Albany Port Expansion Project

Dredging and Land Reclamation Management Plan

October 2011
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Dredging and Land Reclamation Management Plan

Prepared for

Albany Port Authority

Prepared by

Oceanica Consulting Pty Ltd

October 2011

Report No. 874_002/1
## Client: Albany Port Authority

### Revisions history

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Director

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1. Introduction

1.1 Issue

The Albany Port jurisdiction covers the waters and seabed of the majority of King George Sound (KGS) and Princess Royal Harbour (PRH). The port has undergone some trade growth in the past decade, and is due to expand further with the Albany Port Authority’s (APA’s) Albany Port Expansion Project (the Expansion Project) to meet the shipping needs of Southdown Joint Venture (SDJV), Southdown Magnetite Project. Due to the interconnected nature of the Expansion Project and the Southdown Magnetite Project, the environmental work needed is being undertaken in close collaboration between APA and SDJV. The environmental work is directed by APA (the legal proponent) in consultation with SDJV, who provides financial support.

The Expansion Project allows for the dredging of 12 million cubic metres (Mm$^3$) of sediments to widen and deepen the existing shipping channel into PRH and to extend the shipping channel into KGS to allow access for cape-size vessels (16 m draft) to Albany Port. Most of the dredged material will be disposed offshore at a location in KGS (Figure 1.1). The Expansion Project received environmental approval on 18 November 2010, (Ministerial Statement 846; MS 846), with its key characteristics as shown in Table 1.1.

<table>
<thead>
<tr>
<th>Key Aspect</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Dredging</strong></td>
<td>Cutter Suction Dredge (CSD) for the berth pockets and reclamation batter. Trailer Suction Hopper Dredge (TSHD) for the shipping channel. No blasting required.</td>
</tr>
<tr>
<td>Dredge methods</td>
<td>12 million cubic meters (Mm$^3$)</td>
</tr>
<tr>
<td>Total quantity of dredge material to be generated</td>
<td>247.7 hectares (ha) including all channel batters. 47.3 ha of which is an existing channel and has been dredged.</td>
</tr>
<tr>
<td>Total area to be dredged</td>
<td>32 weeks.</td>
</tr>
<tr>
<td><strong>Independent CSD Dredging (Stage 1 dredging)</strong></td>
<td>~300,000 m$^3$ for reclamation area by CSD</td>
</tr>
<tr>
<td>Total quantity of dredge material to be generated</td>
<td>11.7 Mm$^3$ dredged by TSHD.</td>
</tr>
<tr>
<td>Stage 1 duration</td>
<td>20 weeks.</td>
</tr>
<tr>
<td><strong>TSHD Dredging (Stage 2 dredging)</strong></td>
<td>-19.2 m CD (Figure 1.1).</td>
</tr>
<tr>
<td>Maximum channel depth</td>
<td>-17.8 meters (m) Chart Datum (CD) (Figure 1.1).</td>
</tr>
<tr>
<td>Berth Pocket depth</td>
<td>Continuous rock armoured sea wall, lined with geotextile filter cloth.</td>
</tr>
<tr>
<td>Berth and Channel Characteristics</td>
<td>Nil.</td>
</tr>
<tr>
<td>Clearing</td>
<td>Up to 9 ha (Figure 1.2).</td>
</tr>
<tr>
<td><strong>Land Reclamation Area</strong></td>
<td>Up to 4 m CD (Figure 1.2).</td>
</tr>
<tr>
<td>Area</td>
<td>Continuous rock armoured sea wall, lined with geotextile filter cloth.</td>
</tr>
<tr>
<td>Height</td>
<td>Nil.</td>
</tr>
<tr>
<td>Construction of sea wall</td>
<td>~360 m.</td>
</tr>
<tr>
<td>Length of rocky shoreline to be reclaimed</td>
<td>~900 m in total and ~570 m along the berth edge.</td>
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### Key Aspect

<table>
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<th>Surface drainage</th>
<th>Reclamation area will be filled and graded to achieve internal drainage until adequate stormwater system is constructed for the intended use.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock armour material</td>
<td>Granite rock</td>
</tr>
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### Offshore Disposal Area

<table>
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<tr>
<th>Disposal location</th>
<th>In deep water within King George Sound (Figure 1.3).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal footprint</td>
<td>250 ha. Diameter is 1800 m (Figure 1.3).</td>
</tr>
<tr>
<td>Disposal depth</td>
<td>Finished depth to the top of the disposal site is -35 m CD (Figure 1.3).</td>
</tr>
</tbody>
</table>

### Disturbance Footprint

| Total Albany Port Expansion Proposal marine disturbance footprint | 506.7 ha. |

## 1.2 Scope of this DLRMP

This dredging and land reclamation management plan (DLRMP) was developed to address the environmental management of dredging and land reclamation activities associated with the Expansion Project.

The construction activities covered by this DLRMP comprise:

- Dredging the berth pocket and reclamation batter (Stage 1 dredging);
- Dredging the shipping channel (Stage 2 dredging);
- Land reclamation and wharf infrastructure; and
- Disposal of dredged material in deep water at the entrance to King George Sound.

The DLRMP is based on Office of Environmental Protection Authority (OEPA) guidelines for the preparation of environmental management plans (DoE 2006a), and is structured as follows:

- A description of the implementation strategy for the DLRMP (Section 2);
- A brief description of the existing marine and social environments (Section 3);
- A brief description of the potential impacts of the Expansion Project (Section 4);
- The activity-based project management specific to the Expansion Project (Section 5);
- The proposed monitoring programs (including performance indicators and management triggers) to determine environmental impacts and allow for the effective and timely implementation of contingency plans if required (Section 6);
- Auditing and reporting requirements (Section 7); and
- Procedures for the review and revision of the DLRMP (Section 8).

## 1.3 Description of Key Works

The Expansion Project involves the dredging of 12 million m$^3$ of sediments to widen and deepen the existing shipping channel into Princess Royal Harbour and to extend the shipping channel into King George Sound to allow access of cape-size vessels into the Port. Most of the dredged material will be disposed offshore in a deep location at the entrance to the southern channel of King George Sound.

A portion of the dredged material will be used for reclamation of up to 9 hectares of Princess Royal Harbour to construct a new berth (Berth 7). Construction of the seawall will involve the importation of core and armour material by road transport. Pile driving activities will be required to construct the new berth. The location of the proposal is shown in Figure 1.1. Further detail on the land reclamation area is provided Figure 1.2 and the offshore disposal site is shown in Figure 1.3.
1.3.1 Dredging

Dredge Method

A Trailer Suction Hopper Dredge (TSHD) will be used for a minimum of approximately 90% of the dredging in combination with a small to medium sized Cutter Suction Dredge (CSD). The TSHD will go through cycles of four consecutive operations:

- Dredging and loading of the hopper;
- Sailing full to the disposal site(s) (either offshore or reclamation area);
- Disposal of dredge material at the offshore disposal site by bottom dumping or pumping directly to the land reclamation area; and
- Sailing empty to resume dredging.

The dredging operation will continue 24 hours a day and 7 days a week as weather permits, subject to compliance with the Dredging and Land Reclamation Plan (DLRMP) and all other contingency plans.

The CSD will be used to cut a batter profile at the proposed berth 7 and the southern side of the channel. It is intended that the material dredged by the CSD will be pumped directly into the land reclamation area. The reporting details in relation to dredging and disposal activities are contained in Section 7.2.

Dredging Exclusion Period

In accordance with Condition 5-1 of MS 846 (Appendix A) and Condition 2 of the EPBC Act referral (Appendix B) no stage 2 (i.e. using TSHD) capital dredging of the shipping channel is to occur between 1 November to 28 February in any year in order to protect seagrasses.

1.3.2 Land reclamation

The majority of the material to be dredged is unconsolidated sediments (mostly sand). A small proportion is to be pumped directly into the land reclamation area (300,000 m³; or 0.3 Mm³), via a CSD, for construction of a new berth (Berth 7).

The reclamation area will be completely bunded prior to the commencement of dredging. The land reclamation area will be protected on the seaward face by a continuous rock armoured seawall (Figure 1.4). The initial rock bund will be constructed to a height of +2 m CD. The armouring for berth 7 will be granite. The seawall will be formed by progressively end tipping core material onto the seabed. The seaward face will be progressively protected by placing two layers of armour extending to the seafloor. Prior to commencement of reclamation, the landward face of the core material will be faced with small rock to fill the voids and a geotextile filter cloth will be laid from the top of the core to the seafloor (Figure 1.4). This will reduce swell penetration through the seawall and reduce the return of dredged material back into the harbour.

The reclamation will be subdivided into a number of cell arrays via internal bunding. Dredged sandy material may be pumped into the reclamation area initially to construct the internal bunds. One cell array will be filled prior to overflowing to the next with the excess water entering the successive settlement areas to maximise settlement and allowing the slurry to settle over a period of time and to control the turbidity of return water via a sluice/weir box arrangement (JFA Consultants Pty Ltd, 2005). The weir box will be located at the south eastern corner of the reclamation area. Reclamation will occur progressively from the western end towards the eastern end. Earthmoving equipment will be utilised on the reclamation to control the spread of material and complete the filling to fill height. Reclamation to full height may occur in two lifts or in one single lift, depending on the final ground improvement methodology that may be required to provide a suitable construction surface.

Towards the completion of filling the reclamation area the volume available for settlement of fines in the return water will be reduced when compared to the start of reclamation. To allow for this and to maintain sufficient retention time, dredged sand will be stockpiled above the final design level of +4.0 m CD. Following completion of the dredging, the stockpiled material will be used to backfill the remaining settlement area. A final graded fall of
approximately 1% will be trimmed back to the central area of the reclaim that will ensure any interim surface water accumulations infiltrate *in situ*. This final trim and grade will ensure that stormwater is ameliorated in the interim until the construction of an adequate stormwater system is implemented by SDJV under the Works Approval for its’ portside infrastructure.
Figure 1.1 Location map showing Albany Port Expansion Project proposal, land reclamation at Semaphore Point, shipping channel, Albany Port Authority area, Princess Royal Harbour and King George Sound.
Note: The insert represents a cross section of the reclamation area

Figure 1.2 Layout of land reclamation area and berth pocket at Semaphore Point, turning basin and approach channel
Figure 1.3 Location of offshore disposal site between Bald Head and Breaksea Island
Figure 1.4  Typical cross section of seawall

Source:  BMT JFA
1.3.3 Disposal site

The remainder of the material (11.7 Mm$^3$) requires offshore disposal at the entrance to King George Sound in South Channel, between Bald Head on Flinders Peninsula and Breaksea Island (Figure 1.6). Dredged material at the disposal site will be disposed such that the finished depths are approximately -35 m CD. Disposal at this depth is considered stable and minimises the likelihood for resuspension.

A bathymetric survey of the disposal site must be undertaken by APA to meet the requirements of Condition 19 of the Sea Dumping Permit (SDP) obtained for this exercise:

- Prior to the commencement of dredging under this permit;
- Within two months of the completion of all dumping$^1$ activities authorised under this permit; and
- 12 months after the completion of all dumping activities authorised under the SDP.

Each load of dredged material will be dumped so that overall the dredge material is distributed evenly over the area, in accordance with Condition 9 of the SDP. The average thickness of disposed material will be between 3.5 m and 6.5 m above the existing seabed, with a maximum total footprint of 250 ha.

In accordance with Conditions 10 and 11 of the SDP, immediately prior to disposal activities, it will be established by GPS that the vessel is within the disposal site defined by the co-ordinates contained in Table 1.2.

| Disposal ground centre co-ordinates (radius 900 m) Co-ordinates based on GDA94 datum |
|---------------------------------|--------------------------------|
| Latitude (South)                | Longitude (East)               |
| 35° 04’ 55"S                   | 118° 01’ 40”E                  |

1.4 Legislative Requirements

This DLRMP addresses the conditions of approval for the Expansion Project under the State and Commonwealth legislative requirements, as detailed in Sections 1.4.1 to 1.4.4 below. In the event that there is an inconsistency between the legislative requirements and the DLRMP identified, the legislative requirements will take precedence over the requirements of the DLRMP.

1.4.1 State Ministerial Conditions

This DLRMP is required under Conditions 5A, 5, 7, 8, 9 and 10 of the MS 846 (18 November 2010), refer Appendix A.

1.4.2 Western Australian Department of Water Dredging Licence

This DLRMP forms part of the requirements to obtain a dredging licence under the Waterways Conservation Act 1976 for the proposed works in Princess Royal Harbour (PRH).

1.4.3 Commonwealth Ministerial Conditions

This DLRMP is required under Condition 1 of the Albany Port Authority Expansion Project, WA, EPBC Referral 2006/2540 (Appendix B).

1.4.4 Sea Dumping Permit

This DLRMP addresses the relevant requirements of the Albany Port Authority Expansion Project Sea Dumping Permit (SDP) No. SD2006/0035 (Appendix C). Condition 3 of the SDP requires that the DLRMP include management of the impacts on the environment from the dredging and dumping activities relating to the capital dredging of the Shipping channel as part of the Expansion project.

$^1$ Dumping activities as defined by the SDP include:
The excavation or dredging of the material;
The loading and carriage of dredged material for the purpose of dumping;
The dumping of the material at the prescribed disposal site.
1.5 Environmental Values and Objectives

Environmental Values (EVs) and Environmental Quality Objectives (EQOs) applicable to the Expansion Project have been determined using the framework specified for Perth’s Coastal Waters (EPA, 2000), in accordance with Condition 5A-2 of MS 846. The EVs and EQOs for Perth’s coastal waters are reproduced in Table 1.3.

Table 1.3 Perth’s Coastal Waters Environmental Values (EVs) and Environmental Quality Objectives (EQOs) (EPA 2000)

<table>
<thead>
<tr>
<th>Environmental Value (EV)</th>
<th>Environmental Quality Objectives (EQOs)</th>
</tr>
</thead>
</table>
| Ecosystem Health        | EQO1: Maintenance of Ecosystem Integrity  
Ecosystem integrity, considered in terms of structure and function, will be maintained throughout Perth’s coastal waters. The level of protection of ecosystem integrity shall be high (E2) throughout Perth’s coastal waters, except in areas designated E3 (moderate protection) and E4 (low protection). |
| Fishing and Aquaculture | EQO2: Maintenance of Aquatic life for human consumption  
Seafood will be safe for human consumption when collected or grown in all of Perth’s coastal waters except areas designated S2. |
| Recreation and Aesthetics | EQO3: Maintenance of primary contact recreation values  
Primary contact recreation (e.g. Swimming) is safe in all of Perth’s coastal waters except areas designated S3. |
|                         | EQO4: Maintenance of secondary contact recreation values  
Secondary contact recreation (e.g. Boating) is safe in all of Perth’s coastal waters except areas designated S4. |
|                         | EQO5: Maintenance of aesthetic values  
The aesthetic values of Perth’s coastal waters will be protected except in those areas designated S5. |
| Industrial Supply Water | EQO6: Maintenance of industrial water supply values  
Perth’s coastal waters will be of suitable quality for industrial water supply purposes except in areas designated S6. |

Notes:
1. No industrial water supply uses are known to occur within the immediate vicinity of the Expansion Project activities. Management of water quality for EQO1 will also address EQO6.

