

## Cape Lambert Port B development

### DREDGING AND SPOIL DISPOSAL MANAGEMENT PLAN

- Rev 9
- 12 December 2011





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## Acronyms and Abbreviations

|                 |                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------|
| ALARP           | As Low As Reasonably Practicable                                                            |
| AQIS            | Australian Quarantine and Inspection Service                                                |
| AMSA            | Australian Maritime Safety Authority                                                        |
| BEP             | Best Environmental Practice                                                                 |
| BHD             | Backhoe Dredge                                                                              |
| BPP             | Benthic Primary Producers                                                                   |
| BPPH            | Benthic Primary Producer Habitat                                                            |
| CALM            | Department of Conservation and Land Management (now the DEC)                                |
| CCIMPE          | Coordinating Committee for Introduced Marine Pest Emergencies                               |
| CEDA            | Central Dredging Association                                                                |
| CEO             | Chief Executive Officer of the Office of the Environmental Protection Authority             |
| CD              | Chart Datum                                                                                 |
| CSD             | Cutter Suction Dredge                                                                       |
| CSIRO           | Commonwealth Scientific and Industrial Research Organisation                                |
| Cwth            | Commonwealth                                                                                |
| D&B             | Drilling and Blasting                                                                       |
| DAMP            | Dampier Archipelago Marine Park                                                             |
| DEAG            | Dredging Environmental Advisory Group                                                       |
| DEC             | Department of Environment and Conservation (State)                                          |
| DSEWPac         | Department of Sustainability, Environment, Water, Population and Communities (Commonwealth) |
| DoE             | Department of Environment (State), now the DEC                                              |
| DoF             | Department of Fisheries (State)                                                             |
| DOP             | Department of Planning                                                                      |
| DPA             | Dampier Port Authority                                                                      |
| DSDMP           | Dredging and Spoil Disposal Management Plan                                                 |
| EA              | Environment Australia (now DSEWPac)                                                         |
| OEPA            | Office of the Environmental Protection Authority                                            |
| EPBC Act        | <i>Environment Protection and Biodiversity Conservation Act 1999</i>                        |
| EMP             | Environmental Management Plan                                                               |
| EPCM            | Engineering, Procurement and Construction Management                                        |
| ERA             | Environmental Risk Assessment                                                               |
| EQO             | Environmental Quality Objective                                                             |
| EQC             | Environmental Quality Criteria                                                              |
| IADC            | International Association of Dredging Companies                                             |
| KPI             | Key Performance Indicators                                                                  |
| LEP             | Level of Environmental Protection                                                           |
| Mm <sup>3</sup> | Million Cubic meters                                                                        |
| Mtpa            | Million tonnes per annum                                                                    |
| NODGDM          | National Ocean Disposal Guidelines for Dredged Material                                     |
| NTU             | Nephelometric Turbidity Units                                                               |
| OSCP            | Oil Spill Contingency Plan                                                                  |
| PAR             | Photosynthetically Active Radiation                                                         |



|       |                                                         |
|-------|---------------------------------------------------------|
| PER   | Public Environment Report / Public Environmental Review |
| PSD   | Particle Size Distribution                              |
| SAP   | Sampling and Analysis Plan                              |
| SDP   | Sea Dumping Permit                                      |
| SOPEP | Ship Board Oil Pollution Emergency Plan                 |
| TBT   | Tributyltin                                             |
| TSHD  | Trailing Suction Hopper Dredge                          |
| VCP   | Vessel Clearance Procedure                              |
| WA    | Western Australia                                       |
| WQM   | Water Quality Monitoring                                |



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# 1. Introduction

## 1.1. Cape Lambert Port B Development

Rio Tinto Iron Ore (RTIO) proposes to construct a second port facility at Cape Lambert, located adjacent to their existing operations, to process and export up to 130 million tonnes per annum (Mtpa) of iron ore.

The Cape Lambert Port B Development (the Port B development) involves both marine and terrestrial works. The marine works include the construction of a jetty, wharf and ship loaders, in addition to dredging and disposal for berth pockets, turning basins, approach / departure channel and the tug harbour extension. The dredging and spoil disposal program will involve the removal and subsequent relocation of up to 14 million cubic metres (Mm<sup>3</sup>) of material to dedicated offshore spoil grounds. **Figure 1-1** presents an overview of the Port B development.

## 1.2. Proponent

The Proponent for the Port B development is Pilbara Iron Pty Limited (Pilbara Iron), a wholly owned subsidiary of RTIO.

## 1.3. Location

The Port B development is located on the Pilbara coast of Western Australia, approximately 6 km north-north-east of the township of Wickham. It is situated on the Cape Lambert Peninsula, which is bounded to the north and west by the Indian Ocean, to the east by tidal inlets and to the south by arid grazing land.

## 1.4. Environmental Approvals

The Port B development was assessed through a Public Environment Report/ Public Environmental Review (PER) process (Rio Tinto 2009). The Port B development was approved by the Western Australian State Minister for the Environment on 30 September 2010, with the granting of Ministerial Statement 840.

The Port B development was approved by the Delegate of the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (DSEWPoC) with the granting of Conditions (2008/4032) issued under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Approval to undertake ocean disposal was issued through Sea Dumping Permit (SDP) SD2008/0822 under *Environment Protection (Sea Dumping) Act 1981*. The Proponent will comply with the conditions outlined in both EPBC 2008/4032 and the SDP SD2008/0822. The conditions outlined in EPBC 2008/4032 and the SDP SD2008/0822 are provided in **Appendix B** and **Appendix C**, respectively.

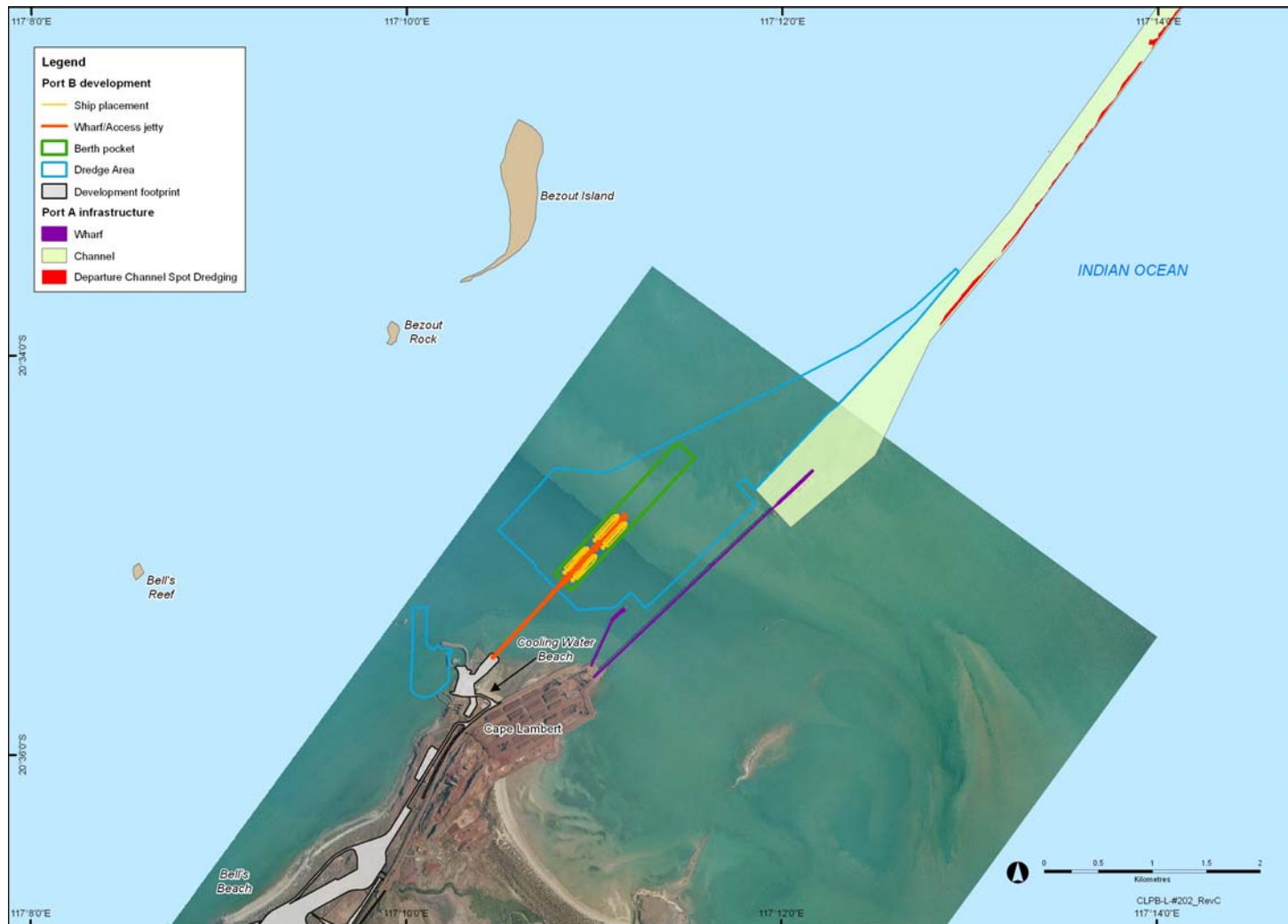
Subsequent to the grant of the above approvals an amendment to the Tug Harbour Extension design, including changes to the dredging footprint and breakwater layout, was sought in December

2010. A further amendment was sought in August 2011 and covered additional dredging for a total volume of 610,000m<sup>3</sup>; these additional dredging areas included widening of the Western Port A Departure Channel (500,000m<sup>3</sup>), localised spot dredging in the main departure channel (65,500m<sup>3</sup>) and tug harbour channel re-alignment (45,000m<sup>3</sup>). The approvals covering these amendments are also contained in the respective appendices to this document.

The Dredging and Spoil Disposal Management Plan (DSDMP) covers the Port B development as approved under the State Ministerial Statement 840, and Commonwealth EPBC Reference 2008/4032 and SDP SD2008/0822. The approved DSDMP will be implemented. In the event that the Proponent wishes to amend any part of the DSDMP, approval (in writing) from the Minister for Sustainability, Environment, Water, Population and Communities will be obtained prior to implementation of such amendments. The finalised DSDMP will be made publicly available within 30 days of approval by the Minister for Sustainability, Environment, Water, Population and Communities.

### **1.5. Purpose**

The purpose of this DSDMP is to provide details on the environmental management aspects of the dredging and spoil disposal activities to be undertaken as part of the Port B development. It details the environmental management and monitoring that will be implemented throughout the dredging and spoil disposal works to ensure that the risk of potential environmental impacts associated with the works are reduced to as low as reasonably practicable (ALARP), and meet the requirements of the Commonwealth Minister for Sustainability, Environment, Water Population and Communities under the Sea Dumping Act and EPBC Act. This Plan will be implemented in conjunction with the management actions outlined in the associated Cetacean Management Plan and the Marine Turtle Management Plan that have been prepared for the Port B development.



