any variation from the information provided in Clause 9 above.

11. All costs incurred as a result of specified monitoring activity and analysis of samples are to be met by EPA.

12. Examination of the dredge and dumping vessel log book entries, and verification that dumping is taking place in the correct location, is to be the responsibility of EPA.

13. Continuous supervision of all activities associated with the operation is to be undertaken by EPA which is to advise the Secretary immediately of any unscheduled environmentally adverse event.

14. Certified copies of dumping vessels' log book entries covering all loading and dumping activities are to be submitted to the Secretary at the end of each calendar month during which dredging is carried out. The details recorded are to include:

   - time and date;
   - quantities dumped;
   - actual location at the commencement and completion of each dumping event (latitude and longitude).

15. Discharge of material at the dumpsite is to be managed so that, as far as practicable, spoil is distributed evenly over, and not beyond, the area of the dumpsite.

16. If at any time a developing environmental risk is identified from dredging and dumping operations, measures are to be taken immediately to mitigate such risk, including restrictions on timing and location of operations.

17. If measures are taken to mitigate any developing risks under clause 16, a report is to be made immediately to the Department detailing such situations, measures adopted and proposals for subsequent monitoring.

18. Any additional monitoring, investigation or inspection which may be required in connection with this operation by the Department, including air and/or surface surveillance and the provision of facilities mentioned in clauses 20 and 21 below, shall be at the cost of EPA.

19. At the completion of the dredging operation the following information is to be provided to the Secretary:

- dates of commencement and completion;
- total quantity of dredge spoil handled, in metric tonnes; and
- the least depth of water over the dredge spoil dumping site determined by sounding and expressed with reference to chart datum.

20. If so required, up to two Commonwealth Government nominees are to be afforded access to witness, inspect or examine any part of the operations, including any monitoring activity or equipment, and are to be provided with any necessary assistance in carrying out their duties. The Permittee is to meet all costs for the attendance of Commonwealth Government nominees including their travel, accommodation and associated incidental expenses.

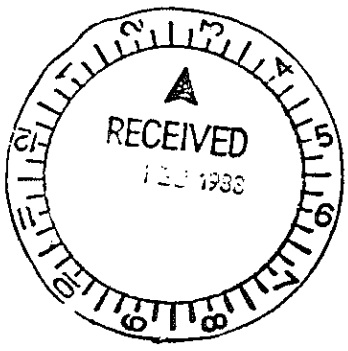
21. If the duties specified in Clause 20 require the Commonwealth Government nominees referred to above to go to sea, the Permittee is to provide them with food and accommodation of an acceptable standard incidental to the carrying out of the duties specified. Arrangements are to be made for nominees on completion of their duties to be returned to a convenient Australian port.

22. EPA is to ensure that all owners and persons in charge of vessels involved in the dredging, loading and dumping of dredge spoil are fully conversant with the requirements of this permit and of the Environment Protection (Sea Dumping) Act 1981.

Appendix D

Hydrographic and diver survey of the disposal site, 1988

ATTACHMENT 5



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Marine Consultants

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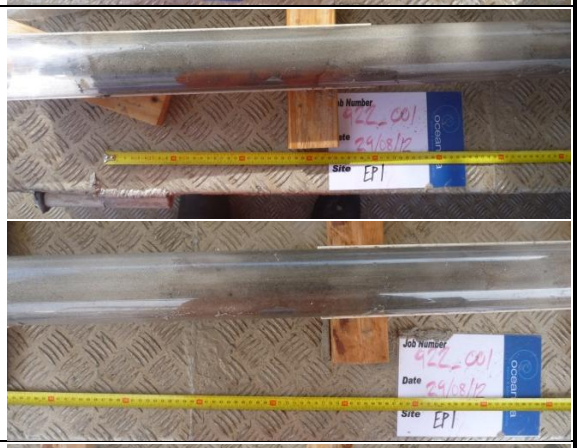
R H Stewart