Ecological EQO

The EQO for the EV of ‘Ecosystem Health’ is aimed at maintaining ecosystem integrity and biodiversity thereby ensuring the continued health and productivity of the coastal ecosystem. Four levels of protection for EQO1 are outlined in EPA (2000), which are generally described in terms of the limit of acceptable change from natural conditions (Table 1.4).

Table 1.4 Four levels of protection and their corresponding limits of acceptable change for EQO1; Maintenance of Ecosystem Integrity (EPA2000)

<table>
<thead>
<tr>
<th>EQO 1 Level of protection (code)</th>
<th>Relative Protection</th>
<th>Limit of acceptable change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 (E1)</td>
<td>Total protection</td>
<td>No detectable change from natural variation</td>
</tr>
<tr>
<td>Level 2 (E2)</td>
<td>High protection</td>
<td>Some small changes from natural variation</td>
</tr>
<tr>
<td>Level 3 (E3)</td>
<td>Moderate protection</td>
<td>Moderate changes from natural variation</td>
</tr>
<tr>
<td>Level 4 (E4)</td>
<td>Low protection</td>
<td>Large changes from natural variation</td>
</tr>
</tbody>
</table>

With respect to spatial definition of areas with different levels of ecological protection for the Expansion Project, High Ecological Protection Areas (HEPAs, E2) and Moderate Ecological Protection Areas (MEPAs; E3) will apply. King George Sound and outer Princess Royal Harbour have been influenced by historical and present anthropogenic uses of the terrestrial and marine environment. The environmental quality of this marine environment is categorised as ‘slightly to moderately disturbed’, due to the presence of the Port and other industrial land uses along the northern shore of Princess Royal Harbour, the aquaculture leases in King George Sound, recreational and commercial vessel passage through both Harbours and the impacts of runoff from the surrounding catchments. The slightly to moderately disturbed ecosystems of the outer portion of Princess Royal Harbour and King George Sound are assigned HEPAs (Figure 1.5).
The inner harbour area of Albany Port has been categorised as a ‘highly disturbed’ ecosystem due to current and historic activities in the area and consequently is assigned MEPA (Figure 1.5). This area includes waters surrounding the existing port infrastructure, the new berth pocket and swing basin; however, excludes the channel.

A temporary construction MEPA will also be established during the dredging and disposal activities (Figure 1.6). The temporary MEPA will extend 250 m around the shipping channel and the disposal area. Upon completion of the dredging campaign, the temporary MEPA will revert to a HEPA classification.

**Social EQOs**

The social EQOs relate to the social EVs (fishing and aquaculture, recreation and aesthetics, and industrial water supply, Table 1.3) and aim to protect the associated human uses by ensuring that it is safe to swim and eat seafood grown or collected from these waters, the waters are suitable for extraction for industrial purposes (e.g. cooling water), and that the marine environment in general is aesthetically pleasing. Different levels of protection do not apply to social EQOs: an area is either considered suitable for these human uses, or not.
Figure 1.5 Moderate Ecological Protection Areas (MEPAs; E3) in relation to the Expansion Project: the waters outside of the MEPA are classified High Ecological Protection Areas (HEPA; E2; EPA 2000)
Figure 1.6 Temporary Moderate Ecological Protection Areas (MEPAs; E3), which will be in place for the duration of dredging and disposal: the waters outside of the MEPA are classified High Ecological Protection Areas (HEPA; E2; EPA 2000)
1.6  Albany Ports’ Environmental Management Framework

1.6.1  Environmental Policy

Albany Port Authority has developed an Environmental Policy which states the Port’s intentions and commitment to environmental performance in alignment with international standards. The policy is appropriate to the nature, scale and environmental impacts of the APA and will provide the foundation for setting and reviewing APA’s environmental objectives and targets. An Environmental Management System (EMS; refer Section 1.6.2) ensures that the Environmental policy is documented, implemented, maintained and communicated to all persons working for or on behalf of the APA and the public.

The Environmental Policy states that APA is committed to continuously improving all aspects of their operations and overall environmental performance to:

- Avoiding the pollution of waterways by strict compliance with government regulations and undertaking Port operations in a way that maintains water quality;
- Minimising potential environmental impacts related to dust, noise, waste, land and water pollution or contamination, exotic species and loss of native habitat;
- Monitoring operations to provide the benchmark for setting environmental objectives and measurable targets, evaluate compliance with legal and other requirements and measure progress against environmental objectives;
- Continual improvement in environmental performance through periodic management reviews and internal audits to detect necessary preventative or corrective actions;
- Consistent communication within the organisation, including informing personnel of the environmental requirements associated with their roles, and informing relevant personnel of changes to Port activities, services, legal and other requirements which will affect the Port operations;
- Communicating environmental performance openly with employees, regulators and external stakeholders; and
- Educating all APA personnel and contractors of their environmental obligations through inductions and training programs and refreshers.

1.6.2  Environmental Management System

Introduction and Scope

Albany Port Authority has developed an Environmental Management System (EMS). This DLRMP forms a part of the operational control procedures for the APA EMS, which has been developed in order to:

- manage the environmental impacts of the operation;
- ensure that effective management of the environment is integral to its operations; and
- satisfy legislative and regulatory requirements.

The EMS is based on the requirements of the ISO 14001:2004 - Environmental Management Systems – Requirements with guidance for use. The scope of APA’s EMS applies to all port operations and activities and those of its contractors, but excludes the activities of lease holders and their contractors.

Records and Document Control

APA documentation and environmental records that will be maintained include:

- Environmental Management System manual;
- Environmental documents and registers; and
- Environmental Management Plan.

The Environment Manager is responsible for maintaining and updating EMS documents on a day to day basis. The CEO is responsible for authorising changes to documents from reviews, and Line Managers and/or senior officers are responsible for providing work instructions or other documents relating to their area of responsibility.
**Management responsibilities**

The management structure of APA is provided in the EMS. The CEO controls Job Descriptions for all Port employees. The Environment Manager is responsible for the identification and communication of roles and responsibilities to APA personnel and contractors, and also for setting out resources required for implementation of the EMS, to be approved by the Chief Executive Officer.

**Competence, training and awareness**

The Environment Manager will ensure that personnel and contractors whose roles may contribute to significant environmental impacts are identified, informed and trained about EMS requirements. Line Managers or delegates will ensure that employees and contractors are aware of work procedures relating to environmental impacts.

**Communication**

The Environment Manager is responsible for internal communications of EMS-related information to relevant personnel and contractors. The CEO and Executive Officer are responsible for communications to and from external bodies.
2. Implementation Strategy

2.1 Project management programs

This DLRMP presents three project management programs for marine construction activities associated with the Expansion Project, as follows:

- General marine works management program;
- Dredging and plume management program; and
- Marine infrastructure management program.

Each project management program includes:

- **Application** – the project activities and project areas to which the management program applies;
- **Performance objectives** – the performance goals;
- **Key performance indicators** – measures of performance to demonstrate the objective is being achieved;
- **Management measures** – management and mitigation measures required to achieve the performance objective related to each activity; and,
- **Reference to monitoring and contingency plans and environmental quality indicators and associated triggers** applicable to the management program.

The project management programs are described in full in Section 5. The relationships between the project management programs and various monitoring and contingency plans are further described below.

2.2 Monitoring and contingency plans

Monitoring and contingency plans have been developed to address the following environmental aspects, as required for the Expansion Project under various State or Commonwealth approval instruments (MS 846, Sea Dumping Permit SD2006/0035, EPBC Act Referral 2006/2540):

- Oil Spill Monitoring and Contingency Plan (see Section 6.1);
- Introduced Marine Pests Monitoring and Contingency Plan (see Section 6.2);
- Marine Fauna Monitoring and Contingency Plan (see Section 6.3);
- Water Quality Monitoring and Contingency Plan (see Section 6.4); and
- Underwater Noise Monitoring and Contingency Plan (see Section 6.5).

The monitoring and contingency plans relevant to each of the three project management programs are summarised in Table 2.1.

<table>
<thead>
<tr>
<th>Project management program</th>
<th>Monitoring and contingency plan</th>
<th>DLRMP Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>General marine works management program</td>
<td>1. Oil spill monitoring and contingency plan.</td>
<td>Section 6.1</td>
</tr>
<tr>
<td></td>
<td>2. Introduced marine pests monitoring and contingency plan.</td>
<td>Section 6.2</td>
</tr>
<tr>
<td></td>
<td>3. Marine fauna monitoring and contingency plan.</td>
<td>Section 6.3</td>
</tr>
<tr>
<td>Dredging and plume management program</td>
<td>4. Water quality monitoring and contingency plan.</td>
<td>Section 6.4</td>
</tr>
<tr>
<td>Marine infrastructure management program</td>
<td>5. Underwater noise monitoring and contingency plan.</td>
<td>Section 6.5</td>
</tr>
</tbody>
</table>

A key component of the DLRMP is the water quality monitoring program (WQMP; Appendix D) developed as a stand-alone document specifically to satisfy Condition 5A, and which also encompasses Conditions 5, 7, 8, and 10 of MS 846. Some of the monitoring and contingency plans listed in Table 2.1 have monitoring and contingencies that are components of the WQMP: in these instances the DLRMP provides only a summary and citation to the corresponding section of the WQMP. Where the monitoring and contingency plans include
monitoring and contingencies that are not covered in the WQMP, the DLRMP provides a description of these.

2.2.1 Monitoring

Monitoring procedures have been prepared for each Monitoring and Contingency Plan, including an outline of monitoring sites, methods, frequency and statistical analyses (where applicable). Monitoring procedures also include provisions in the event that monitoring cannot be undertaken (e.g. due to inclement weather, equipment failure, etc.) and will incorporate sufficient flexibility in terms of scheduling and implementation so as to minimise disruption to the project. Detailed monitoring methods and definition of technical analyses will be incorporated into the Monitoring and Contingency Plans prior to the commencement of construction works, as required.

In the event that monitoring procedures cannot be followed, the following management approach will apply:

- Assess the impact of the monitoring failure on the ability to evaluate environmental performance and then determine whether to continue, modify or suspend activities;
- Where the failure of monitoring would affect the ability to evaluate compliance with an environmental limit, the relevant contingency plan will be implemented (see Section 6); and
- Monitoring in accordance with the DLRMP will be reinstated as soon as practicable.

2.2.2 Environmental quality indicators and associated triggers

Assessment of whether the Environmental Quality Objectives (EQOs) for the protection of Environmental Values (EVs) within PRH and KGS are being met (see Section 1.5) is based on environmental quality indicators (i.e. what is measured, for example, cadmium concentrations in water), and their associated triggers for management (e.g. the concentration of cadmium that triggers management, if exceeded). These have been based on the environmental quality criteria (EQC) established by the Cockburn Sound SEP and supporting document Environmental Quality Criteria Reference Document for Cockburn Sound (EPA 2005), viewed as the template for the management of WA’s coastal waters.

EQC are numerical values (e.g. cadmium < 0.7 μg/L) or narrative statements (e.g. no deaths of marine fauna that can be linked to anthropogenic-sourced changes in pH) that serve as benchmarks to determine whether (i) a more detailed assessment of environmental quality is required, or (ii) a management response is required (EPA 2005). There are two types of EQC that reflect different levels of environmental risk, as follows:

- Environmental quality guidelines (EQG) – typically based on simple, easy to measure indicators (e.g. turbidity, or contaminant concentrations in water) that, if exceeded, indicate some uncertainty that an EQO is met, and triggering further assessment against a relevant environmental quality standard.
- Environmental quality standards (EQS) – typically more detailed and direct measures of environmental quality (e.g. seagrass shoot density) that, if exceeded, indicate an unacceptable level of risk that an EQO is not met, and triggering a management response.

To facilitate assessment whether the EQOs for PRH and KGS are being achieved during the Expansion Project, EQC have either been adopted or project-specifically developed in accordance with the Environmental Quality Criteria Reference Document for Cockburn Sound (EPA 2005), as defined within relevant Monitoring and Contingency Plans (see Section 2.2 and Table 2.1).
2.2.3 Contingencies

Contingency procedures have been incorporated within each monitoring and contingency plan, which describe the process to be followed in the event that:

- Environmental quality criteria have been exceeded, triggering a response;
- Where monitoring results indicate that management or mitigation measures may otherwise be required; and/or,
- There has been a failure to monitor in accordance with a monitoring program.

The contingency plans are intended, as far as foreseeable, to accommodate likely scenarios requiring management responses.

2.3 Integration of project management programs and Cockburn Sound SEP framework

The three project management programs presented in this DLRMP have been developed to ensure that the Project dredging and construction works are undertaken in a manner consistent with the environmental management framework defined by the Cockburn Sound SEP (EPA 2005). The Environmental Values and Environmental Quality Objectives are outlined in Table 2.2, together with applicable project management programs, monitoring and contingency plans and environmental quality criteria, with reference to sections of this DLRMP that specifically describe the relevant approach to environmental management.
### Table 2.2  Environmental Values and Environmental Quality Objectives, with reference to relevant sections of this document describing applicable Project Management Programs, Monitoring and Contingency Plans and Environmental Quality Criteria.

