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**CALTEX REFINERIES (NSW) PTY LTD**

# **Kurnell Wharf Infrastructure Upgrade Sediment and Water Quality Management Plan**

301015-03067 – 301015-03067-EN-REP-011

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## CALTEX REFINERIES (NSW) PTY LTD KURNELL WHARF INFRASTRUCTURE UPGRADE SEDIMENT AND WATER QUALITY MANAGEMENT PLAN

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### PROJECT 301015-03067 - KURNELL WHARF INFRASTRUCTURE UPGRADE

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	<u>S Mason-Jones</u>	<u>N Cowlishaw</u>		27-Mar-13	<u>N/A</u>	
B	Issued for client review	<u>S Mason-Jones</u>	<u>N Cowlishaw</u>	<u>D Aubourg</u>	28-Mar-13		
0	Issued for use	<u>S Mason-Jones</u>	<u>C Jones</u>	<u>D Aubourg</u>	26-Apr-13		
1	Reissued for use	<u>S Mason-Jones</u>	<u>N Cowlishaw</u>	<u>D Aubourg</u>	22-Aug-13		
2	Reissued for use	<u>N Cowlishaw</u>	<u>S Mason-Jones</u>	<u>D Aubourg</u>	11-Sep-13		
3	Reissued for use	<u>N Cowlishaw</u>	<u>S Mason-Jones</u>	<u>S Rachkidi</u>	17-Sep-13		
4	Reissued for use	 <u>N Cowlishaw</u>	 <u>S Mason-Jones</u>	 <u>D Aubourg</u>	01-Oct-13		



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## **1 INTRODUCTION AND LOCATION**

### **1.1 Introduction**

Caltex Refineries (NSW) Pty Ltd (Caltex) proposes to undertake port and berthing facility works off Silver Beach in Botany Bay, NSW (the Project). There are two main elements to the Project:

- Dredging; and
- Upgrading existing elements of the berthing infrastructure.

This Sediment and Water Quality Management Plan (SWQMP) relates only to the dredging component of the works and the requirements of Draft Condition of Approval C1, C2, C3, C4 and C36(a)(i).

### **1.2 Location**

The Project is located in the waters of Botany Bay off Silver Beach, in close proximity to places with important ecological and heritage values. These include Towra Point Nature and Aquatic Reserves, which contain an internationally important Ramsar-listed wetland habitat (3.5 km to the west), areas of seagrass beds (100 m to the south), which support a range of threatened species, and both Taren and Dolls Point (5 km to the west), which both contain important and protected shorebird communities.

Kamay Botany Bay National Park is located approximately 700 m to the east. The National Park contains important Aboriginal and historic heritage; which includes the landing place of Captain James Cook. The National Park also serves as a valued recreational and educational asset. The nearest residents to the Project Site are the Ranger's House (Alpha House) in Kamay Botany Bay National Park (700 m to the east) and the properties along Prince Charles Parade, Kurnell (800 m to the south).

The location of the Project Site and dredge footprint is shown in Figure 1-1.

The location of the Project Site relative to places with important ecological values is shown in Figure 1-2.



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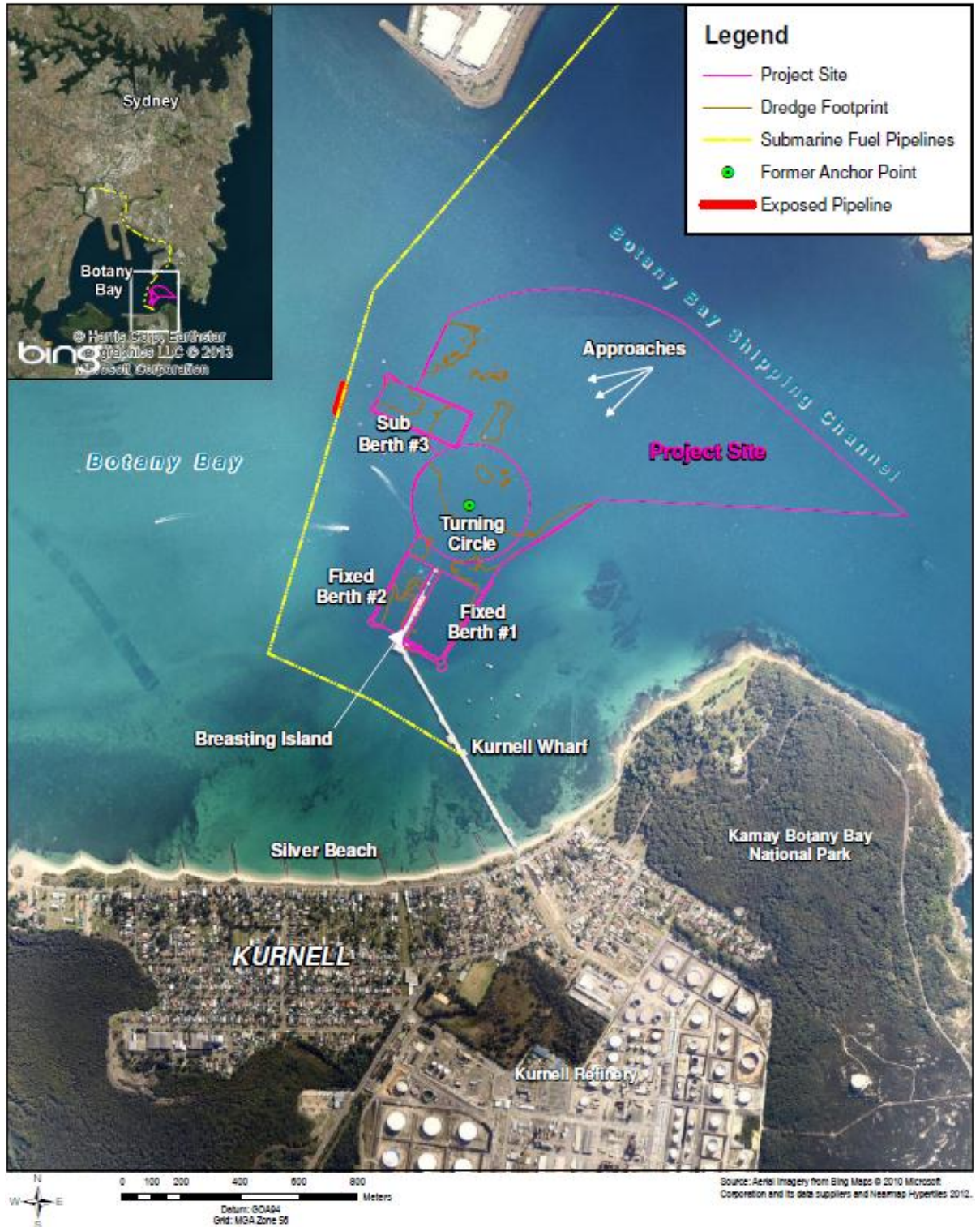