Appendix E

Field log

Date	Site	Total core length (cm)	Sample characteristics	Photo
29/8/12	EP1	140	• 0-140 cm dark to light grey medium grained sand with layers of seagrass	
27/8/12	EP2	150	• 0-50 cm dark grey, homogenous, medium grained sand • 50-150 cm light grey, homogenous, medium grained sand	
27/8/12	EP3	80	• 0-80 cm dark grey, homogenous, medium grained sand	
27/8/12	EP4	70	• 0-50 cm grey medium to coarse grained sand • 50-1 cm grey medium to coarse grained sand with biomass	
27/8/12	EP5 T1	120	• 0-120 cm grey to dark grey medium to coarse grained sand with thin black layers throughout core	

Date	Site	Total core length (cm)	Sample characteristics	Photo
				 
27/8/12	EP5 T2	120	• 0-120 cm grey to dark grey medium to coarse grained sand	 
27/8/12	EP5 T3		• 0-50 cm grey to dark grey medium to coarse grained sand	No photographs were taken
27/8/12	EP6	80	• 0-80 cm dark grey, medium to coarse grained sand	
28/8/12	EP7	130	• 0-50 cm dark to light grey medium grained sand • 50-130 cm light grey, medium grained sand	 
28/8/12	EP8	50	• 0-50 cm dark grey, homogenous, medium grained sand	

Date	Site	Total core length (cm)	Sample characteristics	Photo
27/8/12	EP9	140	• 0-50 cm dark grey medium grained sand with shells in the top layers	
28/8/12	EP10	150	• 0-50 cm black fine to medium grained sand with sulphurous odour	
28/8/12	EP11	130	• 0-50 cm dark grey fine to medium grained sand	
28/8/12	EP12	130	• 0-50 cm black fine to medium grained sand	
28/8/12	EP13	100	• 0-50 cm dark grey, homogenous, medium grained sand with some wrack material • 50-100 cm black, homogenous, medium grained sand	

Date	Site	Total core length (cm)	Sample characteristics	Photo
				
28/8/12	EP14	90	• 0-50 cm grey, homogenous, medium grained sand	 
28/8/12	EP15 T1	130	• 0-100 cm dark grey, homogeneous, medium grained sand • 100-130 cm dark grey fine to medium grained sand with shells material	 
28/8/12	EP15 T2	140	• 0-50 cm light grey, homogeneous, medium grained sand	  

Date	Site	Total core length (cm)	Sample characteristics	Photo
28/8/12	EP15 T3	100	• 0-50 cm light grey, homogeneous, medium grained sand	
29/8/12	EP16	90	• 0-90 cm light grey medium grain sand with shell material	
29/8/12	EP17	130	• 0-130 cm light grey medium grain sand with shell material	
29/8/12	EP18	100	• 0-50 cm grey medium grained sand with shell material • 50-100 cm brown medium to coarse grained sand with shell material.	

Appendix F

Sediment metal data

0-0.5 m metal concentration and 95% upper confidence limit for berth sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
EP1A	5	0.2	10.0	22.0	**67.0**	21	30.0	<0.01
EP2A	2	<0.1	8.4	12.0	**77.0**	57	18.0	<0.01
EP3A	<2	<0.1	7.8	2.4	10.0	6	7.5	<0.01
EP4A	<2	<0.1	7.7	3.3	29.0	25	3.6	<0.01
EP5A	<2	0.1	8.0	5.3	55.3	65	6.9	<0.01
EP6A	3	<0.1	8.3	15.0	**220.0**	77	13.0	<0.01
EP7A	<2	0.1	7.7	6.1	50.0	26	9.5	<0.01
EP10A	9	0.2	13.0	**200.0**	**140.0**	15	110.0	0.01
EP12A	3	<0.1	7.6	37.0	17.0	16	11.0	<0.01
EP13A	<2	<0.1	6.8	4.7	9.2	5	5.6	<0.01
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA Assessment Levels for Soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
95% UCL	6	0.2	9.56	78.3	**127.8**	46	43.4	0.01
Method	Chebyshev (Mean, Sd) UCL	Chebyshev (Mean, Sd) UCL	Student's-t UCL	Approximate Gamma UCL	Approximate Gamma UCL	Student's-t UCL	Approximate Gamma UCL	Student's-t UCL
WA Assessment Levels for Soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**
Mean	3	0.1	8.5	30.8	67.5	31	21.5	0.01

Notes: Exceedances of Screening Levels and Sediment Quality High Values are shown in blue and red respectively. Exceedances of both the Screening Level and EIL are shown in bold blue and Sediment Quality High and EIL are shown in bold red.