<table>
<thead>
<tr>
<th>Environmental Value</th>
<th>Environmental Quality Objective</th>
<th>DLRMP Project Management Programs</th>
<th>Monitoring and Contingency Plans</th>
<th>Environmental Quality Criteria</th>
<th>DLRMP Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ecosystem Health</strong></td>
<td>Maintenance of ecosystem integrity, Refers to the level of ecological protection to be maintained for ecosystem integrity, in terms of structure (diversity and abundance of biota) and function (food chains and nutrient cycles).</td>
<td>General Marine Works PMS</td>
<td>Oil Spill MCP</td>
<td>• Physico-chemical stressors (dissolved oxygen and pH); • Toxicants in water; and • Toxicants in sediment.</td>
<td>Section 6.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Introduced Marine Pest MCP</td>
<td></td>
<td>• No high risk vessels; and • Zero detection of IMP.</td>
<td>Section 6.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine Fauna MCP</td>
<td></td>
<td>• No injury or death of marine fauna from vessel strikes or interactions with dredging and disposal vessels.</td>
<td>Section 6.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredging and Plume PMS</td>
<td>Water Quality MCP</td>
<td>• Physico-chemical stressors (dissolved oxygen and pH); • Toxicants in water; • Toxicants in sediments; • Underwater light; • Seagrass health; • Seagrass direct and indirect loss; and • Reef communities.</td>
<td>Section 6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine Infrastructure PMS</td>
<td>Underwater Noise MCP</td>
<td>• No significant impacts on the following factors from pile driving activities: • Listed threatened species; • Listed migratory species; and • Commonwealth marine areas.</td>
<td>Section 6.5</td>
</tr>
<tr>
<td><strong>Fishing and Aquaculture</strong></td>
<td>Maintenance of aquaculture, Such that water is of a suitable quality for aquaculture purposes.</td>
<td>General Marine Works PMS</td>
<td>Oil Spill MCP</td>
<td>• Turbidity; and • Toxicants and bacteria in shellfish (sentinel mussels).</td>
<td>Sections 6.1 &amp; 6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredging and Plume PMS</td>
<td>Water Quality MCP</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Recreation and Aesthetics</strong></td>
<td>Maintenance of primary contact recreation values, Such that primary contact recreation (e.g. swimming) is safe.</td>
<td>General Marine Works PMS</td>
<td>Oil Spill MCP</td>
<td>• Toxicants in water.</td>
<td>Sections 6.1 &amp; 6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredging and Plume PMS</td>
<td>Water Quality MCP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance of aesthetic values, Such that aesthetic values are protected.</td>
<td>General Marine Works PMS</td>
<td>Oil Spill MCP</td>
<td>• Aesthetic indicators.</td>
<td>Sections 6.1 &amp; 6.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredging and Plume PMS</td>
<td>Water Quality MCP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4 Roles and Responsibilities for Implementation

APA is the proponent of the Expansion Project and consequently is responsible for the construction and operation of the port and marine facilities. APA is ultimately responsible for the implementation of the management actions and commitments made within this DLRMP; however, all personnel involved in construction of the Expansion Project are responsible for environmental management, as outlined in Table 2.3 below.

<table>
<thead>
<tr>
<th>Role</th>
<th>Name and contact details</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>APA Project Director</td>
<td>t.b.a</td>
<td>• Overall responsibility for the project and implementation of this DLRMP.</td>
</tr>
</tbody>
</table>
| APA Project Manager | t.b.a | • Undertakes the dredging and reclamation activities in compliance with this DLRMP.  
• Communicates environmental requirements to the dredging contractor. |
| APA site Environmental Officer | t.b.a | • Implements the day-to-day environmental management of the works including regular audits of the environmental performance of dredging and disposal activities.  
• Provides environmental advice regarding dredging and reclamation activities.  
• Responds to calls from community and records issues time, date and issues raised.  
• Coordinates environmental monitoring and reporting.  
• Investigates and reports on any environmental incidents.  
• Implements the environmental monitoring programs.  
• Implements any vessel pest inspections.  
• Provide advice regarding environmental issues as required. |
| Dredging Contractor – Project Manager | t.b.a | • Undertakes the dredging and reclamation activities in compliance with this DLRMP.  
• Implements management strategies as directed by APA Project Manager.  
• Ensures all dredging contractor staff and crew receive adequate environmental training.  
• Provides advice regarding the environmental management of dredging and reclamation activities.  
• Ensures that all equipment is maintained in appropriate condition to minimise the risk of environmental incidents. |
| Marine Infrastructure Construction Contractor – Project Manager | t.b.a | • Undertakes the construction activities in compliance with this DLRMP.  
• Implements management strategies as directed by APA Project Manager.  
• Ensures all construction contractor staff and crew receive adequate environmental training.  
• Provides advice regarding the environmental management of construction activities.  
• Ensures that all equipment is maintained in appropriate condition to minimise the risk of environmental incidents. |
| Environmental Monitoring contractor | t.b.a | • Undertakes the monitoring activities in compliance with this DLRMP. |
| All persons involved in the Expansion Project | t.b.a | • Conduct all work in compliance with this DLRMP.  
• Exercise a ‘Duty of Care’ to the environment.  
• Reporting all environmental incidents as soon as practicably possible to the Site Environmental Officer and/or Project Manager. |

Note: t.b.a - to be announced
2.5 Training and awareness

All personnel involved in the Expansion Project are required to undertake APA’s Safety, Security and Environment Induction to ensure they are fully aware of all health, safety and environmental requirements of the project and surrounding Port.

The Dredging Contractor and Marine Infrastructure Construction Contractor will also be required to develop scope-specific project induction packages for delivery to all relevant personnel. As part of the Contractors induction process all personnel engaged on the project, including subcontractor personnel, will receive project information and training regarding environmental awareness and the expectations and environmental requirements for the project, including relevant details of this DLRMP and APA’s broader environmental commitments and conditions incorporated in State and Commonwealth approvals.

2.6 Environmental Incident Reporting

Environmental incidents are defined as any breaches or non-compliance with environmental objectives and controls prescribed by the management programs of this DLRMP (see Section 5). All incidents shall be immediately reported to the Site Environmental Officer and/or Project Manager by the person responsible for the incident or the first person at the site of an incident. The incident report will include:

- Details of the incident;
- Measures taken to mitigate the impact of the incident;
- The outcome of measures implemented to mitigate the impact of the incident; and
- Any additional measures proposed to be taken.

Internal reporting of all incidents is mandatory throughout the Expansion Project. All incidents will be recorded in an Environmental Incident Register maintained by the Site Environmental Officer and reported to the OEGA and/or other authorities through the annual compliance reporting required for the project under Condition 4 of MS 846. Major environmental incidents include non-compliance with Ministerial Conditions and will be reported to the relevant regulatory authority as prescribed by the management programs of this DLRMP (see Section 5). All major incidents will be investigated to identify to root cause, contributing factors, and key recommendations for consideration and implementation.

In accordance with Condition 15 of the Expansion Project’s Sea Dumping Permit (refer Appendix C), if at any time during the course of the dumping activities, an environmental incident occurs or environmental risk is identified, all measures must be taken immediately by APA to mitigate the risk or the impact. The situation is to be reported within 24 hours to the Federal 2 Minister for Sustainability, Environment, Water, Population and Communities, with details of the incident or risk, the measures taken, the success of those measures in addressing the incident or risk and any additional measures proposed to be taken.

2.7 Contractor requirements

All contractors engaged in the Expansion Project are required to ensure that the environmental controls and environmental requirements outlined in this DLRMP are incorporated into their own Construction Environmental Management Plans (CEMPs).

Contractors must submit their CEMPs to APA prior to commencement of work. APA will review CEMPs to ensure compliance with this DLRMP. In the event of non-compliance, contractors will be required to revise their CEMP to incorporate additional or expanded environmental management measures.

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2 Formerly the Department of Environment Protection, Heritage and the Arts (DEWHA), now the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).
3. Existing Environment

3.1 Marine Environment

The Albany Port is located at the junction of Princess Royal Harbour and King George Sound. A comprehensive description of the Marine Environment in the Albany area has been provided in the Public Environment Review (PER) for the proposal (Ecologia 2007). Additional baseline information on water and seagrass health for a twelve month between autumn 2009 and autumn 2010 was developed for the project (Oceanica 2010). A brief summary of key information from both of these sources has been provided here.

3.1.1 Meteorology and Oceanography

The dominant influence on the circulation in the waters of King George Sound (KGS) and Princess Royal Harbour (PRH) is strong winds which flow over the ocean at scales of tens of kilometres (Ecologia 2007). Albany is dominated by easterly winds in summer and westerly winds in winter. Tides are relatively weak and vary from diurnal to semi-diurnal throughout the year with a spring tidal range of approximately 1.1 m.

The Southern and Indian Oceans produce a highly energetic wave climate at the south-west corner of the continent. However, the south-easterly to easterly feature of King George Sound provides a significant level of protection to these waves.

3.1.2 Geology and Bathymetry

The bathymetry of KGS is highly variable and relatively shallow, ranging between 5-40 m (Ecologia 2007). The Albany Port basin and entrance channel is currently dredged to a depth of 12.2 m LWOST (Low Water of Ordinary Spring Tide). Water depth within PRH becomes progressively shallower in the southern and western areas of the Harbour due to the presence of a wide sandy inter-tidal shelf of less than two metres depth.

The sediment within the existing shipping channel was described by SKM (2007) as consisting of unconsolidated material of approximately 8-10 m depth into the seabed with a particle size composition of medium to coarse silica sand and some fine silt. Dive observations (JFA Consultants, 2005) described the material from the existing harbour and channel as a dark grey, fine to medium grained sand with minimal organic material and the material offshore as clean white sand.

3.1.3 Sediment Quality

Sediment investigations carried out during the PER, identified levels of mercury and silver in a portion of the proposed shipping channel above the National Ocean Guidelines for Dredged Material (NOGDM) screening levels (EPA 2010). Subsequent pore water testing showed that mercury levels were at or above the 99% species protection trigger level in a number of samples, while silver levels were below the 99% species protection trigger level. APA has committed to selectively dredge this portion of the channel without overflow and to place the material in the centre of the offshore disposal site (see Section 7.2.3, Table 7.2, and management measure 10 for details).

3.1.4 Water Quality

The results of the baseline water quality monitoring program (Oceanica 2010) showed that there was little to no spatial or temporal variation for water quality. Comparison with National default water quality guidelines for south-west Australian marine waters (ANZECC/ARMCANZ 2000) indicated that natural background concentrations for some of the parameters were above guideline values on occasions. Mercury and silver concentrations during the baseline monitoring were below National guideline trigger levels (i.e. potential contaminants of concern were at safe levels). Microbiological sampling undertaken at two popular beaches (Middleton Beach and Goode Beach/Whalers Cove) indicated that good water quality typically prevails at both beaches.
3.1.5 Benthic Habitats

Seagrasses
Seagrass meadows in PRH are dominated by three species: *Posidonia sinuosa*, *P. australis* and *Amphibolis*: *P. sinuosa* occurs most extensively in the harbour, down to waters depths of about 5 m, while *P. australis* occurs in shallower waters (1-2 m) (DoW 2008). These three species also occur in KGS, with *P. sinuosa* present to water depths of approximately 10 m, with patchy meadows of a fourth species, *P. coriacea*, present in deeper waters 14-16 m) in the centre of KGS.

The footprint of the proposed channel is predominantly comprised of fine sand with no sessile benthic flora or fauna, other than as follows:

- Sea pens (*Sarcoptilus grandis*) that occur on the seabed along the northern batter of Ataturk entrance between King Point and Vancouver Peninsula; and
- Sparse clumps of the seagrass *P. coriacea* found at varying densities.

Results of the baseline monitoring survey indicated that there was little seasonal variation (i.e. seagrass shoot density and amount of epiphytic growth on seagrass leaves) at monitoring sites in KGS and PRH entrance.

Reefs
There are two major reef systems (Gio Batta Patch and Michaelmas Reef) adjacent to the proposed channel in King George Sound. Both reefs are limestone reefs that support macroalgal communities and a rich and diverse fauna consisting of encrusting sponges, bryozoans, ascidians and soft corals (EPA 2010).

3.1.6 Marine Fauna and Aquaculture

Fish
During the PER studies for the Expansion Project, it was identified that 203 species of fish occur in the marine environment of Princess Royal Harbour, Oyster Harbour and King George Sound. The purse-seine fishery for pilchards, comprises approximately 97% of the total fish catch in the Albany area (Ecologia 2007).

Pinnipeds
Seals and sea-lions are found along the southern coast and on the islands off the coast of Albany, with the most commonly sighted species are the Australian Sea-lion (*Neophoca cinerea*) and the New Zealand Fur-seal (*Arctocephalus fosteri)*.

Cetaceans
The coastal areas from Albany to the Great Australian Bight are migratory paths and breeding areas for the southern right whale (*Eubalaena australis*) and the humpback whale (*Megaptera novaeangliae*). The bottle nose dolphin (*Tursiops truncates*) and the common dolphin (*Delphinus delphis*) also frequent Albany waters.

Avifauna
Breeding colonies of migratory seabirds are present on Breaksea, Michaelmas, Eclipse and Bald Islands, particularly the Great Winged Petrel (*Pterodroma macroptera*) and the Flesh-footed Shearwater (*Puffinus carneipes*).

Aquaculture mussels
There are 12 Albany Port Authority aquaculture leases and Department of Fisheries (DoF) licences issued in King George Sound, with the majority being sited adjacent to Mistaken Island (Ecologia 2007). These sea based sites are used to cultivate mussels (*Mytilus edulis*) which are farmed in the Albany harbours by collecting wild spat that is then attached to long lines to grow-out to market size (Ecologia 2007). A land based aquaculture facility is also situated at Frenchman’s Bay. It extracts seawater from King George Sound to service mussel hatcheries.
Baseline monitoring for mussel samples were obtained from the Mistaken Island aquaculture suppliers in KGS (Oceanica 2010). Results showed that baseline concentrations of mercury in mussel tissue were well below the Food Standards Australia and New Zealand (FSANZ 2006) guidelines for shellfish.

3.1.7 Introduced Marine Pests

**Introduced Marine Pests in Western Australia**

Introduced marine species (IMS) are animals and algae that are not indigenous to Australia (or particular habitats within Australia) but have been transferred to local waters and either established or have the potential to establish within the marine environment (DAFF, 2009). In contrast, Introduced Marine Pests (IMP) are those species introduced into, or translocated within Australian waters that pose a significant risk to environmental values, biodiversity, ecosystem health, human health, fisheries, aquaculture, shipping, ports or tourism (DAFF, 2009).

The introduction of marine species into areas outside their native range is a serious risk to Australia’s native marine life, and can also greatly impact on commercial fisheries and aquaculture industries (ABS 2001). Non-deliberate introductions occur in two main ways: either through ballast or biofouling.