Figure 1-1: Project Site and dredge footprint (URS 2013a)



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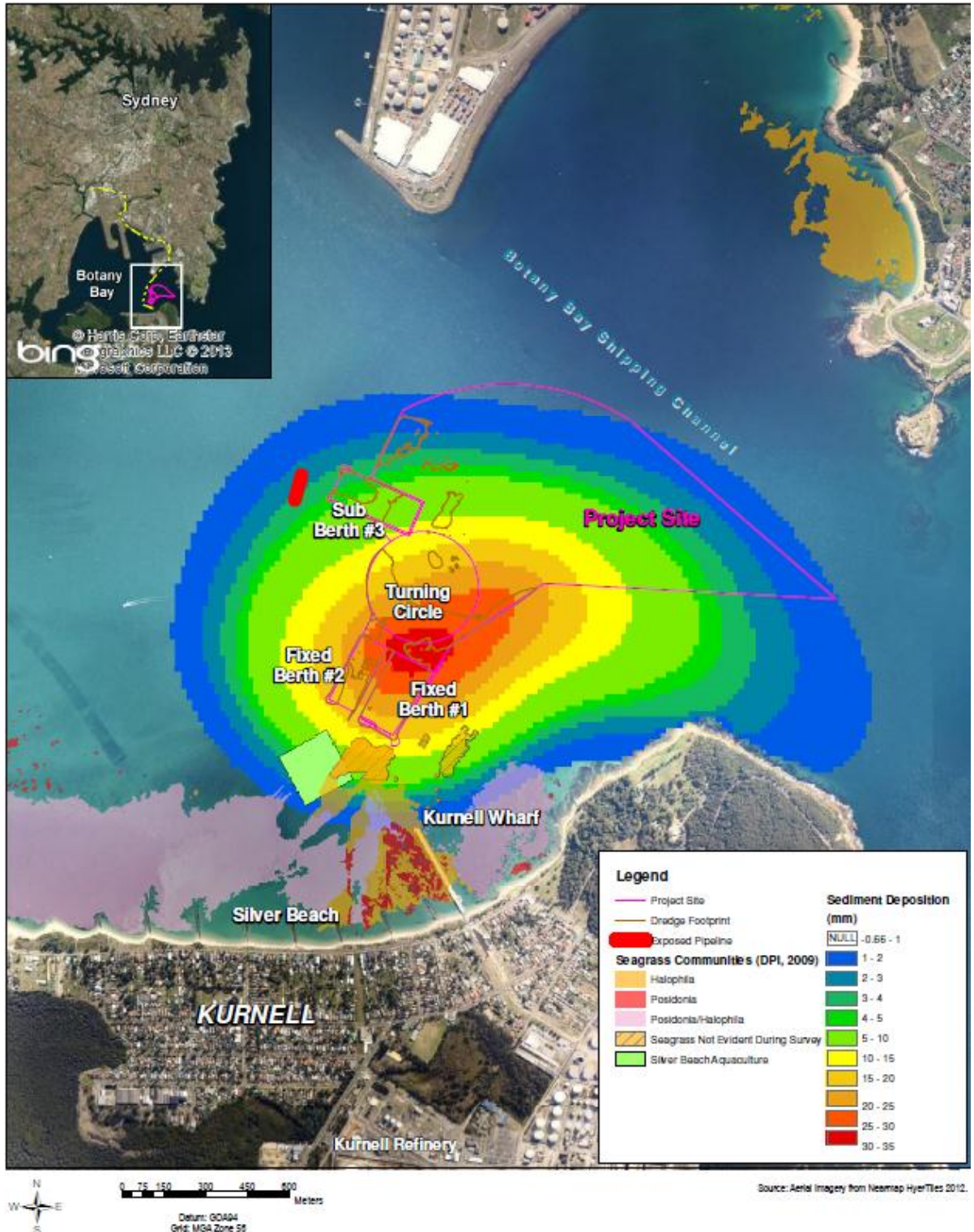


Figure 1-2: Modelled sediment deposition relative to places of important ecological value (URS 2013a)



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## **2 DREDGING, REUSE AND DISPOSAL ACTIVITIES**

Dredging of approximately 153,000 m<sup>3</sup> is required from spot locations within the berths, approaches and turning circle over a total area of approximately 178,000 m<sup>2</sup>. Dredging locations are shown in Figure 1-1.

The dredging is required to achieve a number of access improvements, including:

- Improve overall navigability across the dredge footprint through removal of sediment that has accumulated over the past 40 years;
- Extend the depth, length and width of the two fixed berths to allow larger capacity ships to access the berths and load/unload at the Kurnell Wharf; and
- Provide improved access in and out of the sub berth.