■ Figure 1-1 Cape Lambert Port B development

## 1.6. Legal Requirements and Guidelines

The requirements of this DSDMP, as contained in the relevant Conditions (Conditions 6, 8, 9 and 11) from Ministerial Statement 840 are listed in **Table 1-1**. The state Ministerial Statement 840, and Commonwealth EPBC Conditions (2008/4032) and the SDP SD2008/0822 are detailed within **Appendix A**, **Appendix B** and **Appendix C**, respectively.

■ **Table 1-1 Western Australia's Legislative requirements**

| Ministerial Document      | Condition Number | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Section Reference |
|---------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Ministerial Statement 840 | 6-5              | The Proponent shall report any mortality of marine turtles or other threatened or specially protected fauna to the Department of Environment and Conservation within 24 hours following detection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4.4               |
| Ministerial Statement 840 | 8-1              | The Proponent shall ensure that the implementation of the proposal does not cause a direct loss of Benthic Primary Producer Habitat in excess of 0.7 ha.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5.4               |
| Ministerial Statement 840 | 8-2              | <p>Prior to the commencement of dredging, the Proponent shall establish a monitoring program to monitor water quality and coral health. The monitoring program shall include:</p> <ol style="list-style-type: none"> <li>1) The collection and analysis of water quality and coral health monitoring data including turbidity (NTU), temperature (°C), light (<math>\mu\text{mol.m}^2/\text{day}</math>), gross sedimentation rates (<math>\text{mg.cm}^2/\text{day}</math>), particle size distribution and coral health;</li> <li>2) Monitoring for all nominated parameters is to be undertaken at the 15 monitoring sites;</li> <li>3) Data recording and downloading frequencies for all nominated parameters at the 13 monitoring sites (including one 'impact', five 'indicator', five 'influence' and two 'reference' sites) as set out below, unless otherwise approved by the CEO: <ol style="list-style-type: none"> <li>a) Coral health monitoring is to be undertaken at intervals of 14 days or less;</li> <li>b) Particle size distribution monitoring should, as a minimum, occur prior to, during and post dredging;</li> <li>c) Sedimentation deposition data is to be collected at intervals of 14 days or less using sediment traps;</li> <li>d) All other parameters, including NTU and temperature, are to be recorded at intervals not exceeding 30 minutes and downloaded at intervals of 14 days or less.</li> </ol> </li> <li>4) The two 'contingency reference' sites shall be monitored as required in order to provide evidence of the spatial distribution of any observed trends in water quality or coral health at the 13 monitoring sites.</li> </ol> <p>This program shall be designed to allow net coral mortality at any 'indicator' site to be calculated with a statistical power of 0.8 or greater, or an alternative statistical power determined by the CEO.</p> | 4.1<br>5.2<br>5.3 |
| Ministerial Statement 840 | 8-3              | Prior to the commencement of dredging the Proponent shall implement the monitoring program required by condition 8-2 to the satisfaction of the CEO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.1<br>5.2<br>5.3 |

| Ministerial Document      | Condition Number | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Section Reference     |
|---------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Ministerial Statement 840 | 8-4              | The Proponent shall ensure that net detectable coral mortality at any 'indicator' site, which is a result of proposal implementation, is less than 5 percent and the net detectable coral mortality at any 'influence' site is zero.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.1<br>5.2<br>5.3     |
| Ministerial Statement 840 | 8-5              | The Proponent shall monitor water quality and coral health for the duration of the dredging and/or spoil disposal activities and for at least two months after cessation of all dredging and spoil disposal activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4.1<br>5.2<br>5.3     |
| Ministerial Statement 840 | 8-6              | In the event that the coral health monitoring required by condition 8-3 is not undertaken during any 28 day period (i.e., two consecutive coral health monitoring surveys) at any 'indicator' or 'influence' site, the Proponent shall immediately cease dredging and disposal activities which may affect water quality at that site until such a time as the net detectable coral mortality at that site can be assessed and demonstrated to be no greater than that state in condition 8-4.                                                                                                                                                                                                                                                             |                       |
| Ministerial Statement 840 | 8-7              | In the event that monitoring required by conditions 8-3 and 8-5 indicates that the coral criterion in condition 8-4 is not being met at any 'indicator' site as a result of proposal implementation and the circumstances which led to the exceedance still persist or are likely to re-occur, the Proponent shall: <ol style="list-style-type: none"> <li>1. Immediately cease dredging activities that could contribute to the decline in coral health at the affected 'indicator' site(s); and</li> <li>2. Report such findings including evidence which allows the determination of the cause of the decline in coral health</li> </ol> The Proponent shall report the above to the CEO within 4 days of the decline in coral health being identified. | 4.1<br>5.3            |
| Ministerial Statement 840 | 8-8              | The Proponent shall not recommence dredging and/or spoil disposal activities following any cessation required under condition 8-7 until it can be demonstrated to the requirements of the CEO that the recommencement of such activities will not contribute to further net mortality of corals at sites where non compliant levels of net detectable coral mortality have occurred.                                                                                                                                                                                                                                                                                                                                                                       | 4.1<br>5.3<br>(5.3.5) |
| Ministerial Statement 840 | 8-9              | The Proponent shall not conduct any dredging and/or spoil disposal activities or drilling and blasting activity during the period 3 days prior to the predicted commencement of mass coral spawning or as soon as mass coral spawning is detected if prior to that predicted time, and dredging and spoil disposal activities are to remain suspended for seven days from the commencement of mass coral spawning.                                                                                                                                                                                                                                                                                                                                         | 4.3 & 5.6             |
| Ministerial Statement 840 | 8-10             | At 6 months and 18 months from completion of construction the Proponent shall report to the CEO the permanent loss of Benthic Primary Producer Habitat and any loss of Benthic Primary Producer Communities within the six local assessment units. The reports shall include co-ordinates and a map showing the areas of loss of Benthic Primary Producer Habitat and Benthic Primary Producer Communities caused by the proposal and the results of water quality monitoring correlated with coral health, to the requirements of the CEO.                                                                                                                                                                                                                | 5.4                   |
| Ministerial Statement 840 | 9-1              | The Proponent shall ensure that all non-trading vessels and associated immovable equipment, that are either owned by the Proponent, or contracted for construction, maintenance, port operations or decommissioning of the Cape Lambert Port B proposal, (including dredges and pile driving barges) are                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4.5 & 5.8             |



| Ministerial Document      | Condition Number | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Section Reference |
|---------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                           |                  | <p>appropriately cleaned, maintained and inspected by a Department of Fisheries Officer or a suitably qualified marine pest expert approved by the Department of Fisheries, and provide evidence to the satisfaction of the CEO on advice from the Department of Fisheries, certifying that:</p> <ol style="list-style-type: none"> <li>1) there is no sediment on or within the non-trading vessel and equipment;</li> <li>2) ballast water (if any) has been, or will be, managed according to the Australian Quarantine Inspection Service ballast water requirements;</li> <li>3) No invasive marine species (as listed within the Revised Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) Trigger List – refer to condition 9-5) or any other species demonstrating invasive characteristics, have been identified on or within any vessel or immersible equipment inspected;</li> <li>4) Any cleaning or treatment activities undertaken to address invasive marine species risk, has been undertaken to an extent that the non-trading vessel or associated immersible equipment is considered to represent a low risk to the West Australian marine environment; and</li> <li>5) Vessel and immersible equipment inspections shall be conducted either;               <ol style="list-style-type: none"> <li>a) Immediately (no more than 48 hours) prior to vessel or immersible equipment departure for Cape Lambert Port B; or</li> <li>b) Within 48 hours following arrival of vessel or immersible equipment within Port Walcott; and</li> <li>c) Vessels that have spent more than seven days in coastal waters (less than 50 meters depth) between inspection and their arrival at Port Walcott shall also be inspected during the sixth week after arrival at Port Walcott.</li> </ol> </li> </ol> <p>Tug vessels and other support vessels that move between the Proponents Dampier and Cape Lambert operations and between Johns Creek marina at Point Samson to these operations and remain in Western Australia's territorial waters, are excluded from the requirements of this condition and condition 9-2.</p> |                   |
| Ministerial Statement 840 | 9-2              | <p>Specified vessels and immersible equipment and vessels used to undertake single or multiple bunkering or other routine operational activities at neighbouring ports (Dampier and Port Hedland), will be exempt from the invasive marine species risk mitigation measures referred to in condition 9-1 if, prior to arriving or departing from Port Walcott, the CEO, on advice from the Department of Fisheries, has issued a written exemption for that specified vessel and immersible equipment to enter Port Walcott prior to an identified date, based on comprehensive information submitted by the Proponent that includes a risk assessment supported by documentation demonstrating biofouling management measures and a vessel activity profile since the most recent dry-dock cleaning.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4.5 & 5.8         |
| Ministerial Statement 840 | 9-3              | <p>If, non-trading vessels and associated immersible equipment are to be transferred without exemption (condition 9-2) from Cape Lambert to other locations within Western Australia's territorial waters, the Proponent shall, at least 14 days prior to departure from Port Walcott, undertake an inspection or submit a demobilisation risk assessment to the Department of</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4.5 & 5.8         |

| Ministerial Document      | Condition Number | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Section Reference |
|---------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                           |                  | <p>Fisheries that is informed by the invasive marine species monitoring of Cape Lambert Port B. Invasive marine species monitoring shall:</p> <ol style="list-style-type: none"> <li>1) be consistent with monitoring design, implementation and reporting standards set out as part of the National Monitoring Network for the Prevention and Management of Marine Pest Incursions, as approved by the Monitoring Design Assessment Panel of the National Introduced Marine Pest Coordinating Group;</li> <li>2) include a review of target priority species prior to each monitoring survey;</li> <li>3) include a range of sample sites focusing on habitats considered most capable of facilitating the establishment of priority target species throughout all areas of port activities including anchorages, wharves, jetties, slipways, harbours and natural substrates;</li> <li>4) be undertaken a minimum of every three years for the life of the project; and</li> <li>5) include opportunistic sampling and analysis of specimens removed during port and vessel maintenance activities.</li> </ol> |                   |
| Ministerial Statement 840 | 9-4              | The Proponent shall, throughout the life of the project notify the CEO and the Department of Fisheries of any known invasive marine species detected in the waters within the marine leases held by the Proponent at or adjacent to Cape Lambert within 48 hours following detection or following subsequent sample analysis undertaken as part of inspection or monitoring activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4.5 & 5.8         |
| Ministerial Statement 840 | 9-5              | In the event that any invasive marine species are detected during either the inspection of non-trading vessels and immersible equipment, or during monitoring surveys, the Proponent shall, in consultation with the CEO and the Department of Fisheries develop and implement an agreed Invasive Marine Species Management Strategy to prevent wherever practicable, the establishment and proliferation of that organism, aiming to control and potentially eradicating that organism, and to minimise the risk of that organism being transferred to other locations within Western Australia.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4.5 & 5.8         |
| Ministerial Statement 840 | 11-1             | <p>Prior to commencing marine drilling and blasting activities, the Proponent shall prepare to the requirements of the CEO, a Drilling and Blasting Management Plan (D&amp;BMP), in consultation with:</p> <ol style="list-style-type: none"> <li>1) Department of Environment and Conservation;</li> <li>2) Department of Transport (Maritime Division);</li> <li>3) Department of Fisheries; and</li> <li>4) Commonwealth Department of the Environment, Water, Heritage and the Arts (now DSEWPaC).</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4.6               |
| Ministerial Statement 840 | 11-2             | <p>The objectives of the D&amp;BMP are to ensure that drilling and blasting activities are managed to minimise adverse impacts on marine vertebrate species. The D&amp;BMP shall include:</p> <ol style="list-style-type: none"> <li>1) an assessment of the amount of drilling and blasting required and over what area;</li> <li>2) an assessment of likely blast pressures and potential environmental impacts of these pressures;</li> <li>3) management actions and procedures to minimise environmental impacts, including the disposal of drilling muds and consideration of ecological windows between seasonally sensitive periods for marine wildlife;</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.6               |