Since the AQIS introduction of mandatory ballast water regulations, where ballast water must be exchanged outside territorial sea (12 nautical miles off the Australian coast, including islands), risk of IMP from international ballast has been greatly reduced. Provided that the AQIS strategy is correctly enforced, the risk rating of IMP from international ballast water should be negligible to low. Domestic ships that discharge or exchange ballast water at any Australian port have variable risk ratings depending on where the ballast water was last acquired. For example, if the ballast water was collected at a port where IMP are known to be present, the risk rating will be moderate to high, whereas ports without IMP are considered negligible to low.

While the above is accurate, there is now a global understanding that the risk from ballast water while still considerable may have been overstated relative to biofouling. Biofouling species contribute approximately 80% of the introduced species we currently have in Australia – therefore biofouling is the greatest risk. In the recent analysis of the risks of marine species being introduced through 15 ports in Western Australia, McDonald (2008) indicated that ports with a high proportion of working vessels (such as tugs, barges and dredges) were at the greatest risk of IMP. These vessels pose a risk as they typically spend long periods at anchor or moored between jobs, undertake slow moving work in one location for long periods, use seafloor equipment, and work in population centres and coastal areas where most IMP are located.

In 2009, the Commonwealth of Australia released a series of guidance documents setting out a consensus view of effective biofouling management practices. The documents relevant to this DLRMP include “National Biofouling Management Guidelines for Non-trading Vessels”; and “National Biofouling Management Guidelines for Commercial Vessels.” (CA 2009a and CA 2009b). The purpose of the documents was to provide guidance and recommendations for practical management options for the management of biofouling hazards associated with vessels and equipment. All States and Territories of Australian, and New Zealand have endorsed the ANZECC Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance. This Code of Practice guides antifouling and in-water hull cleaning and maintenance activities for Australia and New Zealand.

Further to Commonwealth requirements for waters in their jurisdiction, Western Australian Department of Fisheries has requirements for West Australian State waters regarding introduced marine pests which are underpinned by legislation.

Eradication of IMP is often only feasible if they are detected very early in their colonisation. Currently the most effective form of control is prevention. Once established marine pests have long lasting impacts and are usually impossible to eradicate.
**Introduced Marine Pests in Albany**

A survey of the Albany marine area (King George Sound, Princess Royal Harbour and Oyster Harbour) for IMS was conducted in 2007 by Department of Fisheries (McDonald et al 2009). The purpose of this survey was to identify if there were any National Introduced Marine Pests Coordination Group (NIMPCG) listed introduced species present in the Albany marine area. The Albany marine area has the widest habitat diversity on the south coast, but the area is still small enough to be sampled readily and there are a wide variety of potential sources of IMS, including aquaculture, fishing, a yacht club, and the commercial trading port (Albany Port).

Two species recorded from Albany were on the NIMPCG target list:

- The polychaete (European fanworm) *Sabella spallanzanii*; and
- The marine alga *Codium fragile ssp. tomentosoides* (now *C. fragile ssp. fragile*).

*Sabella spallanzanii* was previously known from the area, but the single specimen of *C. fragile ssp. fragile* was a new record. Following the finding of *C. fragile ssp. fragile* in PRH, an extensive survey specifically targeting this species was conducted in June 2008. No further specimens were found during the survey. The Port of Albany later collected thirteen additional individuals outside the initial survey area and their identity was confirmed as *C. fragile ssp. fragile*. In addition, six IMS not on the NIMPCG target list were also recorded during the study, bringing the total number of introduced species known from this region to 27 (McDonald et al 2009).

*C. fragile ssp. fragile* and *Sabella spallanzanii* have not been detected in the three high risk ports of Western Australia (Port Hedland, Fremantle and Dampier) nor have they been detected in other locations in Western Australia. Preventing spread of these species outside of the Albany marine area must be a strong consideration for all activities occurring.

### 3.2 Social Environment

#### 3.2.1 Maritime and indigenous heritage

Investigations carried out as part of the PER studies (Ecologia 2007) found that there were no sites within the proposal footprint were listed on Register of Heritage Places or the City of Albany Municipal Inventory List.

Historical evidence indicates that the shoreline and adjoining seabed have cultural heritage significance and may contain land and maritime archaeological sites. In particular the area was associated with the:

- Construction and operation of the King Point Lighthouse (1858) (the existing lighthouse keepers cottage sits several hundred metres to the east of the Project area).
- Operations of the Albany Pilot Station (1852-C1960).
- Princess Royal Harbour mine defences (C1890).
- Fish Landing Jetty.
- Multiple shipwrecks with various levels of protection are registered on both, the State and Federal Shipwreck Registers.

#### 3.2.2 Recreation, public access and shoreline change

Major recreational marine sites in the Albany area that involve direct (primary) contact with the water were identified during the PER process, including areas utilised for swimming, diving, crabbing and a horse training locality (Ecologia 2007). Additional recreation and aesthetic sites were identified during the Albany Dredge Reference Group meetings of key stakeholders (refer to WQMP section 5.1.1). Thirteen major areas for contact recreation were identified.

#### 3.2.3 Visual amenity

Potential impacts to visual amenity during construction works, primarily as a result of the sediment plume while dredging is in progress, was described in the PER (Ecologia 2007). The
amenity of residents and visitors in areas overlooking the proposed dredging and land reclamation activities were identified in the PER to potentially be affected while dredging is in progress as sediment plumes will be visible in Princess Royal Harbour (PRH) and King George Sound (KGS).
4. Potential Impacts

4.1 Ecosystem Health

4.1.1 Marine benthic communities
Potential impacts to marine benthic communities associated with dredging, offshore disposal and increased vessel traffic into the Port identified during the PER (Ecologia 2007) were:

- Direct removal or burial of marine and near shore benthic habitats;
- Indirect loss of benthic primary producers (BPP) as a result of increased suspended solids and smothering; and
- Introduction of and/or spread of exotic species due to ballast water and hull fouling quarantine practices.

In addition, potential environmental impacts of turbidity on marine benthic communities identified during the PER (Ecologia 2007) included:

- Decreased light availability resulting in reduced photosynthesis and growth of benthic communities where affected (particularly seagrass in summer months);
- Deposition of particles and burying of the substratum including benthic communities; and
- Scouring and abrasion of benthic organisms and habitats by particles being moved by wave motion.

4.1.2 Water and sediment quality

*Turbidity*
The process of dredging, land reclamation and disposal of material will result in a short-term increase of sediment loads in the water column, which will likely increase turbidity with potential environmental impacts on water quality identified during the PER (Ecologia 2007) including:

- Reduced visibility (water clarity); and
- Increased light attenuation (decreased light availability).

*Sediment contamination*
Sediments act as long term reservoirs of chemicals that may adversely affect the surrounding aquatic environment and/or the organisms having direct contact with them. The disposal of sediment may potentially release contaminants trapped in sediment, which may result in mobilisation into the surrounding ecosystem. The proposal has the potential to impact on sediment quality as follows:

- Mobilisation and release of sediment bound contaminants into the water column; and
- Oxidation of acid forming peaty material if placed on land.

Re-suspension of contaminants can potentially impact on aquatic bacteria, phytoplankton, filter feeders, seagrass, macroalgae, invertebrates and fish (refer Section 4.1.3).

Mobilisation of sediment contaminants may also impact on other environmental quality management framework values including:

- Maintenance of fishing and aquaculture (Section 4.2); and
- Recreation and aesthetics (Section 4.3).

*Spills and discharges*
Dredging, land reclamation and disposal activities could potentially impact marine sediment and water quality through new contamination from spills or accidental discharges such as spills of diesel, oil and grease.
Contamination of marine sediment and water through accidental discharges may also impact on other environmental quality management framework values including:

- Marine benthic communities;
- Maintenance of fishing and aquaculture; and
- Recreation and aesthetics.

### 4.1.3 Marine Fauna

Potential impacts to marine fauna associated with dredging, land reclamation, offshore disposal of excess dredge material and increased vessel traffic into the Port are:

- Increased turbidity potentially impacting invertebrates through the clogging of respiration and filter-feeding functions;
- Introduction of and/or spread of exotic fauna species;
- Physical injury to cetaceans and pinnipeds due to vessel strike;
- Physical injury to cetaceans and pinnipeds from underwater noise;
- Habitat degradation and reduction; and
- Introduced Marine Species.

As described in Section 3.1.7, IMP can also have significant impacts on the marine environment, human health and the economy including, but not limited to:

- Loss of biodiversity;
- Destruction of marine habitats;
- Outcompeting aquaculture species; and
- Adverse effects on tourism, fishing, marine industry and coastal values.

The Project risk register (PER, Ecologia (2007); Table 8.1) identified that inadequate quarantine practices may result in a moderate risk to biodiversity and aquaculture. The primary vectors for the translocation of IMP to Albany Port are:

a) Introduction of IMP from construction vessels, including:
   i) Dredge(s);
   ii) Breakwater construction vessels (barges and heavy lift vessels); and
   iii) Freight vessels (carrying building materials for port infrastructure).

b) Introduction of IMP from commercial vessels during operation, including:
   i) Commercial vessels, primarily international bulk carriers.

### 4.2 Fishing and aquaculture

#### 4.2.1 Physico-chemical stressors

The greatest physio-chemical stressor to marine fish and aquaculture species associated with the proposal is the creation of short-term higher sediment loads in the water column. An increase in TSS may directly impact on fisheries and aquaculture through reduced visibility resulting in changes to behaviour such as fish feeding and predator avoidance. Physiological disturbance of marine species such as clogging of filter-feeding morphological features may also potentially impact commercial fish species such as pilchards and aquaculture species such as mussels which rely on filter feeding.

#### 4.2.2 Toxicants and bacteria in seafood

Pilchards, mussels and those biota known to occur at the potential disposal areas (primarily infaunal species or benthic epifauna) are principally filter feeders or scavengers and are unlikely to ingest sediment directly. The major route of exposure to fishing and aquaculture species (and hence potential impact on fishing and aquaculture) for any toxicants or bacteria in sediments handled during dredging and disposal is likely to be direct contact with pore water from contaminated sediments.
4.2.3 Turbidity

Indirect impacts of turbidity to fisheries and aquaculture could potentially include affects on phytoplankton productivity through a reduction in light availability. As phytoplankton form the basis of the food chain for most aquaculture species including mussels, changes in phytoplankton productivity near aquaculture leases could affect production. Further, increases in sedimentation, turbidity and light attenuation may potentially reduce the suitability of seagrass meadows and sub-tidal reefs as habitat for sheltering and foraging for commercially and recreationally important species, affecting catches and fishery viability in the short term.

4.3 Recreation and Aesthetics

4.3.1 Recreational water quality

Turbidity associated with the proposal potentially has a range of social impacts, depending on the location, duration and sediment load of the plume. Potential impacts identified during the PER studies (Ecologia 2007) included:

- Impacts to water quality at nearby beaches and dive wrecks;
- Decreased visual amenity in Princess Royal Harbour and King George Sound; and
- Impacts to tourism.

4.3.2 Visual amenity

The sediment plume may visually impact local residents, recreational boating, scenic tourist sites and charter boat tours by temporarily diminishing the visual amenity of Princess Royal Harbour and King George Sound while dredging is in progress. In addition, the dredging could potentially cause a temporary decrease in the number of whales entering King George Sound, which may require the whale watching industry to go a little further afield, just as their normal activity in the two tails of their standard season (i.e. the boats go to the whales across to Nannarup and beyond).
5. **Management Programs**

5.1 **Overview**
The following section provides the management control measures that will be implemented during the Expansion Project for each of the three project management programs:

- General marine works management program;
- Dredging and plume management program; and
- Marine infrastructure management program.

5.2 **General Marine Works Management Program**

<table>
<thead>
<tr>
<th>General Marine Works Management Program</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
</tr>
<tr>
<td>All marine-based construction and dredging activities associated with the Expansion Project.</td>
</tr>
<tr>
<td><strong>Performance Objectives</strong></td>
</tr>
<tr>
<td>• To ensure appropriate environmental management of all marine-based activities associated with the Albany Port Expansion Project.</td>
</tr>
<tr>
<td>• To protect environmental values, social uses and public and private assets within PRH and KGS from long-term adverse effects due to the Expansion Project.</td>
</tr>
<tr>
<td>• To prevent introduced marine pest introduction or establishment in West Australian State waters.</td>
</tr>
<tr>
<td><strong>Key Performance Indicator</strong></td>
</tr>
<tr>
<td>Conformance with all management measures, environmental monitoring and contingency plans, biosecurity and environmental quality criteria specified in this management program.</td>
</tr>
</tbody>
</table>

**Management Measures**

1. **Hydrocarbon and chemical storage, handling and spill response**
   **Storage, handling and transport** of dangerous goods shall be in accordance with requirements of the W.A. Dangerous Goods Safety Act 2004, Dangerous Goods Safety (Goods in Ports) Regulations 2007 and Australian Standard AS 1940:2004 (SA 2004), including (but not limited to):
   - All hydrocarbons or chemicals (e.g. fuel, oil and grease drums, detergents) stored on land or above deck on vessels shall be stored within bunded areas capable of containing 110% of the liquid volume in order to contain any leaks or spills.
   - All hydrocarbons and chemicals on vessels shall be preferentially stored below deck in appropriate holds.
   - **Oil Spill response** shall be in accordance with the Oil Spill Monitoring and Contingency Plan (see Section 6.1).

2. **Introduced Marine Pests**
   **General Provisions**: Introduced marine pest (IMP) management shall be in accordance with:
   - Fish Resources Management Act 1994 and Fish Resources Management Regulations 1995. Requirement that DoF must be notified within 24 hours of any known or suspected introduced marine pest detected in West Australian State waters, which includes the Albany Port Expansion Project.
   - **Vessel arrival clearance procedure** shall be in accordance with:
     - The above-listed General Provisions.