The dredging works will leave a broadly flat, uniform area across the base of the dredge footprint to the following depths:

- Turning circle and approaches returned to the design depth of 12.8 m below Chart Datum (CD);
- Sub berth returned to the design depth of 14 m below CD; and
- Fixed berths increased to overall effective depth of 12.8 m below CD.

Up to 6,000 m<sup>3</sup> of dredged sediments will be reused locally to cover an exposed section of the Kurnell Refinery subsea fuel pipelines located behind the sub berth and a former anchor point at the entry to the sub berth (Figure 1-1.)

The majority of dredged sediments (up to a maximum of 153,000 m<sup>3</sup>) will be disposed of at the Sydney Offshore Spoil Ground (as per the conditions of the Sea Dumping Permit, issued for the Project under the Commonwealth *Environmental Protection (Sea Dumping) Act 1981*).

The SWQMP is relevant to dredging at the Project Site and reuse of dredged sediments within Botany Bay. The SWQMP is not relevant to disposal of dredged sediments at the Sydney Offshore Spoil Ground.



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### **3 CONTEXT**

The SWQMP has been prepared based on the relevant information, requirements and water quality impacts of dredging, as identified in the Environmental Impact Statement (EIS) (URS 2013) and Submissions Report (URS 2013a) for the Project. The SWQMP incorporates relevant conditions from the following:

- Draft Development Consent issued by the NSW Department of Planning and Infrastructure under Section 89E of the *Environmental Planning and Assessment Act 1979* (SSD\_5353) (DP&I 2013); and
- Draft Environment Protection Licence (EPL) issued for miscellaneous licensed discharge to waters (at any time) by the NSW Environment Protection Authority (EPA) under the NSW *Protection of the Environment Operations Act 1997* (EPA 2013).

Relevant conditions incorporated into the SWQMP are referenced in the document as Draft Conditions of Approval (DCoA) or Draft Environment Protection Licence Conditions (EPL Conditions), as relevant.

Any relevant changes between the draft and final conditions of development consent and the EPL must be incorporated into the SWQMP. Relevant conditions of the Sea Dumping Permit, issued under the Commonwealth *Environmental Protection (Sea Dumping) Act 1981*, must also be incorporated into the SWQMP.

Caltex has consulted with the EPA and the NSW Department of Primary Industries (DPI) (Fisheries) in regard to preparation of the SWQMP [DCoA C3].





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## **4 STRUCTURE OF THE SWQMP**

This SWQMP provides the basis for minimisation of suspended sediment and water quality monitoring associated with dredging activities related to the upgrade of berthing infrastructure at Kurnell Wharf. The SWQMP defines a framework monitoring program to be implemented prior to, during and after dredging activities, with the key focus on the protection of waters and aquatic ecosystems of Botany Bay and Towra Point Nature and Aquatic Reserves.

The SWQMP is to be read in conjunction with the Dredge and Spoil Disposal Management Plan (DSDMP), the Sediment and Water Quality Monitoring Program and the Spill Control Plan which includes specific measures to prevent or minimise impacts to water quality during dredging.

The dredging Contractor will adopt the SWQMP to manage the environmental risks specifically related to their scope of work on the Project. Compliance with the SWQMP is mandatory for all personnel and Contractors involved in dredging activities for the Project.

### **4.1 Purpose**

The purpose of the SWQMP is to set out the management actions to minimise the generation and dispersion of suspended sediment and to define a framework monitoring program to evaluate the extent to which tributyltin (TBT) in the water column (dissolved TBT), sediment-bound TBT and suspended sediment concentrations generated and dispersed by dredging have affected the distribution and condition of sensitive marine receivers.

### **4.2 Objectives**

The objectives of the SWQMP are to:

- Identify representative monitoring locations that can be used to determine the extent to which dissolved TBT, sediment-bound TBT and suspended sediment concentrations have affected the distribution and condition of sensitive marine receivers;
- Identify specific measures to minimise the generation and dispersion of sediments outside the Project Site during dredging (in conjunction with the DSDMP);
- Undertake dry weather baseline water quality monitoring, including for dissolved and sediment-bound TBT and for suspended sediment concentrations at the identified monitoring locations;
- Establish a framework sediment and water quality monitoring program to be followed during and post dredging, specifying the frequency and procedures to measure dissolved and sediment-bound TBT, suspended sediments and other relevant parameters;
- Establish upper threshold water quality performance criteria and interim water quality performance criteria; and
- Identify corrective actions to be implemented where water quality performance criteria are triggered at sensitive marine receivers.



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## **5 MINIMISATION OF SUSPENDED SEDIMENT**

The dredging activities will be undertaken in such a way so as to minimise the generation and dispersion of sediments outside the Project Site. This will include all feasible and reasonable mitigation and management measures for the duration of the dredging to minimise the dispersion of dissolved and sediment-bound TBT and suspended sediment [DCoA C2].

The following sediment and water quality management actions, as set out in the DSDMP, will be implemented during dredging to minimise the generation and dispersion of sediment:

- The contractor will implement all feasible and reasonable mitigation and management measures for the duration of dredging to minimise the dispersion of dissolved and sediment-bound TBT and suspended sediment concentrations outside the Project site during dredging [DCoA C2].
- A silt boom will be installed and maintained around the dredger head to capture sediment that falls into the water across the slewing zone [DCoA C2(b); EPL Condition O3.1].
- Care must be taken with the installation and maintenance of the silt boom to ensure that there are no gaps at the ends, or in the fabric, or in the floating boom [EPL Condition O3.1].
- Adequate freeboard will be maintained to ensure the decks of the BHD are not washed by wave action.\*
- Overflow dredging is not permitted within the fixed berths or in front (immediately east) of the sub berth due to the presence of sediments with elevated concentrations of tributyltin (TBT) and potential turbidity generating peat [DCoA C2(a); EPL Condition 3.2].\*
- Sediments will be lifted and loaded so as to prevent excessive disturbance and agitation, whilst also preventing excessive spillage.\*
- Where overflow dredging is carried out, the BHD will be operated in a manner that minimises the volume of water lifted onto the hopper and thus the volume of water that overflows.
- Where overflow dredging is carried out, dredged sediments will be placed into the hopper in a manner that minimises splash and allows even overflow from the hopper.
- Any excess dredged sediment not cleanly loaded into the hopper will be actively washed into the hopper.\*
- Excess materials will be cleared from the decks before the BHD is moved.\*
- All dredging activities will be conducted using equipment in good working order that is registered and regularly maintained and serviced.\*
- Hopper doors will be kept in good condition to minimise loss of sediment during transport.\*
- Except as expressly provided in the EPL issued for miscellaneous licensed discharge to waters (at any time), the Contractor will ensure their activities conform to the pollution prevention requirements set out under Section 120 of the POEO Act [DCoA C1; EPL Condition L1.1].\*