| Ministerial Document      | Condition Number | Requirement                                                                                                                                                                        | Section Reference |
|---------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|                           |                  | 4) a description of how dead and injured wildlife are to be managed;<br>5) stakeholder communication; and<br>6) reporting procedures and time frames.                              |                   |
| Ministerial Statement 840 | 11-3             | In the event that marine drilling and blasting is required, the Proponent shall implement the D&BMP required under conditions 11-1 and 11-2.                                       | 4.6               |
| Ministerial Statement 840 | 11-4             | The Proponent shall make the Plan required under conditions 11-1 and 11-2 publically available in a manner approved by the CEO.                                                    | 4.6               |
| Ministerial Statement 840 | 11-5             | No dredging, marine drilling or blasting activities are to be conducted outside the 320 hectare area illustrated in this Statement.                                                |                   |
| Ministerial Statement 840 | 11-6             | The disposal of dredge material is not to take place in Western Australian State Waters outside the two square kilometre area bounded by the coordinates listed in this Statement. | 4.7               |

The following key Commonwealth and State legislation is applicable to the dredging and spoil disposal activities:

*State:*

- *Wildlife Conservation Act 1950 (WA);*
- *Environmental Protection Act 1986 (WA);*
- *Pollution of Waters by Oil and Noxious Substances Act 1987 (WA);*
- *Pollution of Waters by Oil and Noxious Substances Regulations 1993 (WA); and*
- *Conservation and Land Management Act 1994 (WA).*

*Commonwealth:*

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cwth);*
- *Environment Protection (Sea Dumping) Act 1981 (Cwth);*
- *Environment Protection (Sea Dumping) Regulations 1983 (Cwth);*
- *Australian Ballast Water Management Requirements 2001 (Cwth);*
- *Australian Quarantine Regulations 2000 (Cwth); and*
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cwth).*

The dredging and spoil disposal activities will be conducted in a manner that is consistent with the following international conventions:

- *International Convention for the Prevention of Pollution from Ships, 1973, as modified by the protocol of 1978 relating thereto (MARPOL 73/78);*
- *London Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter 1972, as modified by the 1996 Protocol relating thereto (the 'London Convention'); and*

- *International Convention for the Control and Management of Ship's Ballast Water and Sediments (note: subject to ratification by the International Maritime Organisation (IMO)).*

In the development of the DSDMP, the following guidelines have been considered:

- *National Assessment Guidelines for Dredging 2009 (Commonwealth of Australia 2009);*
- *Environmental Aspects of Dredging (Bray 2008);*
- *EPA Guidance Statement No. 29: Benthic Primary Producer Habitat Protection for Western Australia's Marine Environment (EPA 2004). This Guidance Statement has been superseded by Environmental Assessment Guideline 3 as of 1 December 2009 (EPA 2009);*
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000);*
- *The Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006);and*
- *OSPAR Guidelines for the Management of Dredged Material (OSPAR 2008).*

## 1.7. Previous Dredging at Cape Lambert

**Table 1-2** provides a summary of the historical dredging undertaken at Cape Lambert.

■ **Table 1-2 Previous Dredging at Cape Lambert**

| Year        | Activity                                                                                                                                                                                                                                                                      |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1972        | Declaration of a natural channel (12.8 m below Chart Datum (CD) ) and turning areas (-10.4 m CD)                                                                                                                                                                              |
| 1972 – 1973 | Dredging of 400 000 to 600 000 m <sup>3</sup> for the construction of Berth 1 (-19.2 m CD) and Berth 2 (-17.8 m CD) with disposal of the material at a previous spoil ground adjacent to the wharf                                                                            |
| 1981        | Planning for the development of a 30 km channel from Bass Pass to the wharf at Cape Lambert                                                                                                                                                                                   |
| 1983        | 2 900 000 m <sup>3</sup> of dredging to <ul style="list-style-type: none"> <li>- Construct a 210 m wide, 30 km long channel</li> <li>- Deepen Berth 1 to -19.5 m CD and Berth 2 to -18.5 m CD</li> <li>- Deepen turning areas to between -19.5 m CD and -21.0 m CD</li> </ul> |
| 1990 – 2001 | Annual dredging of the power station intake area                                                                                                                                                                                                                              |
| 1998 – 2000 | Maintenance dredging of both berth pockets and under the wharf                                                                                                                                                                                                                |
| 2001        | 135 000 m <sup>3</sup> of dredging to widen the turning area and port entrance                                                                                                                                                                                                |
| 2005        | 114 000 m <sup>3</sup> of dredging to construct the tug pens                                                                                                                                                                                                                  |
| 2007        | 1.89 Mm <sup>3</sup> of dredging as part of the Cape Lambert Port A Upgrade ( <b>Section 1.8</b> )                                                                                                                                                                            |

## 1.8. Cape Lambert Port A Upgrade – 85 Mtpa Dredging and Spoil Disposal Program

Dredging and spoil disposal activities were undertaken at Cape Lambert during the Cape Lambert Port Upgrade to 85 Mtpa project in 2007 (Cape Lambert Port A). These dredging works included the dredging of approximately 1.89 Mm<sup>3</sup> of material and subsequent disposal at dedicated offshore disposal grounds. The dredging methods used during the Cape Lambert Port A development are similar to those being proposed for the Port B development. Furthermore, while the extent of dredging works required for the Port B development is larger than that required for Port A, many similarities can be drawn between the two projects including the dredge methods and disposal sites proposed. As such, the proposed environmental management and monitoring of the dredging works associated with the Port B development will build upon the measures, learning's and methods implemented successfully during the Port A dredging program.

## 1.9. Plan Structure

This DSDMP aims to provide an 'outcome-based' management approach for the dredging and spoil disposal activities. As such, each management strategy presented in **Section 4** provides outcomes and Key Performance Indicators (KPIs) against which environmental performance can be accurately measured. For each management strategy, the following is provided:

- *Objective* - details the objective of the management strategy.

- *Background* - provides a brief overview of the potential environmental impact, the proximity and seasonality of the key sensitive environmental receptors and the applicable legislation, convention or guidance documents.
- *Key Performance Indicators* - provides measurable targets against which the project's environmental performance and impacts can be measured and assessed.
- *Management* - details the management measures and procedures that will be implemented to meet the management objective.
- *Monitoring and Auditing* - indicates the monitoring and auditing programs that will be implemented as detailed in **Section 5** and **Section 6**.
- *Reporting* - lists the reporting requirements.
- *References* - provides cross references to where further information can be obtained within the DSDMP or Public Environmental Report (PER) for the Port B development.

#### **1.10. Environmental Risk Assessment and Management Strategies**

An Environmental Risk Assessment (ERA) has been undertaken to assess the potential environmental impacts associated with the Port B development. The potential impacts and applicable management strategies are summarised in **Table 1-3**. These management strategies are presented in **Section 4**.

■ **Table 1-3 Potential impacts and applicable management strategies**

| Impact Area            | Potential Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Applicable Management Strategies                                                                                                                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Marine Habitats        | <ul style="list-style-type: none"> <li>Impacts to Benthic Primary Producer Habitats (BPPH) including coral communities from increased turbidity levels and sedimentation rates</li> <li>Impacts associated with smothering of benthic habitats (including BPPH) by sediment and changes in seabed topography resulting from spoil disposal activities</li> <li>The introduction of invasive marine species (IMS) via the dredging vessels and equipment</li> <li>The accidental direct removal of local habitat outside of the designated dredging areas</li> </ul> | <ul style="list-style-type: none"> <li>Strategy 1 – Water Quality, Sedimentation and BPPH Management</li> <li>Strategy 2 – Coral Spawning Management</li> <li>Strategy 4 – Invasive Marine Species Management</li> <li>Strategy 6 – Spoil Ground Management</li> </ul> |
| Socio-economic         | <ul style="list-style-type: none"> <li>Impacts on social values such as visual amenity resulting from a short term reduction in water quality via increased turbidity levels</li> <li>Access and vessel movement conflicts with other non-operational/ local marine users during dredging and disposal activities.</li> </ul>                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Strategy 1 – Water Quality, Sedimentation and BPPH Management</li> <li>Strategy 9 – Vessel Management.</li> </ul>                                                                                                               |
| Marine Fauna and Flora | <ul style="list-style-type: none"> <li>Impacts to marine fauna including turtles and marine mammals from vessel strikes during dredging and disposal activities</li> <li>Impacts to marine fauna from noise and vibration generated during the dredging, and drilling and blasting (D&amp;B) activities (if required)</li> </ul>                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Strategy 1 – Water Quality, Sedimentation and BPPH Management</li> <li>Strategy 3 – Marine Mammals and Turtle Management</li> <li>Strategy 5 – Drilling and Blasting Management</li> </ul>                                      |
| Water Quality          | <ul style="list-style-type: none"> <li>Decrease in water quality as a result of increased turbidity levels</li> <li>The introduction of contaminants to the water column during dredging and disposal of any contaminated sediments</li> <li>Reduction in water quality and impacts to marine fauna from the accidental release of solid, hazardous or sewage wastes generated during the dredging and disposal activities</li> </ul>                                                                                                                               | <ul style="list-style-type: none"> <li>Strategy 1 – Water Quality, Sedimentation and BPPH Management</li> <li>Strategy 7 – Hydrocarbons and Chemicals Management</li> <li>Strategy 8 – Waste Management</li> </ul>                                                     |

### 1.11. Pilbara Water Quality Guidelines

The DEC has recommended a set of environmental values and spatially allocated Environmental Quality Objectives (EQO) and Levels of Ecological Protection (LEP) for the Pilbara coastal waters (DoE 2006) which are explained in **Section 6.2** of the PER. The LEPs rate from low to maximum, where areas defined as 'low' have high levels of contaminants and are largely changed from natural variation, whilst areas defined as 'maximum' are pristine with no contaminants above background levels. The majority of waters surrounding the Cape Lambert Port B development are designated as a 'high' LEP (DoE 2006).

**Sections 6 and 7** of the PER (Rio Tinto 2009) detail the key water quality values and sensitivities in the Cape Lambert area. These environmental values include ecosystem health, recreational and aesthetic values, commercial and recreational fishing and aquaculture activities, cultural and spiritual values and industrial water supply.