Including but not limited to the following:
- Risk assessment of whether the vessel or associated equipment is harbouring introduced marine pests will be based on a risk assessment in a format endorsed by DoF, supported by documentation demonstrating the record of hull cleaning, antifouling treatment, ship activity profile and location of each vessel since the most recent hull cleaning, as well as other relevant details. Risk assessments are required to be submitted to DoF at least 14 days prior to departure for a determination of the risk level (high, low or uncertain) and include all inputted data and results.
- Vessels and associated equipment determined to be low risk will be issued with a vessel movement clearance by DoF.
- Vessels and associated equipment determined to be of uncertain risk will be required to provide further information to DoF within a specified timeframe. Upon receipt of the further information, the boat will be determined to be either low or high risk.
- Vessels and associated equipment determined to be high risk will have three management options, to be undertaken prior to entry into West Australian State waters. These include biofouling inspection performed by an accredited biofouling inspector or suitably qualified marine expert to demonstrate to DoF absence of introduced marine pests; or hull cleaning followed by a biofouling

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3 For the purposes of this document Introduced Marine Pests (IMP) are defined as those species listed on the National Introduced Marine Pests Coordination Group’s (NIMPCG) target list of 55 potential pest species (see DAFF 2009).
General Marine Works Management Program

- Inspection performed by an accredited biofouling inspector or suitably qualified marine expert; or vessel does not enter West Australian State waters.
- Once DoF is satisfied that the level of vessel or equipment hygiene represents a low risk and all conditions have been met to DoF satisfaction, a vessel movement clearance will be issued by DoF, with specific timeframes for movements, depending on the risk profile of the vessels departure location.
- Vessel inspections carried out on all high risk vessels will be no more than 7 days prior to mobilisation to site by an accredited biofouling inspector or a suitably qualified marine pest expert to ensure that: (1) any introduced marine pest on any vessels or associated equipment has been removed or treated; and (2) there is no sediment on or within the vessel or associated equipment.
- If a vessel is determined by risk assessment submitted to DoF to be high risk and has entered West Australian State waters without meeting the above requirements, then the requirements detailed in this section will need to be met, including vessel inspection within 48 hours of arrival in West Australian State waters by an Officer of DoF, accredited biofouling inspector or a suitably qualified marine pest expert and reported to DoF. DoF will then determine further actions required.
- Where introduced marine pests are detected or suspected prior to mobilisation from outside of West Australian State waters, the following will be carried out: cleaning of the affected vessel and associated equipment to remove the introduced marine pests, followed by an inspection carried out by an accredited biofouling inspector or a suitably qualified marine pest expert. All inspections must be conducted no more than 7 days prior to the vessel departure. Risk assessment submission to DoF is then required as described above. Any cleaning and treatment activities must be undertaken to the extent that the vessel is deemed, by DoF, to represent a low risk to the West Australian marine environment and the vessels movement clearance by DoF prior to mobilisation will only be issued when these conditions have been met.
- Where introduced marine pests are detected or suspected prior to mobilisation from inside West Australian State waters, DoF must be notified within 24 hours of detection or suspicion of an introduced marine pest and DoF will provide advice and direction on management options, as per Introduced Marine Pest Monitoring and Contingency Plan described in Section 6.2.
- Vessel inspections may occur on any vessel or marine equipment arriving within Albany Port / King George Sound within 48 hours after arrival on site, upon vessel departure (see Vessel departure clearance procedure below), or at any other time as deemed necessary by DoF, APA, OEPA or AQIS.
- Vessel inspection report of IMP inspection and cleaning (where applicable) must be received from the final port of call, before entry to Albany Port / King George Sound.
- All vessels, greater than 25 metres in length arriving from overseas, or that have been in contact with overseas vessels or sea installations, are required to meet AQIS conditions. These include submission, prior to arrival, of a Quarantine pre-arrival report for vessels form (QPAR) to AQIS. The QPAR must be submitted to AQIS at the First Port of Call no more than 96 and no less than 12 hours prior to the vessel’s estimated time of arrival in Australia. Announcing the planned arrival of the vessel or installation, signals the start of Quarantine Clearance. AQIS must be notified immediately if the current status of the vessel (relating to questions on the QPAR) changes at any time.

Ballast water management shall be in accordance with

- The above-listed General Provisions.
- The Quarantine Act 1908 and the Quarantine Regulations 2000 (Commonwealth legislation).

Including but not limited to the following:

- International vessels shall adhere to AQIS (2008) Australian Ballast Water Management Requirements and particularly the implicit mandatory ballast water management requirements stating that “the discharge of high-risk ballast water in Australian ports or waters is prohibited”. High risk waters are considered to be all salt water from ports and coastal waters outside of Australia's territorial sea. Low risk ballast water is considered to be fresh water (relative density <1.002), ballast water exchanged at an approved (mid-ocean) location by an approved method, ballast water of which at least 95% was taken up mid-ocean or inside Australia’s territorial sea. The QPAR required for international vessel arrival clearance (see above) also requires masters to declare whether or not they have complied with Australia’s mandatory ballast water management requirements. Masters must also complete the AQIS Ballast Water Management Summary (AQIS form 26) with details about ballast water uptake ports, ocean exchanges and intended Australian discharge locations.
- Domestic vessels must obtain the approval of the Harbour Master prior to ballast water being discharged within port waters. Such approval may be granted if acceptable to the DoF.

Hull cleaning and biofouling management shall be in accordance with:

- The above-listed General Provisions.
- Port Authority Act 1999 and Port Authority Regulations 2001.
- The Code of Practice for Anti-fouling and In-water Hull Cleaning and Maintenance (ANZECC1997).

Including but not limited to the following:

- Vessels must apply to the Harbour Master for approval to undertake any hull cleaning work within the Port Authority waters and are subject to Port Authority legislation.
- Except under extra-ordinary circumstances, in-water hull cleaning in West Australian State and Commonwealth waters is prohibited. Extra-ordinary circumstances could include the use of a
### General Marine Works Management Program

- method approved by DoF that enables complete containment and disposal of all debris/residue removed from the ship and require application to DoF.
- Any hull cleaning requests must demonstrate freedom from introduced marine pests prior to cleaning.
- Should in water cleaning be approved, any debris removed is not allowed to pass into the water column or fall to the sea bed and persons wishing to conduct this work must demonstrate the method by which all debris will be collected and disposed of to DoF and/or the Harbour Master before receiving approval.

#### Monitoring and contingency response

- In the event that introduced marine pests or significant amounts of fouling organisms or sediment (as deemed by an Officer of DoF, accredited biofouling inspector or suitably qualified marine pest expert) are found on a vessel or equipment during the arrival inspection, departure inspection or any other inspection, contingency response and monitoring measures shall be as per the Introduced Marine Pest Monitoring and Contingency Plan described in Section 6.2.

#### Vessel departure clearance procedure

- For vessels travelling to another location within Western Australian State waters, a vessel inspection will be undertaken no more than 7 days prior to vessel departure to ensure that: (1) there is no sediment in the dredging equipment; and (2) there are no biofouling organisms on or in any vessels or associated equipment. Such inspections will be carried out by an Officer of DoF, accredited biofouling inspector or a suitably qualified marine pest expert.
- For vessels travelling to locations outside of West Australian State waters, requirements of destination jurisdictions will need to be considered.

### 3. Marine Fauna

#### Vessel strikes or entanglement

- All vessels to adhere to Port speed limits at all times.
- Dredge vessel operators will be required to maintain a trained Marine Fauna Observer (MFO) on watch during marine operations and vessel movements. The MFO may be a vessel crew member who has been appropriately trained.
- If sea lions or whales are observed within 300 m of the vessel, the vessel will adjust speed and direction where safe to do so, to avoid colliding with the animal.
- Each vessel will keep a log of whale and sea lion sightings.
- All vessel strikes, entanglements or injuries to marine fauna (including dolphins, penguins, turtles, sea lions) shall be reported via the incident report pro-forma contained in the APA/Project EMS.
- Contingency response and monitoring measures shall be as per the Marine Fauna Monitoring and Contingency Plan described in Section 6.3.

### 4. Airborne noise

- Management and monitoring of airborne noise from the Expansion Project and procedures of contingency response should airborne noise limits be exceeded shall be as per the requirements specified in the Construction Environmental Management Plan (CEMP).

### 5. Emissions to air

- Management and monitoring of emission to air from the project, particularly dust from reclamation works, and procedures of contingency response should air emission limits be exceeded, shall be as per the requirements specified in CEMP.

### 6. Marine heritage

- Should artefacts of potential maritime or aboriginal heritage be discovered during marine works, all works in that area shall cease until such time that the artefacts and area have been assessed for heritage significance in accordance with the *W.A. Aboriginal Heritage Act 1972* and *Heritage of Western Australia Act 1990*.

### 7. Unexploded Ordnance

- Prior to the commencement of dredging operations the following tasks will be undertaken to minimise the risk of encountering unexploded ordnance (UXO) during the works:
  - Completion of a 100% coverage magnetometer survey of the dredge area to identify and interpret all magnetic materials located within the boundaries of the site.
  - Completion a diver inspection and identification of the anomalies identified during the magnetometer survey that display the characteristics that are comparable to those associated with UXO.
  - The clearance of all anomalies that are identified as UXO during the diver inspection process.
  - Should UXO be found during dredging and sea dumping activities, the following management measures must be undertaken:
    - Fire and Emergency Services of Western Australia (FESA) will be immediately notified and, if UXO or EXO presence is confirmed by FESA, the Department of Defence (DoD) will be immediately notified.
    - Dredging operations shall cease until the suspected item of ordnance can be identified as inert, or removed from the operational plant for off-site disposal by DoD.
    - Where possible, dredging operations may be diverted to another section of the site while further investigation of the source and risk associated with the item(s) of UXO are undertaken.
5.3 Dredging and Plume Management Program

### Dredging and Plume Management Program

<table>
<thead>
<tr>
<th>Application</th>
<th>Performance Objectives</th>
<th>Key Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>- All dredging activities associated with the Expansion Project.</td>
<td>- To appropriately manage dredging activities and return waters.</td>
<td>- Conformance with all management measures, environmental monitoring and contingency plans and environmental quality criteria specified in this management strategy.</td>
</tr>
<tr>
<td>- Use of cutter suction dredge (CSD) and associated equipment.</td>
<td>- To minimise the area of seabed disturbed by the dredging footprint.</td>
<td></td>
</tr>
<tr>
<td>- Use of trailer suction hopper dredge (TSHD) and associated equipment.</td>
<td>- To protect environmental values, social uses and public and private assets from long-term adverse effects due to dredging-related water quality impacts.</td>
<td></td>
</tr>
<tr>
<td>- Sea dumping activities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Return water from land reclamation.</td>
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<td></td>
</tr>
</tbody>
</table>

### Management Measures

10. **Dredge footprint management and controls (direct impacts to marine habitat)**

- **CSD** dredging is permitted at any time of the year, independent of TSHD dredging.
- **TSHD** dredging of the shipping channel is not permitted between 1 November and 28 February in any year.
- A differential global positioning system (DGPS) will be used on dredge vessels to ensure that direct impact to habitat is restricted to the approved dredging areas.
- Dredge vessels shall retain a track-log of all dredging operations, to be made available to APA upon request.
- APA must keep record (for verification and audit purposes) comprising either weekly plotting sheets or a certified extract of the ship’s log which detail:
  - The times and date of when each dumping run is commenced and finished;
  - The position (as determined by GPS) of the vessel at the beginning and end of each dumping run, with the inclusion of the path of each dumping run; and
  - The volume of dredge material (in cubic metres) dumped for the specified operational period. A comparison of these quantities with the total amount permitted under the permit will be undertaken.
- Accurate bathymetric survey of the dredged areas will be undertaken after Project completion to confirm that dredging has occurred in the approved dredging areas.
- Accurate bathymetric survey of the disposal site will be undertaken:
  - Prior to commencement of dredging under this permit;
  - Within 2 months of the completion of all dredging activities; and
  - 12 months after completion of all dumping activities.
- Benthic habitat mapping will be undertaken after Project completion to confirm that direct (and indirect) habitat losses are within approved limits (see the Water Quality Monitoring and Contingency Plan described in Section 6.4).
11. Contaminated sediments management
- The reclamation area will not contain contaminated sediments.
- To prevent oxidation of peaty material and reduce the risk of remobilisation of nutrients and transport of these nutrients within the marine ecosystem, both dredges will be utilised whilst dredging the entrance to Princess Royal Harbour.
  - The TSHD will target peaty material by initially dredging the portion of the channel in Princess Royal Harbour and moving along the channel alignment out into King George Sound.
  - This portion of the Harbour will be dredged without overflow of potentially high nutrient water until the dredge has moved out into the Sound.
  - At the disposal site, subsequent loads of clean sediment will be placed around, and on top of the sediment containing peaty materials to prevent re-suspension and mobilisation.
- The portion of the shipping channel shown in the WQMP that encompasses the area of potentially contaminated sediments (Appendix D; Figure 3.4) shall be dredged in a manner that does not cause any overflow of turbid water into the environment from the dredge vessel.
  - The material will be removed by accurately locating the dredge suction head using differential GPS and selectively dredging to a depth of two meters. The area of sediment removed without overflow will be verified by hydrographic surveys.
  - The portion of the shipping channel dredged without overflow shall be deposited in the centre of the disposal area. Subsequent loads of clean sediment shall be placed around and covering this material to reduce the likelihood of re-suspension and mobilisation.
- Monitoring for toxicants potentially released from sediment dredging and reclamation water return, including environmental quality criteria and contingency measures, is specified within the Water Quality Monitoring and Contingency Plan described in Section 6.4.

12. Water quality management
The following controls will be implemented to minimise the spatial extent and intensity of dredge plumes:
- CSD Management
  - **Level 1**
    - Dredging will be undertaken using a cutter suction dredge. Well maintained and properly calibrated dredging vessels will be used. Dredge vessels will include features such as real-time bathymetric charts, production statistics and vessel positioning systems.
    - Dredge material will be pumped directly from the dredge to the reclamation area via floating pipelines (see below).
  - **Level 2**
    - Relocation of dredge.
    - Deployment of a silt curtain within the reclamation to maximise the control of turbidity during the reclamation process.
    - Deployment of a silt curtain at or prior to the return water outlet to minimise the turbidity of water discharged from the land reclamation area.
    - Install additional internal bunding in the land reclamation area to increase water retention time.
    - Reduce pumping rate.
    - Trial single shift operation.
- TSHD Management
  - **Level 1**
    - Dredging will be undertaken using a trailer suction hopper dredge fitted with a turbidity reducing (green) valve used within the overflow pipe.
    - Overflow levels will be raised to the highest point during transport to ensure minimum spillage of sediment.
    - Hopper door seals will be maintained in good condition to ensure minimum loss of sediment during transport.
    - Hopper de-watering will be confined to dredging areas.
    - Dredging operations will be sequenced to maximise under-keel clearance (reducing propeller wash) by dredging from shallow to deeper waters where possible.
    - The suction heads at the end of the pipes will be kept above the seabed until the scheduled dredging area has been reached to prevent unnecessary sea bed disturbance.
    - Dredges will be equipped with density monitors and on screen displays that enable the operator to precisely separate dredge material from seawater and divert dredge material into the hopper. A valve will allow excess seawater to be expelled with minimal sediment content, reducing the volume of particulate material in the return waters.
    - Overflow from the TSHD will occur via a submerged outlet located in the ships’ hull below the waterline (approximately 5-9 m below) reducing settlement time (by reducing the distance from the dredge to the seabed).
    - The TSHD will operate at a speed of 1 to 3 knots (depending on the dredge location, surrounding marine activities, sea conditions and material being dredged).
    - A drag head will loosen the bottom material prior to suction and water jets may be employed to assist in loosening the sand. This will optimise the throughput and decrease the duration of the dredging program.
    - Density monitors inside the hopper will ensure maximum fill of the hopper and the dredge will be loaded to its maximum capacity before sailing full to the offshore disposal site to minimise the number of trips the dredge makes along the channel.
Dredging and Plume Management Program

- When the hopper is fully loaded, the suction pipe(s) will be raised and the pumping system shut down. The suction pipe(s) will then be secured on deck during sail. This will prevent seabed disturbance during sailing cycles.
- During sailing the hopper will remain closed (with the watertight bottom doors) to prevent any seepage of dredged material from the vessel and potential loss of sediment during sailing cycles.
- Well maintained and properly calibrated dredging vessels will be used. Dredge vessels will include features such as real-time bathymetric charts, loading diagrams, production statistics and vessel positioning systems.