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- In the event of an unplanned overflow, dredging activities in the immediate area will cease immediately.\*
- In the event of an unplanned overflow, the Caltex EMR will be contacted immediately.
- Following an unplanned overflow, the Contractor will modify their working methods as appropriate.\*
- A Dredging Supervisor will be in attendance at all times (24 hours a day / 7 days a week) during dredging activity.
- The Dredging Supervisor and the Environmental Representative will conduct spot checking at least once a week for the generation and dispersion of sediments outside the Development Site during dredging.

Management actions set out above that are required by the EIS (URS 2013) are marked with an asterisk (\*).

Dredging will be carried out in accordance with all relevant Commonwealth and State legislative and regulatory requirements. Copies of relevant licences, approvals and permits will be held on site and in relevant Project offices. All dredging works will be carried out in accordance with the relevant requirements of:

- Commonwealth Guidelines for Fresh and Marine Water Quality 2000;
- EPL issued for miscellaneous licensed discharge to waters (at any time) under the NSW *Protection of the Environment Operations Act 1997*;
- Georges River – Botany Bay System: Statement of Intent 2003;
- Development consent for State Significant Development (SSD\_5353), granted under the NSW *Environmental Planning and Assessment Act 1979*;
- Permission to lodge (landowners consent) under the NSW Environmental Planning and Assessment Regulation 2000;
- Harbor Master Approval under the NSW Management of Waters and Waterside Lands Regulations 1972;
- The requirement to prepare a remediation action plan under State Environmental Planning Policy No 55 - Remediation of Land;
- A dredging licence under the NSW *Marine Services Act 1998*; and
- Sea Dumping Permit under the Commonwealth *Environmental Protection (Sea Dumping) Act 1981*.



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## **6 ENVIRONMENTAL RISKS**

The EIS (URS 2013) indicated that the marine ecosystem within Botany Bay has the potential to be impacted by dredging in the following ways:

- Increased concentration of suspended sediment (turbidity), which reduces the amount of light that penetrates the water column (i.e. increased light attenuation). The reduction of light penetration can reduce photosynthesis in biota such as seagrass;
- Directly affect key water quality parameters used as indicators for declining ecosystem health such as pH and dissolved oxygen (DO);
- Result in sediment deposition and the build-up of sediments on the seabed, coating key benthic habitat with sediment; and
- Cause the mobilisation of nutrients and toxicants, particularly TBT, present within disturbed sediments. The nutrients can cause algal blooms, whilst the toxicants can:
  - Cause direct mortality to aquatic biota;
  - Impede the ability for biota to withstand or avoid other stressors (natural or anthropogenic); and
  - Bioaccumulate and therefore affect organisms or humans that may consume plants or animals that have taken up those toxicants.

The likely impact of the dredging on local water and sediment quality is dependent upon how dredged sediments suspend and disperse within the water column and settle out.

The monitoring methodology outlined at Section 9 is proposed to record baseline levels and ensure that dredging activities are monitored and managed.



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## **7 RESPONSIBILITIES AND AUTHORITIES**

Overall responsibility for the implementation of the SWQMP rests with Caltex. Implementation of management, monitoring and corrective actions set out in the SWQMP may be delegated in writing by Caltex to specific Contractors.

Key Project personnel including the Caltex Project Manager, Caltex Construction Supervisors, the Environmental Representative, Contractor Project Manager and the Contractor Environment / HSE Representative will ensure that all monitoring and corrective actions are undertaken to a satisfactory standard and that all personnel are aware of their responsibilities with respect to environmental matters.

Descriptions of roles and responsibilities for the Project are set out in the DSDMP.

All personnel involved in the implementation of the SWQMP will be appropriately trained to do so.



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## 8 LOCATION OF MONITORING POINTS

The EIS (URS 2013) identifies the need for sediment and water quality monitoring at the following locations:

- Project Site;
- Silver Beach Aquaculture Site; and
- Seagrass communities along Silver Beach.

Six fixed water quality monitoring points (Monitoring Points 1 to 6) and two mobile monitoring points (Monitoring Points 7 and 8) will be established, in accordance with EPL Condition P1.2 and DCoA C3.

The monitoring points are described in Table 8-1.