0.5-1 m metal concentration and 95% upper confidence limit for berth sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
EP1B	5	0.5	14.0	94.0	**290.0**	7	110.0	0.02
EP2B	<2	0.8	9.4	42.0	14.0	2	20.0	<0.01
EP3B	2	<0.1	7.8	3.7	26.0	43	5.1	<0.01
EP4B	<2	<0.1	8.0	<0.2	1.1	2	1.7	<0.01
EP5B	3	<0.1	7.9	10.0	**160.0**	140	9.1	<0.01
EP6B	7	0.5	11.0	88.0	**390.0**	10	160.0	<0.01
EP7B	<2	<0.1	8.1	1.4	6.8	1	4.1	<0.01
EP13B	2	0.2	8.5	7.4	38.0	26	10.0	<0.01
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA Assessment Levels for Soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
95% UCL	4	n/a	10.9	**163.7**	**395.1**	96	127.9	0.01
Method	Student's-t UCL	n/a	Approximate Gamma UCL	Adjusted Gamma UCL	Approximate Gamma UCL	Approximate Gamma UCL	Approximate Gamma UCL	Student's-t UCL
WA Assessment Levels for Soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**
Mean	3	0.3	9.3	30.8	115.7	29	40.0	0.01

Notes: Exceedances of Screening Levels and Sediment Quality High Values are shown in blue and red respectively. Exceedances of both the Screening Level and EIL are shown in bold blue and Sediment Quality High and EIL are shown in bold red.

1-1.5 m metal concentration for berth sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
EP1C	<2	<0.1	7.5	0.6	3.4	<1	1.7	<0.01
EP7C	<2	<0.1	8.2	1.1	2.8	<1	4.0	<0.01
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA Assessment Levels for Soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
WA Assessment Levels for Soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**

0-0.5 m metal concentration and 95% upper confidence limit for channel sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
EP8A	<2	<0.1	7.0	2.7	15.0	6	4.9	<0.01
EP9A	<2	<0.1	6.7	2.7	16.0	14	4.9	<0.01
EP11A	<2	<0.1	6.8	3.5	15.0	11	5.4	<0.01
EP14A	<2	<0.1	8.5	4.6	17.0	9	6.2	<0.01
EP15A	<2	<0.1	8.5	2.6	11.4	6	4.6	<0.01
EP16A	<2	<0.1	7.9	2.0	9.9	5	3.5	<0.01
EP17A	2	<0.1	5.2	1.3	3.6	2	3.1	<0.01
EP18A	<2	<0.1	7.6	0.8	2.0	<1	1.5	<0.01
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
WA Assessment Levels for Soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
95% UCL	2	0.1	8.0	3.3	15.1	10	5.2	n/a
Method	Student's-t UCL	Student's-t UCL	Student's-t UCL	Student's-t UCL	Student's-t UCL	Student's-t UCL	Student's-t UCL	n/a
WA Assessment Levels for Soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**
Mean	1	0.1	7.3	2.5	11.2	7	4.3	0.01

0.5-1 m metal concentration for channel sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
EP15B	2	<0.1	6.6	0.3	0.8	<1	0.7	<0.01
EP18B	<2	0.1	8.0	0.3	1.1	<1	0.8	<0.01
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA Assessment Levels for Soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
WA Assessment Levels for Soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**

1-1.5 m metal concentration for channel sites (mg/kg)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<2**	**<0.1**	**<0.2**	**<0.2**	**<0.7**	**<1**	**<0.5**	**<0.01**
EP15C	<2	<0.1	2.3	0.2	0.4	<1	<0.5	<0.01
Screening Level	**20**	**1.5**	**80.0**	**65.0**	**21.0**	**50**	**200.0**	**0.15**
Sediment Quality High	**70**	**10**	**370**	**270**	**52**	**220**	**410**	**1**
WA Assessment Levels for Soils: EIL	**20**	**3**	**400**	**100**	**60**	**600**	**200**	**1**
WA Assessment Levels for Soils: HIL, Category F	**500**	**100**	**600,000**	**5,000**	**3,000**	**1,500**	**35,000**	**75**