**Level 2**
- Minimise draining of excess water enroute to the dumpsite (subject to operational safety).
- Relocate dredge.

**Floating pipeline management**

**Level 1**
- Well maintained floating pipelines will be used to minimise leakage of turbid water during pumping of material to the reclamation area.
- Pipeline flow controls and inline monitoring will be utilised.
- Regular observation and inspection of floating pipelines will be undertaken.
- Any observed or detected leaks will be repaired as soon as practicable.

**Level 2**
- Pumping shall be ceased as soon as any major ruptures are identified (within the operational constraints of the equipment).

**Plume monitoring:** The extent of the dredge plume will be visually monitored, either via regularly flown aerial photography, and/or by observation from a high vantage point (e.g. from the lookout on Mt Clarence). This information will be made publicly available on the APA website.

**Water quality monitoring and contingency responses:** Dredge plume water quality monitoring, including contingency measures should environmental quality criteria not be met, are specified within the Water Quality Monitoring and Contingency Plan described in Section 6.4.

13. **Marine fauna management**

Marine fauna monitoring and contingency measures in relation to dredging operations and the movement of vessels shall be in accordance with the Marine Fauna Monitoring and Contingency Program described in Section 6.3.

<table>
<thead>
<tr>
<th>Monitoring and Contingency Programs</th>
<th>DLRMP Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine Fauna Monitoring and Contingency Plan</td>
<td>Section 6.3</td>
</tr>
<tr>
<td>Water Quality Monitoring and Contingency Plan</td>
<td>Section 6.4</td>
</tr>
</tbody>
</table>
# 5.4 Marine Infrastructure Management Program

<table>
<thead>
<tr>
<th>Marine Infrastructure Management Program</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
</tr>
<tr>
<td>• Breakwater construction</td>
</tr>
<tr>
<td>• Reclamation activities</td>
</tr>
<tr>
<td>• Berth works</td>
</tr>
<tr>
<td><strong>Performance Objectives</strong></td>
</tr>
<tr>
<td>• To appropriately manage activities related to the construction of marine infrastructure and associated impacts.</td>
</tr>
<tr>
<td>• To minimise the area of seabed disturbed by the infrastructure footprint.</td>
</tr>
<tr>
<td>• To protect environmental values, social uses and public and private assets within Princess Royal Harbour and King George Sound from long-term adverse effects due to the construction of marine infrastructure.</td>
</tr>
<tr>
<td><strong>Key Performance Indicator</strong></td>
</tr>
<tr>
<td>• Conformance with all management measures, environmental monitoring and contingency plans and environmental quality criteria specified in this management program.</td>
</tr>
</tbody>
</table>

## Management Measures

### 14. Infrastructure footprint (direct impacts to benthic habitat)
- To limit the direct footprint of habitat disturbance, all infrastructure construction and reclamation activities are to take place within approved construction envelopes.
- Benthic habitat mapping will be undertaken after Project completion to confirm that direct (and indirect) habitat losses are within approved limits (see the Water Quality Monitoring and Contingency Plan described in Section 6.4).

### 15. Land Reclamation and return water management
The following controls will be implemented to minimise the spatial extent and intensity of return water plumes from land reclamation activities:
- The design and operation of the reclamation area will be used as the main management measure to reduce the total suspended solids (TSS) being discharged into the marine environment. The layout of the reclamation will take into account the dredging production rates, pumping capacity and pipe diameter proposed by the dredging contractor.
- Seawalls will be constructed in advance of the dredging and reclamation works around the reclamation area.
- A filter fabric lining to seawalls shall be utilised to minimise the flow of fine sediments through the seawalls.
- Utilisation of a settling pond shall maximise retention time and therefore settling of sediments before discharge.
- If required, intermediate bunds will be constructed within the reclamation area to subdivide the overall reclamation area into two or more settlement basins.
- Internal silt curtains may be installed within the reclamation area to increase the settlement time and reduce the TSS of return water.
- A suitable control (e.g. weir box) will be used at the discharge point to control the water level and the rate and timing of discharge.
- The extent of the return water plume will be visually monitored, via regularly flown aerial photography, and made publicly available on APA website.
- Return water quality monitoring, including contingency measures should environmental quality criteria not be met, are specified within the Water Quality Monitoring and Contingency Plan (Section 6.4).

### 16. Rock Armour Management
- The seawall construction method will involve progressive placement of larger size rocks over finer core material to protect the core from fines washout. This will minimise the sedimentation and turbidity aspects associated with finer core material placement.
- Marine water quality monitoring during seawall construction, including contingency measures should environmental quality criteria not be met, are specified within the Water Quality Monitoring and Contingency Plan (Section 6.4).

### 17. Fauna entrapment
- Reclamation cells shall be checked daily for the presence of marine fauna trapped via seawall construction, introduction via dredge material transfer or otherwise. Trapped fauna shall be humanely transferred to open water.

### 18. Pile Driving Noise
- Exclusion zones will be maintained around cetaceans (2 km) and pinnipeds (500 m).
- Pile driving pre-start procedures will be used to ensure marine fauna are outside exclusion zones.
- Pile driving mechanical ‘soft start’ procedures will be used to encourage animals to move away from subsequent blows that could be injurious.
- Pile driving shut-down procedures will be used if marine fauna are observed within or moving into the exclusion zones.
- Low visibility piling procedures will be used during periods of low visibility. All piling will be undertaken in compliance with the Noise Regs. 1997.
- Marine fauna observation and contingency measures in relation to piling operation noise shall be in accordance with the Underwater Noise Management and Contingency Plan (Section 6.5).
### Marine Infrastructure Management Program

<table>
<thead>
<tr>
<th>19. Stormwater Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No contaminated stormwater shall be discharged to the marine environment.</td>
</tr>
<tr>
<td>• A site-specific stormwater drainage system will be designed to best-practice specifications and will be installed during construction in readiness for operations of installed infrastructure, to intercept and retain potentially contaminated surface waters for treatment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>20. Contaminated sites assessment of reclamation area</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No contaminated sediments or soil shall be utilised as fill within the reclamation area (refer to management measure 11.</td>
</tr>
<tr>
<td>• Commissioning of the reclamation area shall be in accordance with a contaminated sites assessment in accordance with the W.A. Contaminated Sites Regulations 2006.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>21. Public access</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Public access to the shoreline, beaches and water adjacent to construction works shall be maximised to the extent that public use areas shall remain accessible, excluding necessary restrictions of public access for safety purposes.</td>
</tr>
</tbody>
</table>

### Monitoring and Contingency Programs

<table>
<thead>
<tr>
<th>Monitoring and Contingency Programs</th>
<th>DLRMP Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality Monitoring and Contingency Plan</td>
<td>Section 6.4</td>
</tr>
<tr>
<td>Underwater noise monitoring and contingency plan</td>
<td>Section 6.5</td>
</tr>
</tbody>
</table>
6. Monitoring and Contingency Plans

6.1 Oil Spill Monitoring and Contingency Plan

<table>
<thead>
<tr>
<th>Oil Spill Monitoring and Contingency Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>This Oil Spill Monitoring and Contingency Plan aims to protect the following environmental values and achieve the following environmental quality objectives.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Values and Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>To protect <strong>Ecosystem Health</strong> values by:</td>
</tr>
<tr>
<td>• Maintenance of ecosystem integrity, in terms of structure (diversity and abundance of biota) and function (food chains and nutrient cycles).</td>
</tr>
<tr>
<td>To protect <strong>Fishing and Aquaculture</strong> values by:</td>
</tr>
<tr>
<td>• Maintenance of seafood safe for human consumption when collected or grown; and</td>
</tr>
<tr>
<td>• Maintenance of suitable water quality for aquaculture.</td>
</tr>
<tr>
<td>To protect <strong>Recreation and Aesthetic</strong> values by:</td>
</tr>
<tr>
<td>• Maintenance of primary contact recreation values, such that primary contact recreation (e.g. swimming) is safe; and,</td>
</tr>
<tr>
<td>• Maintenance of aesthetic values.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Quality Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>To assess compliance with the above-defined EQOs should an oil spill occur, the Oil Spill MCP indirectly adopts the following EQCs outlined in the Water Quality Monitoring and Contingency Plan (see Section 6.3):</td>
</tr>
<tr>
<td>• <strong>Toxicants in water, for maintenance of ecosystem integrity:</strong></td>
</tr>
<tr>
<td>• EQG – List of contaminants in water.</td>
</tr>
<tr>
<td>• EQS – Bioavailable, indirect biological or direct biological measures.</td>
</tr>
<tr>
<td>• <strong>Toxicants in sediment, for maintenance of ecosystem integrity:</strong></td>
</tr>
<tr>
<td>• EQG – List of contaminants in sediments.</td>
</tr>
<tr>
<td>• EQS – Bioavailable, porewater, indirect biological or direct biological measures.</td>
</tr>
<tr>
<td>• <strong>Toxicants in shellfish, for maintenance of aquaculture production:</strong></td>
</tr>
<tr>
<td>• EQG – List of contaminants in shellfish.</td>
</tr>
<tr>
<td>• EQS – Bioavailable, direct toxicity assessment.</td>
</tr>
<tr>
<td>• <strong>Toxicants in water, for maintenance of primary contact recreation:</strong></td>
</tr>
<tr>
<td>• EQG/EQS – List of toxicants for primary contact recreation.</td>
</tr>
<tr>
<td>• <strong>Aesthetic indicators, for maintenance of aesthetic values.</strong></td>
</tr>
<tr>
<td>• EQG/EQS – Secchi depth must exceed 1.6 m.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to WQMP (Appendix D)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to Management Measures 1 and 10 (Section 5).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contingency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should an oil spill occur, contingency response shall be in accordance with:</td>
</tr>
<tr>
<td>• APA’s <strong>Oil Spill Contingency Plan</strong> (Appendix E);</td>
</tr>
<tr>
<td>• APA’s <strong>Port Emergency Response Plan</strong> (Appendix F); and</td>
</tr>
<tr>
<td>• APA’s <strong>Environmental Management Plan</strong> (Appendix G).</td>
</tr>
<tr>
<td>Please refer to the above documents for procedural details of oil spills. APA will make copies of these documents available to all employees and contractors on site.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reporting and Auditing Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to Section 7 and Table 7.2.</td>
</tr>
</tbody>
</table>
## 6.2 Introduced Marine Pests Monitoring and Contingency Plan

<table>
<thead>
<tr>
<th>Marine Pest Monitoring and Contingency Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Values and Objectives</strong></td>
</tr>
<tr>
<td>This Introduced Marine Pests Monitoring and Contingency Plan aims to protect Ecosystem Health values by:</td>
</tr>
<tr>
<td>• Maintenance of ecosystem integrity, in terms of structure (diversity and abundance of biota) and function (food chains and nutrient cycles), by avoiding the introduction of marine pests.</td>
</tr>
<tr>
<td><strong>Environmental Quality Criteria</strong></td>
</tr>
<tr>
<td>Environmental quality criteria developed to assess compliance with the above EQO are:</td>
</tr>
<tr>
<td>• Zero entry to Albany Port of vessels and equipment determined, by DoF, to be of high risk of introducing marine pests</td>
</tr>
<tr>
<td>• Zero detection of marine pests or sediments during vessel inspections conducted at Albany Port; and</td>
</tr>
<tr>
<td>• No work undertaken using any vessel or equipment classified as high risk (via marine pest risk assessment and determined by DoF).</td>
</tr>
<tr>
<td><strong>Monitoring and Management</strong></td>
</tr>
<tr>
<td>Refer to Section 5.2, Management Measure 2.</td>
</tr>
<tr>
<td><strong>Contingency</strong></td>
</tr>
<tr>
<td>In the event that introduced marine pests or significant amounts of fouling organisms or sediment (as deemed by an Officer of DoF, accredited biofouling inspector or suitably qualified marine expert) are found on a vessel or equipment, the following actions will be taken:</td>
</tr>
<tr>
<td>• Notification of the DoF and OEPA: DoF must be notified within 24 hours of any known or suspected marine pest detection in West Australian State waters, which include the Albany Port Expansion Project.</td>
</tr>
<tr>
<td>• DoF will provide direction and advice on management options for the introduced marine pest detection.</td>
</tr>
<tr>
<td>• Potential management options include removal of vessel or equipment from West Australian State waters, dry docking and cleaning of vessel or in water cleaning. All of these options would be required within specific timeframes and will be under the direction of DoF. In-water cleaning in West Australian State waters and Commonwealth waters will not be approved when introduced marine pests are detected or suspected on vessel or equipment.</td>
</tr>
<tr>
<td>• If cleaning occurs, a post clean inspection performed by an accredited biofouling inspector or suitably qualified marine expert will be required and submitted to DoF for assessment.</td>
</tr>
<tr>
<td>• If DoF is satisfied that the level of vessel or equipment hygiene represents a low risk and all conditions have been met to DoF satisfaction, a vessel movement clearance will be issued by DoF, with specific timeframes for movements, depending on the risk profile of the vessels current location.</td>
</tr>
<tr>
<td>• Introduced marine pest monitoring may be required for the location/s of the detected introduced marine pest and associated vessel movements, as directed by DoF.</td>
</tr>
<tr>
<td><strong>Reporting and Auditing Requirements</strong></td>
</tr>
<tr>
<td>Refer to Section 7 and Table 7.2</td>
</tr>
</tbody>
</table>

In the event that introduced marine pests (as deemed by an Officer of DoF, accredited biofouling inspector or suitably qualified marine expert) are found in Albany Port Expansion project area, the following actions will be taken:

• Notification of the DoF and OEPA: DoF must be notified within 24 hours of any known or suspected introduced marine pest detected in West Australian State waters, which includes the Albany Port Expansion Project.