**Table 8-1: Fixed and mobile water quality monitoring points**

Name	Fixed / Mobile	Location	Type
Monitoring Point 1	Fixed	Reference Site (refer Figure 8-1)	Background water quality monitoring
Monitoring Point 2	Fixed	Aquaculture Site (refer Figure 8-1)	Discharge to waters – water quality monitoring
Monitoring Point 3	Fixed	Seagrass Site (Posidonia) (refer Figure 8-1)	Discharge to waters – water quality monitoring
Monitoring Point 4	Fixed	Seagrass Site (Posidonia / Halophila) (refer Figure 8-1)	Discharge to waters – water quality monitoring
Monitoring Point 5	Fixed	Project Site (refer Figure 8-1)	Discharge to waters – water quality monitoring
Monitoring Point 6	Fixed	Project Site (refer Figure 8-1)	Discharge to waters – water quality monitoring
Monitoring Point 7	Mobile	Down current, within the flow path of the sediment plume under all tidal conditions and approximately 10 m from the outside edge of the dredge silt boom, dredge barge or overflow barge (whichever is relevant to the sediment plume flow path).	Discharge to waters – near field water quality monitoring
Monitoring Point 8	Mobile	Down current, within the flow path of the sediment plume under all tidal conditions and approximately 50 m from the outside edge of the dredge silt boom, dredge barge or overflow barge (whichever is relevant to the sediment plume flow path).	Discharge to waters – water quality monitoring



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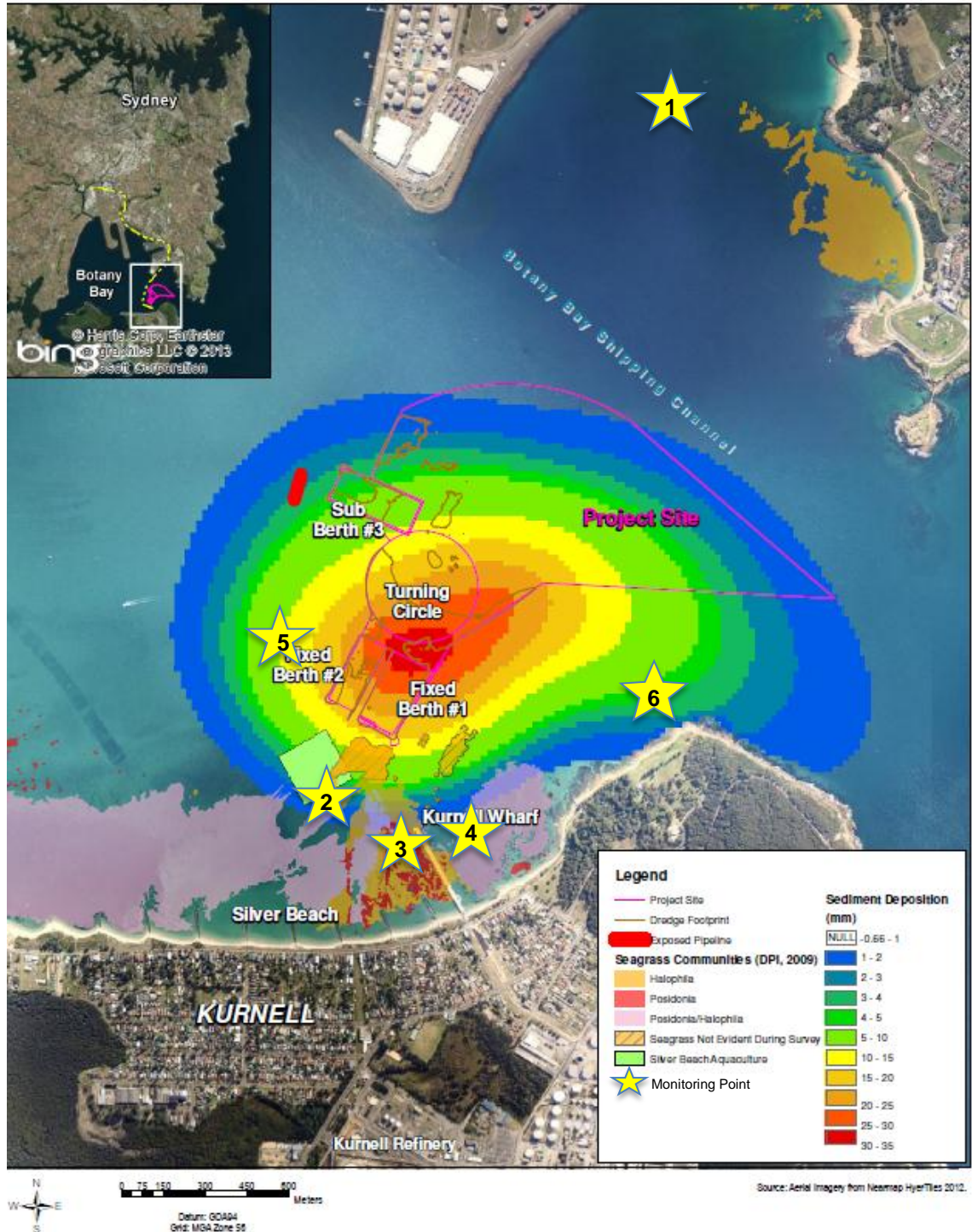
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The location of the fixed monitoring points is shown in Figure 8-1 and described in EPL Condition P1.2.

Monitoring Point 7 and Monitoring Point 8 are proposed to be located down current, within the flow path of the sediment plume under all tidal conditions and approximately 10 m and 50 m (respectively) from the outside edge of the dredge silt boom, dredge barge or overflow barge (whichever is relevant to the sediment plume flow path). The locations for Monitoring Point 7 and Monitoring Point 8 will consider tidal current directions, vessel orientation, vessel location, dredging activities and plume direction [EPL Condition L.2].



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**Figure 8-1: Location of water quality monitoring points<sup>1</sup>**

<sup>1</sup> The final locations of monitoring points must consider relevant navigational charts for Botany Bay.





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## **9 MONITORING METHODOLOGY**

### **9.1 Baseline Water Quality Monitoring**

Water quality within Botany Bay during dredging will be evaluated against baseline levels. Dry weather baseline water quality monitoring will be carried out for a period of at least four weeks prior to the commencement of dredging activities to establish concentrations against which levels during dredging can be compared [DCoA C3].

Dry weather baseline water quality monitoring will include testing for:

- Dissolved TBT;
- Sediment-bound TBT;
- Total suspended solids;
- Dissolved oxygen (DO); and
- pH.

The baseline water quality monitoring will be performed at the fixed monitoring points set out in Section 8, which will also be used to undertake monitoring during dredging activities.