Appendix G

Sediment elutriate metal data

Elutriate metal concentrations in sediment for channel sites (µg/L)

Metal	As	Cd	Cr	Cu	Ni	Pb	Zn	Hg
Reporting Limit	**<0.5**	**<0.1**	**<0.2**	**<0.2**	**<0.3**	**<0.1**	**<1**	**<0.0001**
99% Trigger value	**n/a**	**0.7**	**7.7**	**0.3**	**7**	**2.2**	**7**	**0.1**
90% Trigger value	**n/a**	**14**	**48.6**	**3**	**200**	**6.6**	**23**	**0.7**
EP8-9A	4.0	<0.1	<0.2	1.0	62.0	2.3	3	<0.0001
EP14-16A	6.2	<0.1	<0.2	0.3	41.0	0.8	3	<0.0001
EP15B	2.2	<0.1	<0.2	0.2	1.0	<0.1	2	<0.0001
EP15C	2.6	<0.1	0.2	0.2	0.4	<0.1	1	<0.0001
EP17-18A	39	<0.1	<0.2	1.0	7.8	0.2	1	<0.0001
EP18B	13	0.2	0.2	0.5	0.9	<0.1	1	<0.0001
Mean	**11**	**0.1**	**0.13**	**0.5**	**18.9**	**0.6**	**2**	**0.0001**

Appendix H

Sediment tributyltin data

0-0.5 m TBT concentration and 95% upper confidence limit (UCL) for berth sites (ug/kg)

Site	TBT
Reporting Limit	**<0.5**
EP1A	14.4
EP2A	11.2
EP3A	3.6
EP4A	1.25
EP5A	2.6
EP6A	6.8
EP7A	3.4
EP10A	2333.3
EP12A	152.2
EP13A	15.0
Screening Level	**9**
Sediment Quality High	**70**
95% UCL	2557.0
Method	Chebyshev (Mean, Sd) UCL

Notes: Exceedances of Screening Level and Sediment Quality High Value are shown in blue and red respectively

0.5-1 m TBT concentration and 95% upper confidence limit (UCL) for berth sites (ug/kg)

Site	TBT
Reporting Limit	**<0.5**
EP1B	8.6
EP2B	1000
EP3B	5.2
EP4B	1.25
EP5B	8.5
EP6B	136.4
EP7B	1.25
EP13B	18.2
Screening Level	**9**
Sediment Quality High	**70**
95% UCL	1370.0
Method	Chebyshev (Mean, Sd) UCL

Notes: Exceedances of Screening Level and Sediment Quality High Value are shown in blue and red respectively

1-1.5 m TBT concentration for berth sites (ug/kg)

Site	TBT
Reporting Limit	**<0.5**
EP1C	1.25
EP7C	1.25
Screening Level	**9**
Sediment Quality High	**70**

0-0.5 m TBT concentration and 95% upper confidence limit (UCL) for channel sites (ug/kg)

Site	TBT
Reporting Limit	**<0.5**
EP8A	8.5
EP9A	20.5
EP11A	4.4
EP14A	3.5
EP15A	17.5
EP16A	0.6
EP17A	0.9
EP18A	1.2
Screening Level	**9**
Sediment Quality High	**70**
95% UCL	18.0
Method	Approximate Gamma UCL

Notes: Exceedances of Screening Level are shown in blue

0.5-1 m TBT concentration for channel sites (ug/kg)

Site	TBT
Reporting Limit	**<0.5**
EP15B	1.25
EP18B	1.25
Screening Level	**9**
Sediment Quality High	**70**

1-1.5 m TBT concentration for channel sites (ug/kg)

	TBT
Reporting Limit	**<0.5**
EP15C	1.25
Screening Level	**9**
Sediment Quality High	**70**

Appendix I

Laboratory reports (on CD)

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