• A Marine Pest Management Strategy will be developed and implemented, in consultation with DoF, to prevent, wherever practicable, the establishment and proliferation of that organism, aiming to control and potentially eradicate that organism, and to minimise the risk of that organism being transferred to other locations with West Australian State waters.

• A report detailing the outcomes of the implementation of the Marine Pest Management Strategy will need to be submitted to DoF within one month of the commencement of the implementation of the Marine Pest Management Strategy and thereafter as required by DoF.

• Introduced marine pest monitoring may be required for the location/s of the detected introduced marine pest and associated vessel movements, as directed by DoF.
# Marine Fauna Monitoring and Contingency Plan

<table>
<thead>
<tr>
<th>Marine Fauna Monitoring and Contingency Plan</th>
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</thead>
<tbody>
<tr>
<td><strong>Environmental Values and Objectives</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Environmental Quality Criteria</strong></td>
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<tr>
<td></td>
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<tr>
<td><strong>Monitoring</strong></td>
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<td></td>
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<tr>
<td><strong>Management</strong></td>
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<tr>
<td><strong>Contingencies</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>Reporting and Auditing Requirements</strong></td>
</tr>
</tbody>
</table>

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\(^4\) The SDP defines "trained crew" as personnel experienced in fauna observation, distance estimation and reporting.
*Establish zones, trained crew member to observe for marine fauna for at least 20 minutes

No marine fauna observed, or observed outside 300m?

Yes

Operate dredge and disposal equipment

No

Figure 6.1 Flowchart showing marine fauna monitoring and avoidance procedures during dredging and disposal operations
## Water Quality Monitoring and Contingency Plan

### Environmental Values and Objectives

This Water and Sediment Quality Monitoring and Contingency Plan aims to protect the following environmental values and achieve the following environmental quality objectives.

**To protect Ecosystem Health** values by:
- Maintenance of ecosystem integrity, in terms of structure (diversity and abundance of biota) and function (food chains and nutrient cycles), by maintaining water and sediment quality.

**To protect Fishing and Aquaculture** values by:
- Maintenance of suitable water quality for aquaculture.

**To protect Recreation and Aesthetic** values by:
- Maintenance of primary contact recreation values, such that primary contact recreation (e.g. swimming) is safe; and
- Maintenance of aesthetic values.

### Environmental Quality Criteria

The environmental quality criteria to assess compliance with the above EQOs have either been directly adopted or developed in accordance with the EPA (2005), ANZEC/ARMCANZ (2000), NHMRC (2008) and FSANZ (2009).

#### Maintenance of Ecosystem Integrity

- **Seagrass and underwater light:**
  - EQG – site specific underwater light criteria.
  - EQS - during dredging - median shoot density > 1st percentile of baseline.
  - EQS - after dredging - median shoot density > 20th percentile of baseline.

- **Seagrass direct loss:**
  - EQG/EQS - Seagrass loss not to exceed:
    - 16.6 ha in King George Sound.
    - 0.8 ha in Princess Royal Harbor.
    - Seagrass rehabilitation of 1 ha in PRH achieves 75% average cover within 10 years following planting.

- **Reef communities:**
  - EQG/EQS - Marine benthic community habitat cover, diversity and abundance shall not decline beyond approved limits (comparison with baseline survey and reference sites).

- **Physico-chemical water quality stressors (dissolved oxygen and pH):**
  - EQG – DO and pH.
  - EQS – DO and pH.

- **Toxicants in water:**
  - EQG – List of contaminants in water.
  - EQS – Bioavailable, indirect biological or direct biological measures.

- **Toxicants in sediments:**
  - EQG – List of contaminants in sediments.
  - EQS – Bioavailable, porewater, indirect biological or direct biological measures.

#### Maintenance of aquaculture

- **Physico-chemical stressors:**
  - EQG – DO and pH.
  - EQS – DO and pH.

- **Toxicants and bacteria in shellfish (sentinel mussels):**
  - EQG – List of contaminants in shellfish.
  - EQS – Bioavailable, direct toxicity assessment.

- **Turbidity:**
  - EQG – TSS not to exceed 80th percentile of baseline.
  - EQS – TSS not to exceed 10 mg/L.

#### Maintenance of primary contact recreation values

- **Toxicants at primary contact recreation areas:**
  - EQG/EQS – List of toxicants for primary contact recreation (Appendix D).

#### Maintenance of aesthetic values

- **Water clarity and aesthetics of primary contact recreation areas:**
  - EQG/EQS – Secchi depth must exceed 1.6 m.
### Water Quality Monitoring and Contingency Plan

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Refer to WQMP (Appendix D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Refer to Section 5.3 and Figure 6.2 below</td>
</tr>
<tr>
<td>Contingency</td>
<td>Refer to WQMP (Appendix D)</td>
</tr>
<tr>
<td>Reporting and Auditing Requirements</td>
<td>Refer to Section 7 and Table 7.2</td>
</tr>
</tbody>
</table>

**Water Quality Monitoring including:**
- Seagrass/underwater light
- Reef communities
- Water quality
- Sediment quality

**General Marine Works Management (refer to Section 5.1)**
- Dredging and Plume Management (refer to Section 5.2)
- Marine Infrastructure Management (refer to Section 5.3)

**Trigger 1**
Aspect of Water Quality exceeds EQQ?
- Yes
- No (High certainty of meeting EQO)

**Trigger 2**
Aspect of Water Quality exceeds EQS?
- Yes
- No (High certainty of meeting EQO)

**Level 1 Management**
- Dredging and Plume Management (section 5.2)
- Management Measure 11

**Level 2 Management**
- Dredging and Plume Management (section 5.2)
- Management Measure 11

**Contingency Management** (refer to WQMP)

**Figure 6.2** Flowchart showing water quality monitoring procedures during dredging and disposal operations
### 6.5 Underwater Noise Monitoring and Contingency Plan

<table>
<thead>
<tr>
<th><strong>Environmental Values and Objectives</strong></th>
<th>This Underwater Noise Monitoring and Contingency Plan aims to protect Ecosystem Health values by:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maintenance of ecosystem integrity, in terms of structure (diversity and abundance of biota) and function (food chains and nutrient cycles), by avoiding impacts on marine fauna.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Environmental Quality Criteria</strong></th>
<th>The environmental quality criterion developed to assess compliance with the above EQO is:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No significant impacts on the following factors resulting from pile driving activity:</td>
</tr>
<tr>
<td></td>
<td>Listed threatened species and communities.</td>
</tr>
<tr>
<td></td>
<td>Listed migratory species.</td>
</tr>
<tr>
<td></td>
<td>Commonwealth marine areas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Monitoring and Management Measures</strong></th>
<th><strong>Exclusion zones</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A cetacean exclusion zone of 2 km shall be maintained around each piling activity.</td>
</tr>
<tr>
<td></td>
<td>A pinniped (i.e. sea lion) exclusion zone of 500 m shall be maintained around each piling activity.</td>
</tr>
</tbody>
</table>

**Piling driving - pre-start-up procedure**

- Visual monitoring within the above exclusion zones for the presence of cetaceans and pinnipeds will be undertaken for at least 20 minutes prior to pile driving activities, by a qualified Marine Fauna Observer (MFO) during peak whale migration periods (May to October), or by personnel experienced and/or trained in fauna observation, distance estimation and reporting, at all other times.
- The designated MFO shall be an inducted person in the construction crew whose responsibility is to notify the Piling Supervisor that the observation zone is clear of all specified marine fauna prior to commencement of pile driving. Personnel on board the barge who are not directly involved in pile driving works may also provide assistance in spotting.
- The mechanical soft start procedure detailed below may only commence if no specified marine fauna have been sighted within the observation zone during the pre-start-up visual observation period.

**Pile driving - Mechanical soft start procedure**

- A mechanical soft start shall be initiated at commencement of each piling activity by piling at low energy levels ('fairy taps') and then build up to full impact force.
- At least the initial five impacts from the hammer will be at no more than half of full hammer weight.
- In this way the first noise emitted from the piling operation would be sub-lethal and likely to encourage animals to move away from the subsequent blows that could be injurious.
- Visual monitoring within the above exclusion zones for the presence of cetaceans and pinnipeds will be undertaken at least every 20 minutes during pile driving activities, by a MFO during peak whale migration periods (May to October), or by personnel experienced and/or trained in fauna observation, distance estimation and reporting, at all other times.

**Pile driving - Shut down procedure**

- If marine fauna are observed within or moving into the exclusion zones pile driving will be shut down immediately.
- Shut down of activities must be maintained for at least 20 minutes from the time of last sighting within the exclusion zone, or until the cetacean or pinniped has been observed to move outside the exclusion zone.

**Pile driving - Low visibility piling procedure**

- If the exclusion zones cannot be fully observed due to low visibility conditions between peak whale migration periods (May to October) pile driving operations will shut down.
- If the exclusion zones cannot be fully observed due to low visibility conditions outside of the peak whale migration periods (November to April) pile driving operations may continue provided that no marine fauna have been observed in the exclusion zone during the previous 24 hours.
- Night time pile driving operations are not permitted.
- Refer to Figure 6.3 below for a flow diagram of the start up and operation procedures for pile driving during the Project construction.
<table>
<thead>
<tr>
<th><strong>Underwater Noise Monitoring and Contingency Plan</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contingencies</strong></td>
</tr>
<tr>
<td>Incidents involving injury of marine fauna as a result of underwater noise from pile driving will invoke the following contingency actions:</td>
</tr>
<tr>
<td>• Immediately cease all significant in-water noise generating activities;</td>
</tr>
<tr>
<td>• Notify Environmental Manager and other relevant personnel of the incident;</td>
</tr>
<tr>
<td>• Notify Commonwealth Department of Sustainability, Environment, Water, Population and Communities, CEO of OEPA and Albany DEC of the incident within 24 hours</td>
</tr>
<tr>
<td>• Complete an incident report;</td>
</tr>
<tr>
<td>• Investigate the incident to determine the case and identify possible changes to activities to avoid reoccurrence; and</td>
</tr>
<tr>
<td>• Complete a risk assessment to the satisfaction of the Environmental Manager before re-starting activity.</td>
</tr>
<tr>
<td><strong>Reporting and Auditing Requirements</strong></td>
</tr>
<tr>
<td>Refer to Section 7 and Table 7.2</td>
</tr>
<tr>
<td>Observation and reporting of injured fauna during pile driving, sea dumping and dredging including the maintenance of a log of fauna observations during pre-startup and operation of piling equipment.</td>
</tr>
<tr>
<td>EPBC compliance reporting – By July 1 each year after commencement of the action, the person taking the action must provide a report to the Department of Sustainability, Environment, Water Population and Communities addressing compliance with the conditions of the conditions (EPBC referral 2006/2540) over the previous 12 months. Reports must be provided until closure of the action.</td>
</tr>
</tbody>
</table>
*Establish zones, communications and observe for at least 20 minutes by Marine Fauna Observer (MFO) during May to October or experienced personnel at other times

*Night time pile driving not permitted

Soft Start for at least initial 5 impacts < half full hammer weight

Cetaceans not observed or outside 2 km. Pinnipeds not observed or outside 500m

Marine fauna not observed, or observed outside exclusion zones?

Yes

Operate at Full Power

Whale Migration Period (May to October) Specific MFO at least every 20 minutes

Not whale Migration Period (November to April) Experienced personnel observations at least every 20 minutes

Marine fauna not observed, or observed outside exclusion zones?

Yes

Marine fauna inside zones:
• Continuous monitoring;
• Cease pile driving for at least 20 minutes from time of last sighting within exclusion zone

No

Figure 6.3 Flowchart showing start up and operation procedures for pile driving during construction of the wharfs and associated infrastructure
7. Auditing and Reporting

7.1 Auditing

7.1.1 Access for observers

In accordance with Condition 12 of the Expansion Project’s Sea Dumping Permit (refer Appendix C), at least two Australian Government nominees are to be afforded access to witness, inspect, examine or audit any part of the operations, including any dumping or monitoring activity, the vessel or any other equipment, or any documented records, and are to be provided with any necessary assistance in carrying out their duties.

7.1.2 Independent audit

Condition 23 of the Sea Dumping Permit (refer Appendix C) requires that APA undertake an independent audit of compliance with the conditions of approval within two months of commencement of dumping activities. The independent auditor is to be approved by the Minister for the Department of Sustainability, Environment, Water, Population and Communities (formerly the Department of Environment Protection, Heritage and the Arts) prior to the commencement of the audit. In addition, audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.

7.1.3 Compliance Assessment Plan

Prior to the implementation of the project, a Compliance Assessment Plan (CAP) shall be prepared, in accordance with Condition 4 of MS 846 (Appendix A) and shall indicate:

- The frequency of compliance reporting;
- The approach and timing of compliance assessments;
- The retention of compliance assessments;
- Reporting of potential non-compliances and corrective actions taken;
- The table of contents of compliance reports; and
- Public availability of compliance reports.

7.2 Reporting

7.2.1 Reporting

Routine internal and external reporting will be carried by the APA or its contractors and consultants. External reporting procedures will be consistent with the relevant State and Commonwealth environmental regulatory requirements. These include:

- State requirements;
- Ministerial Statement 846;
- Department of Water Dredging Permit.
- Commonwealth requirements;
- DSEWPaC EPBC referral 2006/2540; and
- DSEWPaC Sea Dumping Permit No. SD2006/0035.

Accurate records of activities associated with or relevant to the above conditions of approval will be maintained and made available upon request (in accordance with Condition 10 of the EPBC referral). In accordance with Condition 18 of the Sea Dumping Permit, APA are required to keep records comprising either weekly plotting sheets or a certified extract of the ship’s log which detail:

- The times and dates of when each dumping run is commenced and finished;
- The position (as determined by GPS) of the vessel at the beginning and end of each dumping run, with the inclusion of the path of each dumping run; and
- The volumes of dredge material (in cubic metres) dumped for the specified operational period and compare these quantities with the total amount permitted under the permit.
The major reporting requirements and responsibilities are summarised in Table 7.1, structured according to the State environmental requirements (Environmental Values that are to be protected) and Commonwealth environmental requirements (Sea Dumping Permit, and EPBC Act).