Monitoring of baseline water quality will enable confirmation that the modelling inputs used in the EIS (URS 213) were representative of normal dry-weather conditions experienced at the Project Site within Botany Bay. If baseline conditions do not align with the modelled scenario, consideration will be given to the need for remodelling and subsequent review and revision of management practices.

Baseline monitoring will be undertaken at least four weeks prior to commencement of dredging to ensure any required remodelling of water quality impacts and subsequent review and revision of management practices do not delay the commencement of dredging. It is anticipated that baseline monitoring will commence in mid to late September 2013.

### **9.2 Dredging Water Quality Monitoring**

Water quality monitoring during dredging will include both real time (live) continuous monitoring of selected parameters and some discrete sample collection events (grab samples) with subsequent laboratory analysis.

Real time monitoring of turbidity, pH and DO will be undertaken for the duration of the dredging activities. This will be achieved through the deployment of a continuous water quality monitoring buoy at each of the fixed monitoring points shown on Figure 8-1. Water quality monitoring buoys will monitor, record and transmit turbidity, pH and DO levels at 0.2 m below the water line at approximately 15 minute intervals [EPL Condition M2.1].



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Direct measurement of total suspended solids cannot be undertaken as real time monitoring. Accordingly, the measurement of turbidity (NTU) will be used to monitor concentrations of total suspended solids once the statistical relationship between turbidity and total suspended solids has been established and approved by the EPA (prior to commencement of dredging) [EPL Condition L2.5].

The establishment of the relationship between turbidity and total suspended solids involves the collection of representative sediment samples from the construction site and the laboratory preparation of standards. Each standard is then tested for total suspended solids and the turbidity measured and the relationship confirmed. The establishment of this relationship will allow for real time measurement of total suspended solids through measurement of turbidity.

The measurement of dissolved TBT and sediment-bound TBT also cannot be undertaken as real time monitoring. To evaluate concentrations of both dissolved and sediment-bound TBT, grab samples will be collected and submitted to a laboratory for analysis.

Where water depth is approximately 4 m or less, grab samples will be collected at mid depth in the water column. Where water depth is significantly greater than 4 m, grab samples will be collected from approximately 4 m below the water's surface. Grab samples will be collected:

- Three times in the first week of overflow dredging (during dredging activities and while barge is overflowing) in the sub berth and weekly thereafter;
- Three times in the first week of dredging in Berth 1 and weekly thereafter; and
- Weekly during dredging in all other areas.

Grab samples from Monitoring Point 7, Monitoring Point 8 and from either Monitoring Point 5 or Monitoring Point 6 (whichever is upstream of the dredging activity) will all be collected on the same day [EPL Condition M2.1]. The collection, transport and analysis of grab samples is expected to take 10 days.

Rainfall will be measured and recorded in millimetres per 24 hour period, at the same time each day throughout the dredging activities [EPL Condition L2.4]. Where turbidity levels exceed the trigger levels set out in Table 9-1, rainfall data will be examined to determine the potential influence of rainfall run-off on turbidity levels.

Water quality monitoring data will be assessed against baseline water quality levels (measured prior to commencement of dredging), reference water quality levels (measured at Monitoring Point 1) and rainfall data to confirm the validity of results. Validated results will then be assessed against the trigger levels set out in Section 9.3.

Water quality monitoring will be carried out continuously during dredging at the Project Site and during reuse of dredged sediments within Botany Bay. Water quality monitoring will continue for one week following completion of dredging activities and will be consistent with the methodology used for the baseline monitoring.

All monitoring will be carried out in accordance with the relevant Approved Methods Publication, unless otherwise set out in the EPL or approved in writing by the EPA [EPL Condition M3.2].



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## **9.3 Trigger Values**

Trigger values (or ranges, as relevant) are described in Table 9-1 for each of the water quality parameters to be monitored during dredging activities [DCoA C3]. The location at which each trigger value or range applies is provided, as is the source of the trigger value or range, the frequency of sampling and the actions to be implemented where the trigger value or range is exceeded.

The EPL for miscellaneous licensed discharge to waters sets out the required trigger values for total suspended solids and TBT, while the trigger ranges for pH and DO have been sourced from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality produced by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (the Guidelines for Fresh and Marine Water Quality, ANZECC and ARMCANZ 2000).

The turbidity trigger values do not apply when the turbidity limits are exceeded due to rainfall run-off or re-suspension of bottom sediments caused by shipping movements [EPL Condition L2.4]. As described in Section 9.2, rainfall must be measured and recorded in millimetres per 24 hour period, at the same time each day during the dredging activities.



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**Table 9-1: Trigger values and ranges for monitored water quality parameters during dredging activities**