In addition to being developed to manage the potential key environmental impacts identified in the ERA, the management strategies identified in **Table 1-3** and presented in **Section 4** have been developed to ensure that the dredging and spoil disposal activities are undertaken in a manner consistent with the EQOs and LEPs recommended by the DEC.

**Table 1-4** outlines the environmental values, the EQOs and the Environmental Quality Criteria (EQC) for the Cape Lambert area as well as the management strategies and performance monitoring that will be applied to meet these objectives.



■ **Table 1-4 Pilbara Water Quality Objectives and Management Response**

| Environmental Values      | Environmental and Social Sensitivities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Environmental Quality Objectives                                                              | Environmental Quality Criteria                                                                                                                                                                                                                                                                                                                                                 | Management Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecosystem health          | <ul style="list-style-type: none"> <li>■ The majority of the waters surrounding Cape Lambert have been allocated a High LEP.</li> <li>■ Relatively small areas of locally significant arid zone mangroves located nearby.</li> <li>■ A proposed marine conservation reserve (Dampier Archipelago Marine Park) located 10 km from the proposed Port B development has been allocated Maximum LEP.</li> <li>■ The waters in the vicinity of the nearshore infrastructure (wharf, berth pockets, turning basins and approach / departure channel) have been allocated a Moderate LEP.</li> </ul> | Maintain structure and function of marine ecosystem.                                          | <ul style="list-style-type: none"> <li>■ Populations of corals retain their current distribution and diversity.</li> <li>■ Impacts on water and sediment quality are restricted to ANZECC guidelines.</li> <li>■ Marine pests not detected. If detected, to be managed in consultation with the Department of Fisheries (DoF), DEC and other relevant stakeholders.</li> </ul> | <ul style="list-style-type: none"> <li>■ Strategy 1 – Water Quality, Sedimentation and Benthic Primary Producer Habitat Management</li> <li>■ Strategy 2 – Coral Spawning Management</li> <li>■ Strategy 4 – Invasive Marine Species Management</li> <li>■ Strategy 6 – Spoil Ground Management</li> <li>■ Strategy 7 – Hydrocarbons and Chemicals Management</li> <li>■ Strategy 8 – Waste Management</li> <li>■ Strategy 9 – Vessel Management</li> </ul> |
| Recreation and aesthetics | <ul style="list-style-type: none"> <li>■ Recreational boating (a small boating club exists to the south-west of Cape Lambert and boating facilities are available at Point Samson).</li> <li>■ Recreational fishing.</li> <li>■ Recreational diving and snorkelling.</li> </ul>                                                                                                                                                                                                                                                                                                               | <p>Water quality for swimming and boating is maintained.</p> <p>Aesthetics are protected.</p> | <ul style="list-style-type: none"> <li>■ None developed as yet.</li> </ul>                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>■ Strategy 1 –Water Quality, Sedimentation and Benthic Primary Producer Habitat Management</li> <li>■ Strategy 7 – Hydrocarbons and Chemicals Management</li> <li>■ Strategy 8 – Waste Management</li> </ul>                                                                                                                                                                                                         |
| Cultural and spiritual    | <ul style="list-style-type: none"> <li>■ The Cape Lambert Port is located within two overlapping Native Title claim areas (Ngarluma/Injibandi) (refer to <b>Section 7.11</b> and <b>Section 7.12</b> of the Cape Lambert Port B PER for further information). These claim areas also include coastal environments.</li> </ul>                                                                                                                                                                                                                                                                 | Cultural and spiritual values of the marine environment are protected.                        | Not applicable as there are no EQC or levels of protection in the Cape Lambert area relating to cultural use of marine waters.                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



| Environmental Values    | Environmental and Social Sensitivities                                                                                                                                         | Environmental Quality Objectives                                    | Environmental Quality Criteria                                                                          | Management Strategies                                                                                                                                                                                                                         |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fishing and aquaculture | <ul style="list-style-type: none"> <li>Various active and non-active fisheries and aquaculture (refer to <b>Section 7.9</b> of Port B PER for further information).</li> </ul> | Fish and seafood (caught or grown) is of a quality safe for eating. | <ul style="list-style-type: none"> <li>Relevant criteria from national foods standards code.</li> </ul> | <ul style="list-style-type: none"> <li>Strategy 1 –Water Quality, Sedimentation and Benthic Primary Producer Habitat Management</li> <li>Strategy 7 – Hydrocarbons and Chemicals Management</li> <li>Strategy 8 – Waste Management</li> </ul> |
|                         |                                                                                                                                                                                | Water quality is suitable for aquaculture purposes.                 | <ul style="list-style-type: none"> <li>Relevant ANZECC guidelines for LEP.</li> </ul>                   |                                                                                                                                                                                                                                               |
| Industrial water supply | <ul style="list-style-type: none"> <li>Cape Lambert Port power station (to be decommissioned).</li> </ul>                                                                      | Water Quality is suitable for industrial supply purposes.           | <ul style="list-style-type: none"> <li>Relevant ANZECC guidelines for LEP.</li> </ul>                   | <ul style="list-style-type: none"> <li>Strategy 1 –Water Quality, Sedimentation and Benthic Primary Producer Habitat Management</li> </ul>                                                                                                    |



### 1.12. Organisational Structure, Roles and Responsibilities

The Proponent (RTIO) is responsible for the implementation of the proposal and adherence to the commitments made within the DSDMP. The management of the works will be via the engagement of a contractor to undertake the Engineering, Procurement and Construction Management (EPCM) of the project.

The Proponent will notify the CEO and DSEWPaC of any change in the name and address of the Proponent for serving of notices or other correspondence within thirty days of such a change.

The Proponent will ensure that all persons engaged in the dredging and spoil disposal activities, including the owner and person in charge of the dredging vessels, comply with the relevant permits and approvals and the requirements under the relevant Acts.

The key roles and responsibilities associated with the implementation of this DSDMP are presented in **Table 1-5**. The Proponent will provide a completed table of contacts to DEC and DSEWPaC at least seven days prior to the commencement of dredging and spoil disposal activities.



■ **Table 1-5 DSDMP Roles and responsibilities**

| Role                                               | Name                    | Contact Details              | Responsibilities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------|-------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RT – Project Manager                               | Stuart Kennedy          | 0418 994 210                 | <ul style="list-style-type: none"> <li>Overall responsibility for the project and implementation of the DSDMP.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| RT – Specialist Environmental Advisor / EM         | Tamara Ainsworth        | 0457 518 971                 | <ul style="list-style-type: none"> <li>Audit / compliance.</li> <li>Advise RT Project Manager and Project Team on environmental issues.</li> <li>Liaise with government, submit reports to government, and notify government of incidents.</li> </ul>                                                                                                                                                                                                                                                                                                                                                             |
| EPCM – Project Manager                             | Arthur Ong              | 0403 601 385                 | <ul style="list-style-type: none"> <li>Manage the dredging and spoil disposal activities in compliance with the DSDMP.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| EPCM – Construction Manager                        | Chris Ingham            | 0407 162 311                 | <ul style="list-style-type: none"> <li>Communicate environmental requirements to the dredging contractor.</li> <li>Approves dredging contractors EMPs.</li> <li>Implementation of this DSDMP.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                          |
| EPCM – Environmental Lead                          | Todd Jess<br>Mary Askey | 0439 945 426<br>0439 951 146 | <ul style="list-style-type: none"> <li>Implement the day-to-day environmental management of the works including regular audits of the environmental performance of dredging and spoil disposal activities.</li> <li>Provide environmental advice with regards to the dredging and spoil disposal activities.</li> </ul>                                                                                                                                                                                                                                                                                           |
| EPCM – Environmental Officer(s)                    | Graeme Noll             | 0408 258 070                 | <ul style="list-style-type: none"> <li>Coordinate environmental reporting.</li> <li>Investigate and report environmental incidents.</li> <li>Manage environmental contractors.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Marine Environmental Contractors – Project Manager | TBC                     | TBC                          | <ul style="list-style-type: none"> <li>Implement the environmental monitoring programs.</li> <li>Implement the vessel pest inspections.</li> <li>Provide advice regarding environmental issues as required.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                            |
| Dredging Contractor - Project Manager              | Van Oord                | TBC                          | <ul style="list-style-type: none"> <li>Undertake the dredging and spoil disposal activities in a manner consistent with the DSDMP.</li> <li>Implement management measures as directed by the EPCM Construction Manager and as defined in the DSDMP.</li> <li>Ensure all dredging contractor staff and crew receive adequate environmental training.</li> <li>Provides advice with regards to the environmental management of the dredging and spoil disposal activities.</li> <li>Ensure that all equipment is maintained in an appropriate condition to minimise the risk of environmental incidents.</li> </ul> |
| All Persons                                        |                         |                              | <ul style="list-style-type: none"> <li>Conduct all work in adherence to this DSDMP.</li> <li>Exercise a 'Duty of Care' to the environment.</li> <li>Report all environmental incidents as soon as practically possible to the site environmental officer.</li> </ul>                                                                                                                                                                                                                                                                                                                                              |

TBC: To be confirmed

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### 1.13. Dredging Environmental Advisory Group

A Dredging Environmental Advisory Group (DEAG) is proposed to be established by the Proponent prior to the commencement of the dredging and spoil disposal activities. The DEAG will essentially be an internal advisory group to assist the Proponent. As well as the Proponent, the DEAG may consist of representatives from the following:

- EPCM;
- DEC (optional);
- Marine contractor; and
- Dampier Port Authority (DPA).

The DEAG will be chaired by an independent advisor, who will, in consultation with the Proponent invite further environmental and technical advisors as appropriate. This may include a specialist in coral ecology. The DEAG will provide advice to the Proponent with respect to the environmental management of the dredging and spoil disposal activities. This may include, but not limited to the following:

- 1) Provide advice to the Proponent on suitable management actions / options which could be implemented Proponent in the event that net coral mortality has exceeded a particular trigger level.
- 2) Provide incident-specific advice on which management options should apply on a case-by-case basis if a limit has been exceeded or is likely to be exceeded.
- 3) Provide briefings to the DEC, should that be required or requested.
- 4) Provide input in relation to the review of individual trigger values based on current knowledge of the site specific relationship between water quality and coral health obtained during the dredging program.

Specific details regarding the DEAG formulation, meeting frequency, meeting structure and reporting requirements will be established by the DEAG following its formation. An initial kick-off meeting will be held prior to the commencement of dredging and spoil disposal activities, during which a briefing will be provided on the project, environmental monitoring and the terms of reference of the DEAG.

### 1.14. Stakeholder Consultation

Extensive stakeholder consultation has been undertaken during the environmental assessment process for the project. The key stakeholders engaged with specific reference to the dredging and spoil disposal activities include the relevant Commonwealth and State regulatory bodies, local government authorities and other non-government organisations. Full details of this stakeholder engagement including the key outcomes are provided in **Section 2** of the PER (Rio Tinto 2009).

## 2. Project Overview

### 2.1. Dredging Works

#### 2.1.1. Methodology Overview

Dredging will be undertaken to construct the berth pockets, turning basins, approach / departure channel and the tug harbour extension. The areas requiring dredging and the corresponding target dredge depth are shown in **Figure 1-1**, **Figure 2-1** and **Table 2-1**.