### 7.2.2 Compliance Reporting

#### Commonwealth requirements

By July 1st each year after the commencement of the Expansion Project, APA must provide a report to the Department of Sustainability, Environment, Water, Population and Communities addressing compliance with the conditions of the EPBC Act approval (refer Appendix B) over the previous 12 month period. Reports will be provided until the closure of the action, in accordance with Condition 6 of the EPBC Act Approval.

#### State requirements

Compliance reporting to the Office of the Environmental Protection Authority (OEPA) is required for the Expansion Project under Condition 4 of MS 846. This is dealt with in more detail in Section 7.2.3.

### 7.2.3 Key Management Actions Table

The key management actions table will form the basis of annual compliance reporting, environmental compliance monitoring and auditing undertaken by APA (Table 7.2). Audit tables form the basis of performance and compliance reporting to the OEPA. On approval of this DLRMP, an audit table will be developed in collaboration with the OEPA with each condition, procedure or commitment from MS 846, separated into audit elements for auditing purposes. In accordance with OEPA guidelines for preparing an audit program (DoE 2006b) the audit table includes the following attributes, to be prepared and finalised in consultation with OEPA:

- Audit code: DLRMP reference number;
- Subject / Issue: The environmental subject/issue;
- Action / Commitment / Requirement: What the proponent must do;
- How: The way it must be done / Performance Criteria;
- Evidence / Reporting: Information or data collected to verify compliance, i.e. report / letter / site inspection requirements;
- Satisfy: Who will give approval;
- Advice: Agencies whose advice must be considered as stipulated in MS 846;
- Phase: Project phase;
- When: Specific timing and/or location; and
- Status: Notes about the fulfilment of compliance.

Note that the audit table is only a summary of the requirements of this DLRMP and that the relevant section of this document should be referred to directly for matters requiring additional clarification or information on procedural matters.
<table>
<thead>
<tr>
<th>Report</th>
<th>Details</th>
<th>Prepared by</th>
<th>Submitted to</th>
<th>Report frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State Environmental Requirements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WQMP - Ecosystem health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WQMP compliance</strong></td>
<td>If the environmental quality trigger levels have been exceeded at any point during the dredging and disposal program</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>CEO OEPA</td>
<td>Immediately on determination of non-compliance</td>
</tr>
<tr>
<td><strong>Underwater light monitoring</strong></td>
<td>Report of $\Delta H_{\text{water}}$ for each potential impact site.</td>
<td>Environmental consultants</td>
<td>APA website</td>
<td>Weekly during dredging and disposal</td>
</tr>
<tr>
<td><strong>Seagrass health monitoring</strong></td>
<td>Comparisons of monitoring site seagrass shoot density with baseline data.</td>
<td>Environmental consultants</td>
<td>APA website</td>
<td>Monthly within 5 days of obtaining processed shoot density data.</td>
</tr>
<tr>
<td><strong>Seagrass health compliance</strong></td>
<td>If seagrass health criteria are not met, or are not able to be measured during dredging, report the findings including evidence which allows for determination of the cause of the decline in seagrass health.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>CEO OEPA</td>
<td>Within 4 days of non-compliance</td>
</tr>
<tr>
<td><strong>Seagrass direct and indirect loss monitoring</strong></td>
<td>Calculation of total loss of seagrass, including co-ordinates and a map of the areas of seagrass losses caused by the Expansion Project.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>APA website</td>
<td>On completion of the Project at intervals of: 2 months, 12 months, 24 months.</td>
</tr>
<tr>
<td><strong>Reef community monitoring</strong></td>
<td>Report of baseline reef survey before and surveys following completion of dredging, including: cover, diversity and abundance of reef communities.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>APA website</td>
<td>Report on completion of the baseline and after dredging reef surveys.</td>
</tr>
<tr>
<td><strong>Toxicants in water and sediments monitoring</strong></td>
<td>Report providing the results of water and sediment testing for metals, and other contaminants. The report will outline the sampling site locations and whether any triggers were exceeded.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>CEO OEPA</td>
<td>Report results of sampling conducted two weeks before commencement. Reporting monthly during, and within 2 months, and every 12 months for 2 years following dredging and disposal. Reporting of Mercury and Silver results every two weeks during construction.</td>
</tr>
<tr>
<td><strong>Toxicants in water and sediments compliance</strong></td>
<td>If toxicants in water and sediments triggers have not been met or are not able to be measured during dredging, report the findings.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>CEO OEPA</td>
<td>Within 2 days of the exceedance being identified</td>
</tr>
<tr>
<td><strong>Introduced Marine Pests - Vessel Risk Assessment and Inspection Reporting</strong></td>
<td>• Number and types of vessels assessed and inspected; • Copies of all assessments and inspection/cleaning records; • Copies of ballast water exchange records; and • Details of JMP discovered and actions taken to prevent establishment within the Port</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>DoF</td>
<td>From the start of Stage 1 dredging, every 6 months until completion of Stage 1 and Stage 2 dredging.</td>
</tr>
<tr>
<td><strong>WQMP - Fishing and aquaculture</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physico-chemical stressor monitoring</strong></td>
<td>Report outlining DO and pH monitoring at two sites.</td>
<td>Environmental consultants</td>
<td>APA website</td>
<td>Two weeks before commencement and on a four week basis during dredging and disposal.</td>
</tr>
<tr>
<td><strong>Sentinel Mussels monitoring</strong></td>
<td>Report outlining the results of mussel testing for metals and other contaminants at two aquaculture sites.</td>
<td></td>
<td></td>
<td>Report immediately prior to dredging begins. Report every six weeks during stage 2 dredging and disposal. Report at 6 months following completion of dredging and disposal.</td>
</tr>
<tr>
<td><strong>Sentinel Mussels compliance</strong></td>
<td>Report outlining exceedance of trigger levels for toxicants and bacteria.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>CEO OEPA</td>
<td>As soon as possible but within 24 hours of exceedance being identified.</td>
</tr>
<tr>
<td><strong>Turbidity monitoring</strong></td>
<td>Report outlining turbidity monitoring at two aquaculture sites.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>APA website</td>
<td>Prior to the commencement of dredging. Every four weeks during Stage 2 dredging.</td>
</tr>
<tr>
<td><strong>WQMP - Recreation and aesthetics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Toxicants in water at primary contact recreation areas</strong></td>
<td>Report outlining the results of water testing for metals and other contaminants at recreational and aesthetic sites.</td>
<td></td>
<td>APA website</td>
<td>A report of pre-dredging water quality will be provided 16 working days after sample collection. Where weekly sampling is triggered, reports will be provided 16 working days after sample collection.</td>
</tr>
<tr>
<td><strong>Water clarity and aesthetics of primary contact recreation areas</strong></td>
<td>Report outlining the Secchi depth at eleven contingency sites.</td>
<td>APA website</td>
<td>Reporting will be on a ten working day basis</td>
<td></td>
</tr>
<tr>
<td><strong>Commonwealth Environmental Requirements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sea dumping permit reporting</strong></td>
<td>Weekly plotting sheets or a certified extract of the ships' log which detail: a) The times and dates of when each dumping run is commenced and finished; b) The position (as determined by GPS) of the vessel at the beginning and end of each sampling run, with the inclusion of the path of each dumping run; and c) The volume of dredge material dumped for the specified operational period and a comparison of these quantities with the total amount under the permit.</td>
<td>Albany Port Authority - Environmental Manager</td>
<td>Records retained by APA for verification and audit purposes</td>
<td>Daily records</td>
</tr>
</tbody>
</table>
Table 7.2  DLRMP Key Management Actions Table

<table>
<thead>
<tr>
<th>Management Measure No.</th>
<th>Management Action</th>
<th>Performance Indicator</th>
<th>OEPA Reporting Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hydrocarbon and chemical storage, handling and response management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>2</td>
<td>Introduced marine pests management measures</td>
<td>Records of the number and types of vessels assessed and inspected.</td>
<td>Introduced marine Pests reporting</td>
</tr>
<tr>
<td>4</td>
<td>Airborne noise management measures</td>
<td>Monitoring outlined in the Construction Environmental Management Plan.</td>
<td>EPRC act compliance reporting</td>
</tr>
<tr>
<td>5</td>
<td>Emissions to air management measures</td>
<td>Monitoring outlined in the Construction Environmental Management Plan.</td>
<td>CEMP compliance reporting</td>
</tr>
<tr>
<td>6</td>
<td>Marine heritage management measures</td>
<td>Details of the discovery of artefacts of potential maritime or aboriginal heritage in the Port, dredging, land reclamation or sea dumping areas.</td>
<td>Notification sent to OEPA if artefacts are discovered</td>
</tr>
<tr>
<td>7</td>
<td>Unexploded ordnance management measures</td>
<td>Details of any unexploded ordnance discovered in the Port, dredging, land reclamation or sea dumping areas.</td>
<td>Notification sent to OEPA if unexploded ordnance are discovered</td>
</tr>
<tr>
<td>8</td>
<td>Harbour access management measures</td>
<td>Records of the vessel movements maintained by APA.</td>
<td>Records available to OEPA upon request</td>
</tr>
<tr>
<td>9</td>
<td>Signage</td>
<td>Explanatory signage shall be erected to inform the public of the dredging program timeline and the expectations of the construction program. DoH shall be consulted to determine the appropriateness of including signage.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>10</td>
<td>Dredge footprint management and controls</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>11</td>
<td>Contaminated sediments management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>12</td>
<td>Water quality management</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>14</td>
<td>Infrastructure footprint management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>EPRC act compliance reporting</td>
</tr>
<tr>
<td>15</td>
<td>Land reclamation and return water management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>16</td>
<td>Rock armour management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>17</td>
<td>Fauna entrapment management measures</td>
<td>Records outlining the details of fauna entrapment in the land reclamation.</td>
<td>Sea dumping permit environmental incidents reporting.</td>
</tr>
<tr>
<td>18</td>
<td>Pile driving noise management measures</td>
<td>Monitoring outlined in the Underwater Noise Monitoring and Contingency Plan.</td>
<td>EPRC act compliance reporting</td>
</tr>
<tr>
<td>19</td>
<td>Stormwater management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>20</td>
<td>Contaminated sites assessment of reclamation area management measures</td>
<td>Monitoring outlined in the Water Quality Monitoring and Contingency Plan.</td>
<td>WQMP compliance reporting</td>
</tr>
<tr>
<td>21</td>
<td>Public access management measures</td>
<td>Complaints register maintained by APA.</td>
<td>Records available to OEPA upon request</td>
</tr>
</tbody>
</table>
8. Review and Revision

8.1 Review

The draft DLRMP has been reviewed by the Department of Health, Department of Fisheries, Department of Water and expert peer reviewer Mr Michael Mulligan (Mulligan Environmental). The draft DLRMP will also be reviewed by the Office of the Environmental Protection Authority and the Department of Environment and Conservation.

The WQMP, which forms a sub-section of the DLRMP, underwent a comprehensive review process which involved consultation and review by the Albany Dredge Reference Group (ADRG). Invited members of the ADRG included representatives from:

- Conservation Council of WA
- Aquaculture Council of WA
- Great Southern Development Commission
- Chamber of Minerals and Energy
- Princess Royal Sailing Club
- Centre of Excellence in Natural Resource Management
- South Coast Diving Supplies
- City of Albany
- Department of Environment and Conservation
- Middleton Beach User Group
- Department of Health
- Albany Whale Tours / Child Education
- Department of Water
- Freight and Logistics Council
- WA Fishing Industry Council
- ANZAC Centenary Alliance
- South Coast Purse Seine Fishery
- Department of Fisheries
- WA Museum (Albany)
- Department of State Development
- Wellstead Progress Association
- Environmentalist
- Department of Transport
- Svitzer
- Albany Chamber of Commerce and Industry
- Ocean Watch
- Silver Star
- Albany Port Rotary Club
- Albany Dive Locker

The draft WQMP was presented at the first ADRG meeting held in Albany on 25 May 2011. The ADRG comments and the Proponent responses are provided in the WQMP, Appendix C. In addition, the draft WQMP was reviewed by an Independent Peer Reviewer, Mr Mike Mulligan from Mulligan Environmental. Copies of the independent peer review comments and how each comment was addressed are provided in the WQMP, Appendix D. Revisions to the WQMP were discussed again at the second ADRG meeting in Albany, held on 28 July 2011. Following this meeting, the ADRG Independent Chairman, Dr Bernard Bowen, provided final comments, which were provided in the WQMP, Appendix E.

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5 The draft DLRMP was sent to the Department of Environment and Conservation, South Coast Region in June 2011, however no review comments have been received to date.
8.2 Revision

In accordance with Condition 5 of the Sea Dumping Permit and Condition 4 of the EPBC Act referral, APA may submit a revised version of the DLRMP for approval by the Minister for Environment Protection, Heritage and the Arts. If the revised plan is approved, that DLRMP must be implemented in place of the original DLRMP. The DLRMP will be made available (electronically) on the APA website within five business days of the DLRMP being approved by the Minister, as required by Condition 7 of the SDP and Condition 8 of the EPBC Referral Decision.

Stakeholder review comments will be addressed and changes incorporated in the final version. The DLRMP revision status (including distribution list) will be updated in the revision history table at the beginning of this document, should any revisions to the plan be required. As per OEPA guidelines (DoE 2006a), if the approved DLRMP subsequently requires modification or updating and major changes are involved (e.g. significant changes that affect key management actions), comment from the Advisory Agencies who provided comment on the original DLRMP will be sought, and formal approval for the change will be requested from the OEPA. Minor changes will be treated as part of the review and revision process.

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6 Formerly DEWHA, now the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).
9. References


DoE 2006b, Compliance Monitoring and Reporting - Guidelines for Proponents: Preparing an Audit Program, Department of Environment, Perth Western Australia, October 2006.


EPA 2000, Perth Coastal Waters - Environmental Values and Objectives - the position of the EPA - a working document, Prepared by Environmental Protection Authority, Perth, Western Australia, February 2000.


EPA 2010, Albany Port Expansion, Albany Port Authority, Report and recommendations of the Environmental Protection Authority - Report 1346, Prepared by Environmental Protection Authority, Perth, Western Australia, January 2010.

Food Standards Australian New Zealand 2006, Safe Seafood Australia - A guide to the Australian Primary Production and Processing Standard for Seafood, 2nd edn, Canberra, ACT.


McDonald, J. I., 2008, A likelihood analysis of non-indigenous marine species introduction to fifteen ports in Western Australia, Prepared by Department of Fisheries, Report no. 182, Perth, Western Australia.