Parameter	Location	Frequency	Trigger Value or Range	Source	Compliance Levels and Corrective Actions
<i>What is being measured</i>	<i>Where the parameter is being measured</i>	<i>How often sampled</i>	<i>Value or range that the parameter should not exceed</i>	<i>Where the value or range has come from</i>	<i>What represents compliance or non-compliance with respect to Trigger Values and what to do if the value or range is exceeded</i>
Total suspended solids measured as turbidity (NTU)	<ul style="list-style-type: none"> <li>Aquaculture Site (Monitoring Point 2)</li> <li>Seagrass Beds (Monitoring Points 3 and 4)</li> </ul>	Real time monitoring approximately every 15 minutes [EPL Condition M2.1]	10 mg/L above level at Monitoring Point 1 Reference Site as equivalent turbidity NTU	EPL [EPL Condition L2] Submissions Report (URS 2013a)	<ul style="list-style-type: none"> <li>Any result &gt;10mg/L:               <ul style="list-style-type: none"> <li>confirm validity of results</li> <li>confirm results are attributable to dredging</li> </ul> </li> <li>Two consecutive confirmed results &gt;10mg/L:               <ul style="list-style-type: none"> <li>reduce rate of overflow dredging or reduce rate of dredging (if overflow dredging is not being undertaken) until levels fall below the trigger value</li> </ul> </li> <li>Three consecutive confirmed results &gt;10mg/L:               <ul style="list-style-type: none"> <li><b>non-compliance with EPL [EPL Condition L2]</b></li> <li>cease dredging at that location</li> <li>notify EPA</li> <li>do not recommence dredging at that location until levels fall below the trigger value</li> <li>investigate the cause and implement additional controls to modify levels and prevent a recurrence</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Project Site (Monitoring Point 5 and 6)</li> </ul>	Real time monitoring approximately every 15 minutes [EPL Condition M2.1]	50 mg/L above level at Monitoring Point 1 Reference Site as equivalent turbidity NTU	EPL [EPL Condition L2] Submissions Report (URS 2013a)	<ul style="list-style-type: none"> <li>Any result &gt;50mg/L:               <ul style="list-style-type: none"> <li>confirm validity of results</li> <li>confirm results are attributable to dredging</li> </ul> </li> <li>Two consecutive confirmed results &gt;50mg/L:               <ul style="list-style-type: none"> <li>reduce rate of overflow dredging or reduce rate of dredging (if overflow dredging is not being undertaken) until levels fall below the trigger value</li> </ul> </li> <li>Three consecutive confirmed results &gt;50mg/L :               <ul style="list-style-type: none"> <li><b>non-compliance with EPL [EPL Condition L2]</b></li> <li>cease dredging at that location</li> <li>notify EPA</li> <li>do not recommence dredging until levels fall below the trigger value</li> <li>investigate the cause and implement additional controls to reduce levels and prevent a recurrence</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Mobile Monitoring Sites (Monitoring Points 7 and 8)</li> </ul>	Grab sample collected: <ul style="list-style-type: none"> <li>Three times in the first week of overflow dredging in the sub berth and weekly thereafter;</li> <li>Three times in the first week of dredging in Berth 1 and weekly thereafter; and</li> <li>Weekly during dredging in all other areas.</li> </ul> [EPL Condition M2.1]	Not Applicable	EPL [EPL Condition L2]	<ul style="list-style-type: none"> <li>Correlate with results of real time turbidity monitoring at Monitoring Point 1 through to Monitoring Point 6.</li> </ul>



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Parameter	Location	Frequency	Trigger Value or Range	Source	Compliance Levels and Corrective Actions
Tributyltin (TBT) (dissolved TBT)	<ul style="list-style-type: none"> <li>Project Site (Monitoring Point 5 or 6, whichever is upstream of the dredging activity)</li> </ul>	Grab sample collected: <ul style="list-style-type: none"> <li>Three times in the first week of overflow dredging in the sub berth and weekly thereafter;</li> <li>Three times in the first week of dredging in Berth 1 and weekly thereafter; and</li> <li>Weekly during dredging in all other areas.</li> </ul> [EPL Condition M2.1] Samples must be collected on the same day as those for TBT at Monitoring Points 7 and 8.	Not Applicable	EPL [EPL Condition L2]	<ul style="list-style-type: none"> <li>Correlate with results of dissolved TBT monitoring at Monitoring Points 7 and 8.</li> </ul>
	<ul style="list-style-type: none"> <li>Mobile Monitoring Site (Monitoring Point 7)</li> </ul>	Grab sample collected: <ul style="list-style-type: none"> <li>Three times in the first week of overflow dredging in the sub berth and weekly thereafter;</li> <li>Three times in the first week of dredging in Berth 1 and weekly thereafter; and</li> <li>Weekly during dredging in all other areas.</li> </ul> [EPL Condition M2.1] Samples must be collected on the same day as those for TBT at Monitoring Point 8.	Not Applicable	EPL [EPL Condition L2]	<ul style="list-style-type: none"> <li>Correlate with results of dissolved TBT monitoring at Monitoring Points 5, 6 and 8.</li> </ul>
	<ul style="list-style-type: none"> <li>Mobile Monitoring Site (Monitoring Point 8)</li> </ul>	Grab sample collected: <ul style="list-style-type: none"> <li>Three times in the first week of overflow dredging in the sub berth and weekly thereafter;</li> <li>Three times in the first week of dredging in Berth 1 and weekly thereafter; and</li> <li>Weekly during dredging in all other areas.</li> </ul> [EPL Condition M2.1] Samples must be collected on the same day as those for Monitoring Point 7.	>0.006 µg/L	EPL [EPL Condition L2] Submissions Report (URS 2013a)	<ul style="list-style-type: none"> <li>Any result &gt;0.006µg/L:               <ul style="list-style-type: none"> <li>confirm validity of results</li> <li>confirm results are attributable to dredging</li> </ul> </li> <li>Any confirmed result &gt;0.006µg/L:               <ul style="list-style-type: none"> <li><b>non-compliance with EPL [EPL Condition L2]</b></li> <li>notify EPA</li> <li>if overflow dredging is being undertaken then cease overflow dredging at that location until levels fall below the trigger value</li> <li>if dredging without overflow is being undertaken then cease dredging at that location until levels fall below trigger value</li> <li>resample at that location as soon as practicable following the cessation of dredging or overflow dredging (as relevant)</li> </ul> </li> </ul>