■ **Table 2-1 Dredge areas and target depths**

| Dredge Area                             | Target Depth             |
|-----------------------------------------|--------------------------|
| Berth pockets                           | -20.0 m Chart Datum (CD) |
| Arrival / departure area and Channel    | -15.6 m CD               |
| Turning basin                           | -10.0 m CD               |
| Tug Harbour Extension                   | -6.8 m CD                |
| Western Port A departure channel        | -15.6 m CD               |
| Spot dredging in main departure channel | -16.0 m CD               |
| Tug harbour channel                     | -6.8 m CD                |

Up to 14.61 Mm<sup>3</sup> of both consolidated and unconsolidated material will be dredged using a combination of Trailing Suction Hopper Dredges (TSHD), a Cutter Suction Dredge (CSD) and a Backhoe Dredge (BHD). Current indications from geotechnical investigations undertaken to date, indicate that there is a low risk that pre-treatment via drilling and blasting (D&B) of the consolidated material is required prior to dredging. Should drilling and blasting be required, a separate Drilling and Blasting Management Plan will be provided to the determining authorities for approval prior to works being undertaken. The dredging and spoil disposal activities commenced in late 2010 and is expected to take approximately sixty-four (64) weeks to complete. Dredging activities will be carried out 24 hours per day, seven days per week during the dredging program, except during coral spawning periods, and in the event dredging is halted for maintenance and / or extreme weather events (i.e. cyclone).

#### **Dredging Equipment**

Dredging equipment will include:

- one large sized TSHD (hopper capacity ~15 000 m<sup>3</sup>);
- one medium sized TSHD (hopper capacity >10 000 m<sup>3</sup>);
- one large CSD;
- one BHD (or similar) with associated hopper barges; and
- one drilling and blasting spread (unlikely to be required).

The general methodology will involve the removal of unconsolidated and loosely consolidated material by the TSHD for disposal at the offshore disposal grounds. Consolidated material which

cannot be directly dredged by the TSHD will initially be crushed using the CSD. The crushed material will be placed on the seabed either directly behind the underwater pump of the CSD or pumped a short distance via a floating pipeline and placed on the seabed via a diffuser. The crushed material will then be dredged by the TSHD and relocated for disposal at the offshore spoil disposal grounds. This CSD method may also be used to remove unconsolidated material from locations not accessible to the TSHD due to vessel draught constraints.

In the unlikely event that any consolidated material cannot be directly crushed by the CSD, it will be pre-treated using the drilling and blasting spread.

Dredging for the Tug Harbour Extension will involve the use of BHD with associated hopper barges.

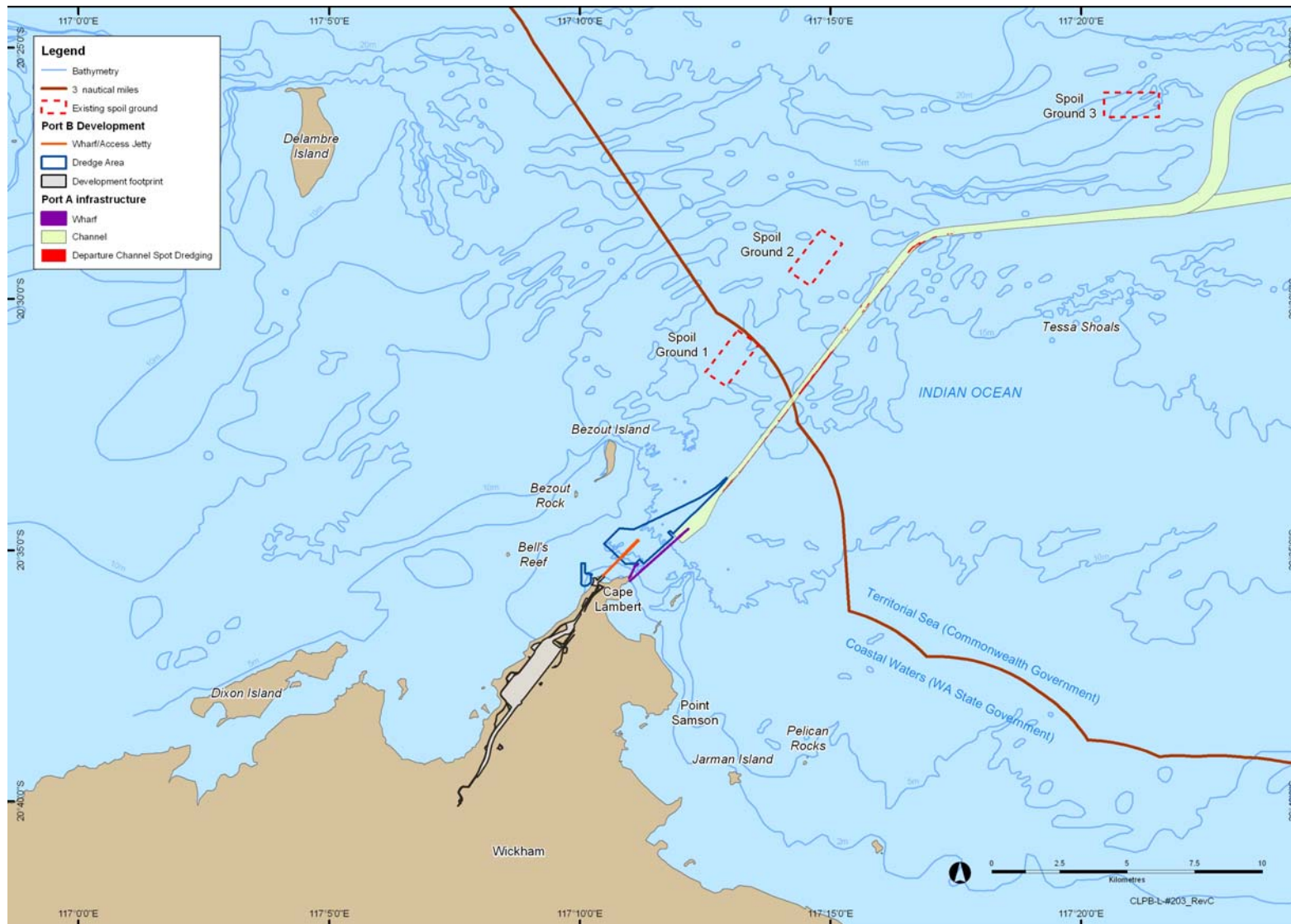
### **2.1.2. Methodology Justification**

The dredging methodology uses medium to large-sized TSHDs and CSDs combined with a BHD. These dredge types have been selected as they are the most suitable selection in terms of environmental performance as well as the technical and economic feasibility of the project. Key advantages with regards to the environmental performance of the selected dredging methodology include the following:

- The utilisation of large and medium-sized TSHDs will limit the volume of material that will be required to be cut and placed on the seabed by the CSD prior to dredging by the TSHD. This will limit double handling of the material and the associated turbidity generation.
- The utilisation of medium to large CSDs will limit and ideally eliminate the amount of pre-treatment via drilling and blasting required during the project.
- The utilisation of large hopper capacity TSHDs will minimise the duration of the works thus minimising the temporal extent of water quality, light and noise related impacts.
- The utilisation of large capacity TSHDs during the bulk dredging will limit the number of shipping movements between the dredging area and disposal grounds when compared to other potential methods such as loading barges using BHDs or a grab dredge. This will also minimise greenhouse gas emissions and fuel usage.

Modern TSHDs and CSDs provide the best solution for dredging projects in terms of the accuracy of dredging thus minimising the amount of over-dredging that may occur. The TSHDs are also conducive to the accurate placement of the dredging spoil at the disposal location. Modern TSHDs and CSDs are owned and operated by world leading dredging contractors and are designed and operated with environmental performance in mind. As such they are equipped with online production/dredging visualisation and environmental devices (for example, turbidity reducing overflow valves) all designed to improve the efficiency and environmental performance of the vessel.





■ **Figure 2-1 Dredging areas and spoil disposal grounds for the Cape Lambert Port B development**

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## 2.2. Spoil Disposal

All spoil generated during the dredging activities will be disposed at designated existing offshore spoil disposal grounds. The locations and coordinates of each of these offshore spoil grounds are shown in **Table 2-2** and **Figure 2-1**. The capacity of these spoil grounds is considered sufficient to accommodate the requirement of the proposed Port B dredging program. Small amounts of Tributyltin (TBT) are already contained within Spoil Ground 1. This material will be capped using uncontaminated material dredged during the Port B development dredging program. Uncontaminated material will be strategically placed over the spoil ground, as previously agreed with DSEWPaC, to ensure that the resident TBT is capped by a sufficient layer of clean sediment.

- **Table 2-2 Coordinates and approximate volumes (capacity) of offshore spoil grounds (MGA94 zone 50)**

| Coordinates                                     |          |
|-------------------------------------------------|----------|
| Easting                                         | Northing |
| <b>Spoil Ground 1 (6 057 000 m<sup>3</sup>)</b> |          |
| 522842                                          | 7732018  |
| 523570                                          | 7731490  |
| 522453                                          | 7729953  |
| 521725                                          | 7730481  |
| <b>Spoil Ground 2 (6 700 000 m<sup>3</sup>)</b> |          |
| 525748                                          | 7735714  |
| 526476                                          | 7735186  |
| 525359                                          | 7733649  |
| 524631                                          | 7734177  |
| <b>Spoil Ground 3 (7 562 000 m<sup>3</sup>)</b> |          |
| 537470                                          | 7740726  |
| 537470                                          | 7739826  |
| 535570                                          | 7739826  |
| 535570                                          | 7740726  |

### 3. Existing Marine Environment and Relevant Studies

#### 3.1. Overview

Characterisation of the existing marine environment at Cape Lambert and an assessment of the potential impacts of the Port B development have been undertaken as part of the environmental assessment process. This characterisation was undertaken based on existing knowledge of the area together with the findings of a number of detailed field studies and investigations.

Details of the existing marine environment and the results of the impact assessment can be found in **Sections 6 and 9** of the PER (Rio Tinto 2009). The key field studies are summarised below:

- Surveys conducted in February and March 2008 were designed to describe the distribution and abundance of benthic habitats, including hard corals, macroalgae, turf algae and seagrass assemblages in the Cape Lambert marine environment. Towed camera technology was used to survey 186 deep water sites, while an additional 36 shallow reef sites were assessed by divers using SCUBA.
- Intertidal surveys of two mainland fringing reefs and one mangrove area located in close proximity to the Port B development were surveyed on foot during a series of low spring tides in February 2008 (**PER Appendix A10**).
- A comprehensive benthic survey of Cooling Water Discharge Bay was undertaken in November 2007. The data collected during this survey was used during the early design phase to minimise disturbance of BPPH and other sensitive marine habitats. The data was also used to calculate estimates of direct loss of BPPH resulting from the Port B development and has also been incorporated into benthic habitat maps (**PER Appendix A11**).
- Turbidity and temperature loggers were deployed at 13 reef sites in the vicinity of Cape Lambert from February 2008 until May 2009 to collect baseline data on water quality prior to the Port B development's dredging and spoil disposal program. The program consists of Water Quality Monitoring (WQM) sites established as part of the 2007 Port A dredging and spoil disposal program and additional sites established on the eastern side of Cape Lambert (SKM 2009c).
- A sediment dispersion study was undertaken by Global Environmental Modelling Systems (GEMS) to predict the fate of sediment mobilised from dredging and spoil disposal activities and to identify potential impacts in relation to BPPH and other sensitive features (**PER Appendix A12**). Sediment cores were taken to determine particle size distribution, resuspension potential and settling velocity of sediment, all of which informed model predictions.