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Parameter	Location	Frequency	Trigger Value or Range	Source	Compliance Levels and Corrective Actions
Tributyltin (TBT) (sediment-bound TBT)	<ul style="list-style-type: none"> <li>Project Site (Monitoring Point 5 or 6, whichever is upstream of the dredging activity)</li> </ul>	Grab sample collected: <ul style="list-style-type: none"> <li>Three times in the first week of overflow dredging in the sub berth and weekly thereafter;</li> <li>Three times in the first week of dredging in Berth 1 and weekly thereafter; and</li> <li>Weekly during dredging in all other areas.</li> </ul> [EPL Condition M2.1] Samples must be collected on the same day as those for dissolved TBT.	Not Applicable	EPL [EPL Condition L2]	<ul style="list-style-type: none"> <li>Correlate with results of sediment-bound TBT monitoring at Monitoring Points 7 and 8.</li> </ul>
	<ul style="list-style-type: none"> <li>Mobile Monitoring Sites (Monitoring Points 7 and 8)</li> </ul>	Grab sample collected: <ul style="list-style-type: none"> <li>Three times in the first week of overflow dredging in the sub berth and weekly thereafter;</li> <li>Three times in the first week of dredging in Berth 1 and weekly thereafter; and</li> <li>Weekly during dredging in all other areas.</li> </ul> [EPL Condition M2.1] Samples must be collected on the same day as those for dissolved TBT.	Not Applicable	EPL [EPL Condition L2]	<ul style="list-style-type: none"> <li>Correlate with results of sediment-bound TBT monitoring at Monitoring Points 5 and 6.</li> </ul>



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Parameter	Location	Frequency	Trigger Value or Range	Source	Compliance Levels and Corrective Actions
pH	<ul style="list-style-type: none"> <li>Aquaculture Site (Monitoring Point 2)</li> <li>Seagrass Beds (Monitoring Points 3 and 4)</li> <li>Project Site (Monitoring Point 5 and 6)</li> </ul>	Real time monitoring approximately every 15 minutes	pH 1.5 higher or lower than at Monitoring Point 1 Reference Site	Submissions Report (URS 2013a)	<ul style="list-style-type: none"> <li>Any result outside range:               <ul style="list-style-type: none"> <li>confirm validity of results</li> <li>confirm results are attributable to dredging</li> </ul> </li> <li>Two consecutive confirmed results outside range:               <ul style="list-style-type: none"> <li>reduce rate of overflow dredging or reduce rate of dredging (if overflow dredging is not being undertaken)</li> </ul> </li> <li>Three consecutive confirmed results outside range three times (nine in all) in any 24 hour period:               <ul style="list-style-type: none"> <li>if overflow dredging is being undertaken then cease overflow dredging at that location until levels fall within the trigger range</li> <li>if dredging without overflow is being undertaken then cease dredging at that location until levels fall below trigger value</li> <li>investigate the cause and implement additional controls to modify levels and prevent a recurrence</li> </ul> </li> </ul>
Dissolved Oxygen (DO)	<ul style="list-style-type: none"> <li>Aquaculture Site (Monitoring Point 2)</li> <li>Seagrass Beds (Monitoring Points 3 and 4)</li> <li>Project Site (Monitoring Point 5 and 6)</li> </ul>	Real time monitoring approximately every 15 minutes	<6 mg/L (<80%)	Guidelines for Fresh and Marine Water Quality Table 3.3.2 Submissions Report (URS 2013a)	<ul style="list-style-type: none"> <li>Any result &lt;6 mg/L:               <ul style="list-style-type: none"> <li>confirm validity of results</li> <li>confirm results are attributable to dredging</li> </ul> </li> <li>Two consecutive confirmed results &lt;6 mg/L:               <ul style="list-style-type: none"> <li>reduce rate of overflow dredging or reduce rate of dredging (if overflow dredging is not being undertaken)</li> </ul> </li> <li>Three consecutive confirmed results &lt;6 mg/L three times (nine in all) in any 24 hour period:               <ul style="list-style-type: none"> <li>if overflow dredging is being undertaken then cease overflow dredging at that location until levels rise above the trigger value</li> <li>if dredging without overflow is being undertaken then cease dredging at that location until levels fall below trigger value</li> <li>investigate the cause and implement additional controls to increase levels and prevent a recurrence</li> </ul> </li> </ul>



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## 9.4 Reporting

Any non-compliance and/or any results that trigger a corrective action will be communicated immediately to the Environmental Representative, including the following information:

- Details and locations of dredging activities being undertaken during the monitoring period;
- Location of the sample(s) at which the exceedence was detected;
- A description of the likely cause of the exceedence;
- Graphical representation of all monitoring results;
- Comparison of the monitoring results against the baseline water quality reference site;
- Rainfall data for the preceding 24 hour period prior to the incident;
- A description of any shipping movements near the dredging activities;
- A description of any remedial action taken including justification where no action is taken; and
- Any other relevant information [EPL Condition R4.1].

Where there has been a non-compliance or conditions that cause or threaten material harm to the environment, the Environmental Representative (or delegated representative) must notify the EPA.

In addition to the above, the results of water quality monitoring will be reported monthly to the Environmental Representative, including:

- Date of report;
- Dates, times and locations at which the samples were taken [EPL Condition M1.3];
- For grab samples, a description of the dredging activities, dredger location and sampling location in relation to the dredger EPL Condition M2.1];
- Name of the person who collected the samples [EPL Condition M1.3];
- Dates of report period (the reporting month);
- Weather conditions during the reporting month;
- External factors occurring during the reporting month that could influence monitoring results;
- Issues or concerns in regard to monitoring equipment or results;
- Total number of samples for each parameter during the reporting month;
- Total number of exceedences for each parameter during the reporting month;
- Total number of exceedences for each parameter to date;
- Description of corrective actions implemented;
- Assessment of the effectiveness of corrective actions implemented; and
- Download of all data for the reporting month.





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Within three months of completing post-dredging water quality monitoring required by DCoA C3, a report will be submitted to Caltex documenting the results of the baseline water quality monitoring undertaken before dredging and the sediment and water quality monitoring program followed during and post dredging, to confirm that residual sediment and water quality is consistent with the predictions made in the EIS (URS 2013), with particular consideration to dissolved and sediment-bound TBT concentrations and impacts to the aquatic health of sensitive marine receivers [DCoA C4].



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## 10 REFERENCES

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