- A verification study of the model that was applied in the sediment dispersion study was undertaken and a report prepared by GEMS (**PER Appendix A13**).
- An independent third party validation of data requirements and availability for GEMS modelling was undertaken by the Centre for Scientific and Industrial Research Organisation (CSIRO) Marine and Atmospheric Research Division in June 2008 (**PER Appendix A14**).
- An extensive review of literature relating to the Cape Lambert coastal and marine environments was undertaken, including searches of key data sources such as the Western Australia Museum, DEC, Department of Fisheries, DSEWPaC databases and reports from the Australian Institute of Marine Science (AIMS).
- Data from the above surveys, in addition to high resolution aerial photography, bathymetry data and existing benthic habitat maps (including data collected for the 2007 Cape Lambert Port A Upgrade) were used to develop the Port B development benthic habitat map (**PER Appendix A11**).

The outputs of the following studies undertaken during the development of the PER are of particular importance to the environmental management of the dredging and spoil disposal activities, and as such, are provided in further detail below:

- Benthic Primary Producer Habitat Survey (**Section 3.4** – further details provided in **Section 6.5.2** of the PER)
- Baseline Water Quality Monitoring (**Section 3.5** – further details provided in (SKM 2009b))
- Marine Sediment Sampling and Analysis (**Section 3.6** – further details provided in **Section 6.4.5** of the PER)
- Sediment Plume Dispersion Modelling (**Section 3.7** – further details provided in **Appendix A11** of the PER).

### **3.2. EPBC Listed Species**

A total of 13 marine mammal species (12 cetaceans) and six turtles listed under the EPBC Act (**Table 3-1**) have the potential to occur within the waters surrounding the development area (DEWHA 2009). Of these, the humpback whale (*Megaptera novaeangliae*), the blue whale (*Balaenoptera musculus*), loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*), hawksbill turtle (*Eretmochelys imbricata*) and the flatback turtle (*Natator depressus*) are listed threatened species (DEWHA 2009). The other whale and dolphin species that may be found within the region are listed as migratory and/or marine species under the EPBC Act and are protected as they are regarded as species of national environmental significance (DEWHA 2009).

For detailed species information and habitat types, refer to the relevant management plan (Biota 2008; SKM 2009f).

■ **Table 3-1 Marine mammal and turtle species of conservation significance (EPBC Act) found in the Pilbara region**

| Scientific Name                                         | Common Name                                                  | Status                          | Type of Presence                                       |
|---------------------------------------------------------|--------------------------------------------------------------|---------------------------------|--------------------------------------------------------|
| <i>Balaenoptera musculus</i>                            | Blue whale                                                   | Endangered, Migratory, cetacean | Species or species habitat may occur within area       |
| <i>Megaptera novaeangliae</i>                           | Humpback whale                                               | Vulnerable, Migratory, cetacean | Species or species habitat may occur within area       |
| <i>Balaenoptera edeni</i>                               | Bryde's whale                                                | Migratory, cetacean             | Species or species habitat may occur within area       |
| <i>Orcinus orca</i>                                     | Killer whale, orca                                           | Migratory, cetacean             | Species or species habitat may occur within area       |
| <i>Sousa chinensis</i>                                  | Indo-Pacific humpback dolphin                                | Migratory, cetacean             | Species or species habitat may occur within area       |
| <i>Tursiops aduncus</i> (Arafura/Timor Sea populations) | Spotted bottlenose dolphin (Arafura/Timor Sea populations)   | Migratory, cetacean             | Species or species habitat likely to occur within area |
| <i>Balaenoptera acutorostrata</i>                       | Minke whale                                                  | Cetacean                        | Species or species habitat may occur within area       |
| <i>Delphinus delphis</i>                                | Common dolphin                                               | Cetacean                        | Species or species habitat may occur within area       |
| <i>Grampus griseus</i>                                  | Risso's dolphin, grampus                                     | Cetacean                        | Species or species habitat may occur within area       |
| <i>Stenella attenuate</i>                               | Spotted dolphin, pantropical spotted dolphin                 | Cetacean                        | Species or species habitat may occur within area       |
| <i>Tursiops aduncus</i>                                 | Spotted bottlenose dolphin, Indian Ocean bottlenose dolphin. | Cetacean                        | Species or species habitat likely to occur within area |
| <i>Tursiops truncatus</i> s. str.                       | Bottlenose dolphin                                           | Cetacean                        | Species or species habitat may occur within area       |
| <i>Dugong dugon</i> *                                   | Dugong                                                       | Migratory                       | Species or species habitat likely to occur within area |
| <i>Caretta caretta</i>                                  | Loggerhead                                                   | Endangered                      | Species or species habitat likely to occur within area |
| <i>Chelonia mydas</i>                                   | Green                                                        | Vulnerable                      | Species or species habitat likely to occur within area |
| <i>Dermochelys coriacea</i>                             | Leatherback                                                  | Endangered                      | Species or species habitat likely to occur within area |
| <i>Eretmochelys imbricata</i>                           | Hawksbill                                                    | Vulnerable                      | Species or species habitat likely to occur within area |
| <i>Natator depressus</i>                                | Flatback                                                     | Vulnerable                      | Species or species habitat likely to occur within area |
| <i>Lepidochelys olivacea</i>                            | Olive Ridley                                                 | Endangered                      | Species or species habitat likely to occur within area |

\*Not a cetacean

### 3.3. Marine Parks and Reserves

There are no existing Commonwealth marine protected areas in the Cape Lambert area. The closest protected marine area is the Ningaloo Marine Park off Exmouth Peninsula, approximately 330 km from Cape Lambert.

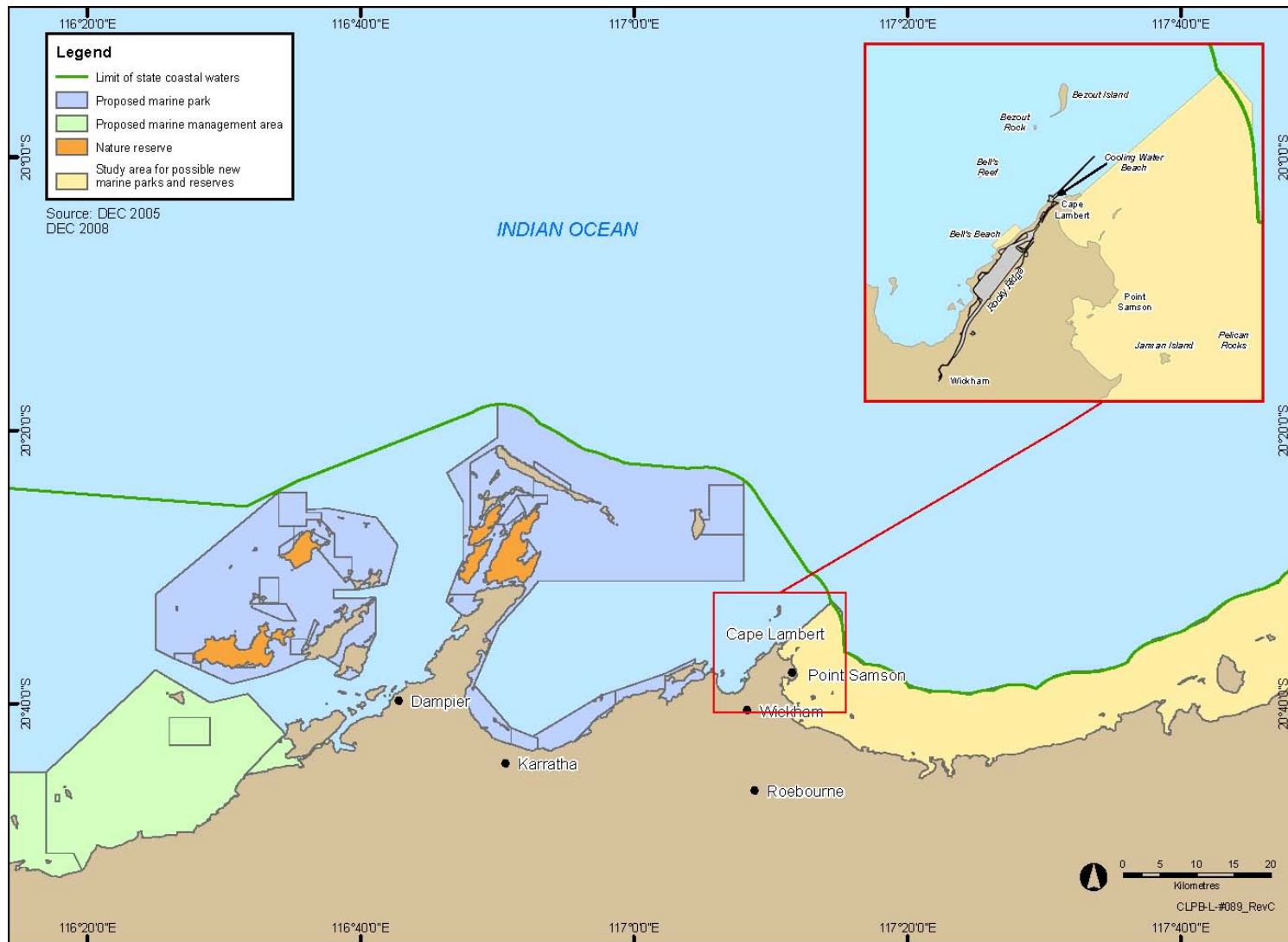
Cape Lambert is not situated within or in close proximity to any existing State marine protected areas. The closest State marine protected area is the Montebello Islands Marine Park, 180 km from Cape Lambert. The proposed Dampier Archipelago Marine Park (DAMP) is located to the west and North West of Cape Lambert. As noted in **Section 3.7**, sediment plume modelling has indicated that no impact to the proposed DAMP is likely to occur. Islands within the proposed DAMP that are closest to the Cape Lambert Port B development include Dixon and Delambre Islands (**Figure 3-1**). Dixon Island is located approximately 8 km west of Cape Lambert, while the Delambre Island Sanctuary Zone is approximately 20 km to the north-west. The area between Cape Lambert and Cape Thouin is one of six study areas in the Pilbara from within which marine parks and reserves may be identified, subject to current assessment (DEC 2008).

Point Samson Reef has fishing restrictions imposed under Section 43 of the *Fish Resources Management Act, 1994* (WA). A number of the islands of the Dampier Archipelago are also contained within nature reserves for the protection of flora and fauna and are managed under the Dampier Archipelago Nature Reserves Management Plan 1999–2000 (CALM 1990).

The mangroves located to the east of Cossack were described as regionally significant under the EPA's Guidance Statement for Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline (EPA 2001).

There are no world heritage properties in the Cape Lambert area. The closest is the Shark Bay World Heritage Property over 600 km to the south. There are no Ramsar wetlands in the Cape Lambert area. The closest Ramsar wetland is Eighty Mile Beach, located south-west of Broome.

The Dampier Archipelago, including the Burrup Peninsula is National Heritage listed property. There are no Commonwealth-listed heritage sites in the Cape Lambert area. Note that the 'Dampier Archipelago Marine Areas' (including waters off Cape Lambert) are listed under the Register of the National Estate (Place ID: 17563).



■ **Figure 3-1 Future marine protected areas**

### 3.4. Benthic Primary Producer Habitat

Full details of the BPPH in the Cape Lambert area can be found in **Section 6.5.2** of the Port B development PER and are summarised briefly here. BPPH in the project area is comprised of both intertidal and subtidal habitats that support several different types of BPP communities that may be affected by the Port B development (**Figure 3-2**).

Four main areas of mangroves exist in the project area. To the west, along the coastline between Dixon Island and Cape Lambert, the dominant mangrove was *Avicennia marina*, followed by *Rhizophora stylosa* (Bowman Bishaw Gorham 1993). At the tip of Cape Lambert, two small stands (of approximately 12 and 10 individuals respectively) of *A. marina* occur. On the eastern side of Cape Lambert, two areas of mangroves exist in Sam's Creek and Pope's Nose Creek. The dominant species here are *A. marina*, followed by *R. stylosa*. *Cerriops australis* occurs landward of *A. marina*, while *Aegiceras corniculatum* occurs as a thin fringe of trees along some of the more stable sand banks in the creek and occasionally fringe the bank of the tidal creek. The mangrove community at Pope's Nose Creek supports the same vegetation associations found in Sam's Creek but does not cover as great an area. Both of these mangroves communities are the most developed mangroves in the proximity of the Cape with a variety of habitat types, vegetation associations, and flora and fauna.

The other types of BPP that occur in the project area are a combination of turf algae, macroalgae and hard corals. These three primary producers form a mosaic on the intertidal and subtidal hard substratum, with turf algae being the most dominant in terms of the amount of seafloor covered. Most areas surveyed, particularly in the intertidal zone, showed rapid transitions between adjacent areas dominated by different kinds of BPP, sometimes only metres in diameter and ranging from high levels of cover to a sparse occurrence. Most BPP types encountered in the Cape Lambert area require hard substrate on which to attach and grow and so are mostly associated with hard structures such as islands or rocks. The main areas where this habitat was found were Delambre Island, Bezout Rock, Bell's Reef and the area to the east of Dixon Island, followed by Pelican and Hat Rocks and nearby islands (**Figure 3-2**).

### 3.5. Baseline Water Quality and Sediment Monitoring

Details of the water quality in the Cape Lambert area can be found in the Marine Water Quality Baseline Monitoring Report (SKM 2009b) and in **Section 6.4.3** of the Port B development PER (Rio Tinto 2009).

The baseline water quality monitoring program undertaken for the Port B development involved measuring a suite of parameters at 13 monitoring sites (**Table 3-1** and **Figure 3-3**). Six of these sites were developed and monitored during the Port A development. The remaining seven sites were determined through the BPPH mapping (**Figure 3-2**) undertaken for the Port B development. The aim of the monitoring program was to collect additional baseline water quality data, particularly at the newly established eastern sites. The baseline water quality monitoring program for the Port B development commenced in late February 2008 and finished in May 2009.

Turbidity, temperature and light loggers were deployed *in situ* where they were programmed to record measurements every 30 minutes, 24 hours a day, during the Port B development baseline monitoring period. Gross sedimentation data was collected (via sediment traps) every fortnight over the baseline period to record spatial and temporal variations with respect to settlement rates.

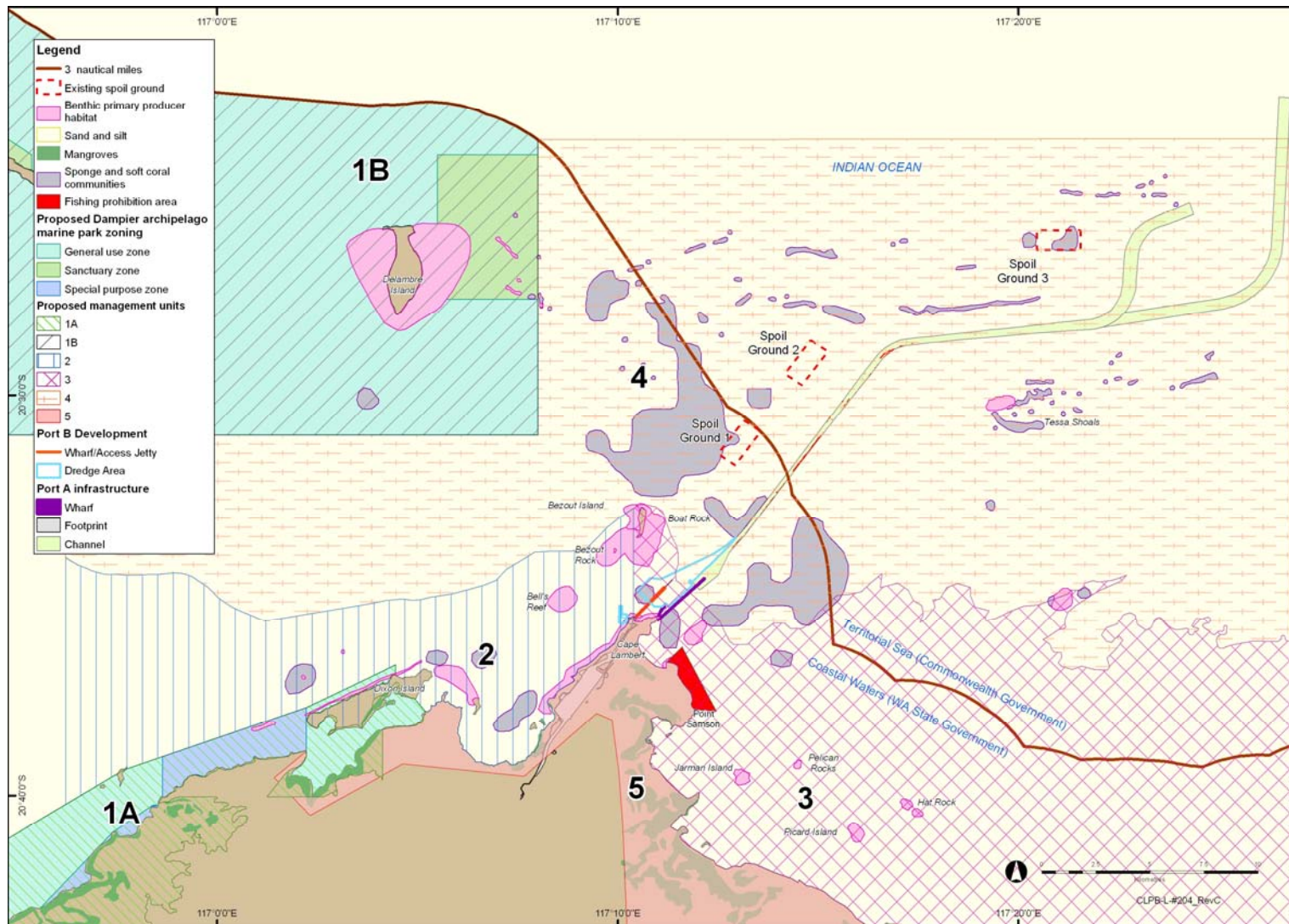
The Particle Size Distribution (PSD) of the naturally occurring sediments at each monitoring location was sampled quarterly during the baseline survey period by two different methods: sediment cores and sediment traps. Sediment cores and sediment traps underwent PSD analysis to provide information about the type, size and characteristics of sediment settling out of the water column. Analysis of sediment traps provided information on the type of sediment settling out of the water column. It is important to note that the sediment traps provide estimates of gross sedimentation rather than net sedimentation. Gross sedimentation on exposed reef habitat in the Cape Lambert area is unlikely as strong wave action and water movement will resuspend sediment prohibiting long-term settlement on living coral, other BPP and their habitat. When coupled with PSD information from the sediment cores, the potential for resuspension and retention of various particle sizes at each site was inferred.

The absence of fine sediments at any of the monitoring sites is likely to be a consequence of prevailing weather conditions and the influence of spring tides preventing the retention of fines at these sites (although settlement may occur from time to time when weather and tidal conditions are favourable). However, sedimentation rates are likely to be temporally and spatially variable (among sites). Temporal variation in sedimentation rates will vary according to season, individual cyclonic events and floods.

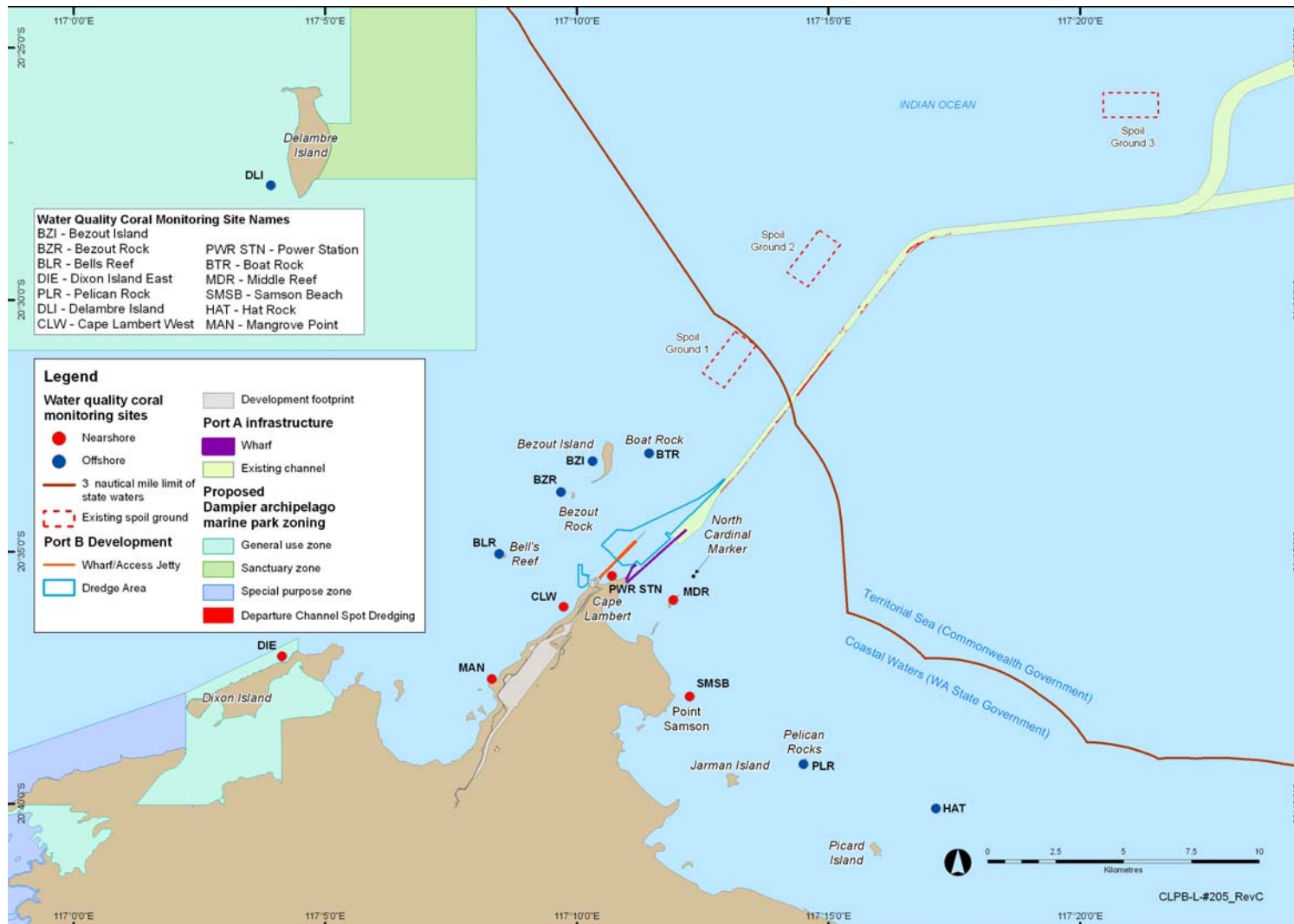
■ Table 3-2 Water quality monitoring sites (GDA94 datum)

| Site Name         | Site Code | Latitude    | Longitude    | Water depth (m) (Chart Datum) | Site Characteristics*                | Parameters measured**                       |
|-------------------|-----------|-------------|--------------|-------------------------------|--------------------------------------|---------------------------------------------|
| Bells Reef        | BLR *     | 20°35.052'S | 117°08.456'E | 3                             | Rocky outcrop, nearshore, West       | NTU, Temperature, Sedimentation, PSD        |
| Boat Rock         | BTR       | 20°33.750'S | 117°10.621'E | 12                            | Rocky outcrop, strong currents, West | NTU, Temperature, Sedimentation, PSD        |
| Bezout Island     | BZI *     | 20°33.213'S | 117°10.311'E | 3                             | Fringing island reef, West           | NTU, Temperature, Light, Sedimentation, PSD |
| Bezout Rock       | BZR *     | 20°33.823'S | 117°09.682'E | 4                             | Rocky outcrop, nearshore, West       | NTU, Temperature, Sedimentation, PSD        |
| Cape Lambert West | CLW *     | 20°36.090'S | 117°09.756'E | 4                             | Nearshore, West                      | NTU, Temperature, Light, Sedimentation, PSD |
| Dixon Island East | DIE *     | 20°37.084'S | 117°04.143'E | 3                             | Fringing island reef, West           | NTU, Temperature, Sedimentation, PSD        |
| Delambre Island   | DLI *     | 20°27.736'S | 117°03.916'E | 9                             | Offshore fringing island reef, West  | NTU, Temperature, Light, Sedimentation, PSD |
| Hat Rock          | HAT       | 20°40.105'S | 117°17.136'E | 4                             | Rocky outcrop, East                  | NTU, Temperature, Light, Sedimentation, PSD |
| Mangrove Point    | MAN       | 20°37.555'S | 117°07.988'E | 3                             | Nearshore, West                      | NTU, Temperature, Sedimentation, PSD        |
| Middle Reef       | MDR       | 20°35.817'S | 117°11.862'E | 3                             | Nearshore rock outcrop, East         | NTU, Temperature, Light, Sedimentation, PSD |
| Pelican Rock      | PLR       | 20°39.249'S | 117°14.415'E | 3                             | Rocky outcrop, East                  | NTU, Temperature, Light, Sedimentation, PSD |
| Power Station     | PWR STN   | 20°35.440'S | 117°10.685'E | 6                             | Nearshore, West                      | NTU, Temperature, Sedimentation, PSD        |
| Samson Beach      | SMSB      | 20°37.337'S | 117°11.890'E | 4                             | Nearshore, East                      | NTU, Temperature, Sedimentation, PSD        |

Note: East and West refers to the site location relative to the existing Cape Lambert wharf, while \* indicates sites used in the previous Cape Lambert Port Upgrade monitoring program. \*\* Light was measured at four sites at any one time to gain an understanding of the amount of light received by corals.



■ **Figure 3-2 Distribution of BPPH and other community types in the Cape Lambert area**



■ **Figure 3-3 Water quality and sedimentation monitoring locations near Cape Lambert, Western Australia**

### 3.5.1. Monitoring Results Summary

Turbidity, water temperature, light, sedimentation and PSD data were spatially and temporally variable among sites. The tidal regime appeared to be the most influential factor determining variations in the turbidity level and light climate at all sites on a fortnightly basis. On a seasonal basis, these water quality variables were also influenced by climate (ambient air temperature), prevailing winds, storms and cyclonic events. The spatial variability among monitoring sites appeared to be driven by the site's characteristics including the bathymetry, exposure to prevailing winds and location in regards to distance from the mainland and islands. Strong correlations between the benthic cover and water quality parameters were recorded between certain sites during the Port B development BPPH subtidal study (SKM 2009e).

#### ***Turbidity***

The turbidity recorded during the baseline water quality monitoring program was spatially variable between monitoring sites and temporally variable over the monitoring period (**Table 3-2**). Monitoring site Mangrove Point (MAN) recorded the highest median turbidity across the baseline period (2.4 NTU), with the lowest median turbidity recorded at Delambre Island (DLI) (0.7 NTU). The turbidity levels at nearshore monitoring sites were consistently higher than the monitoring sites located further offshore (minimum of 2.5 km). Sea floor sediments in shallow nearshore environments are more prone to re-suspension by wave action in comparison to sediment in deep water. In addition, water quality in nearshore environments is more likely to be influenced by turbid water discharged from creeks during high rainfall events, which typically only occur after cyclonic events in summer. The exceptions to this were sites Hat Rock (HAT) and Pelican Rock (PLR) which had the highest turbidity of all of the offshore sites. These two sites are located in the vicinity of major drainage creeks and are affected by sediment loads discharged during large rainfall events.

#### ***Water Temperature***

Ambient air temperature appeared to have the greatest influence on the water temperatures recorded at the monitoring sites during the baseline period (February 2008 to May 2009). Water temperatures at the monitoring sites followed the seasonal trend with temperatures lowest at the end of winter and highest towards the end of summer. Water temperatures ranged between 16.5–33.9 °C with median water temperature recorded ranging from 27.8 °C at Power Station (PWR STN) to 26.4 °C at DLI over the baseline monitoring period (**Table 3-2**).

■ **Table 3-3 Summary statistics for turbidity and temperature data from each monitoring site during the baseline monitoring period**

| Site       | Turbidity (NTU) |                       |                       |       | Water Temperature (°C) |                       |                       |       |
|------------|-----------------|-----------------------|-----------------------|-------|------------------------|-----------------------|-----------------------|-------|
|            | Median          | 20 <sup>th</sup> %ile | 80 <sup>th</sup> %ile | n     | Median                 | 20 <sup>th</sup> %ile | 80 <sup>th</sup> %ile | n     |
| BLR        | 1.3             | 0.6                   | 4.5                   | 15966 | 27.6                   | 23.1                  | 30.3                  | 21889 |
| BTR        | 1.2             | 0.7                   | 2.9                   | 16955 | 26.9                   | 22.9                  | 30                    | 20354 |
| BZI        | 0.9             | 0.5                   | 2.5                   | 21125 | 27.5                   | 23.5                  | 30.1                  | 20696 |
| BZR        | 0.9             | 0.5                   | 2.6                   | 13614 | 27.1                   | 22.5                  | 30.4                  | 20799 |
| CLW        | 1.7             | 0.8                   | 5.2                   | 12861 | 27.5                   | 21.5                  | 30.3                  | 18936 |
| DIE        | 1.3             | 0.8                   | 2.9                   | 15317 | 27.4                   | 22.5                  | 30.2                  | 18155 |
| DLI        | 0.7             | 0.4                   | 1.9                   | 15733 | 26.4                   | 22.3                  | 29.4                  | 18924 |
| HAT        | 2               | 1                     | 6.5                   | 13835 | 26.8                   | 21.7                  | 30.2                  | 16949 |
| MAN        | 2.4             | 1.2                   | 6.9                   | 13326 | 26.7                   | 22.4                  | 30.4                  | 20654 |
| MDR        | 1.6             | 0.9                   | 4.7                   | 15584 | 27.2                   | 23.4                  | 30.2                  | 20217 |
| PLR        | 1.6             | 1                     | 4                     | 13582 | 27.4                   | 21.8                  | 30.1                  | 18114 |
| PWR<br>STN | 1.5             | 0.8                   | 5.8                   | 13953 | 27.8                   | 23.3                  | 30.3                  | 20898 |
| SMSB       | 1.5             | 0.8                   | 4.7                   | 17702 | 26.7                   | 21.9                  | 30                    | 20898 |

\* Differences in n for NTU and temperatures reflects a combination of different lengths of deployment and instrument performance (erroneous or no data)

### Light

Light climate was measured at four of the 13 monitoring locations during any one time (Table 3-4). The light climate was temporally and spatially variable with Cape Lambert West (CLW) recording the highest median total photosynthetically active radiation (PAR) per day (13 327 685  $\mu\text{m}^2/\text{day}$ ), while HAT recorded the lowest median PAR per day (5 897 644  $\mu\text{m}^2/\text{day}$ ). Differences in total light received per site was primarily influenced by the depth of the site with shallow nearshore sites receiving more total PAR than deeper offshore sites. The light levels at nearshore and offshore monitoring sites appeared to be significantly influenced by the turbidity levels recorded.

■ **Table 3-4 Summary statistics for total PAR per day from each monitoring location for the entire monitoring period**

| Site | Total PAR per day ( $\mu\text{m}^2/\text{day}$ ) |                       |                       |     | Average logger depth |
|------|--------------------------------------------------|-----------------------|-----------------------|-----|----------------------|
|      | Median                                           | 20 <sup>th</sup> %ile | 80 <sup>th</sup> %ile | n   |                      |
| BZI  | 12 920 220                                       | 8 271 958             | 15 573 480            | 116 | 3                    |
| CLW  | 13 327 685                                       | 9 960 705             | 16 310 640            | 168 | 4                    |
| DLI  | 7 312 812                                        | 5 132 644             | 9 225 829             | 192 | 9                    |
| HAT  | 5 897 644                                        | 2 789 848             | 8 339 922             | 48  | 6                    |
| MDR  | 1 134 808                                        | 4 490 618             | 14 910 144            | 161 | 5                    |
| PLR  | 7 652 552                                        | 5 503 354             | 9 413 385             | 15  | 6                    |

\* Differences in 'n' reflects different lengths of deployment.

### ***Sedimentation***

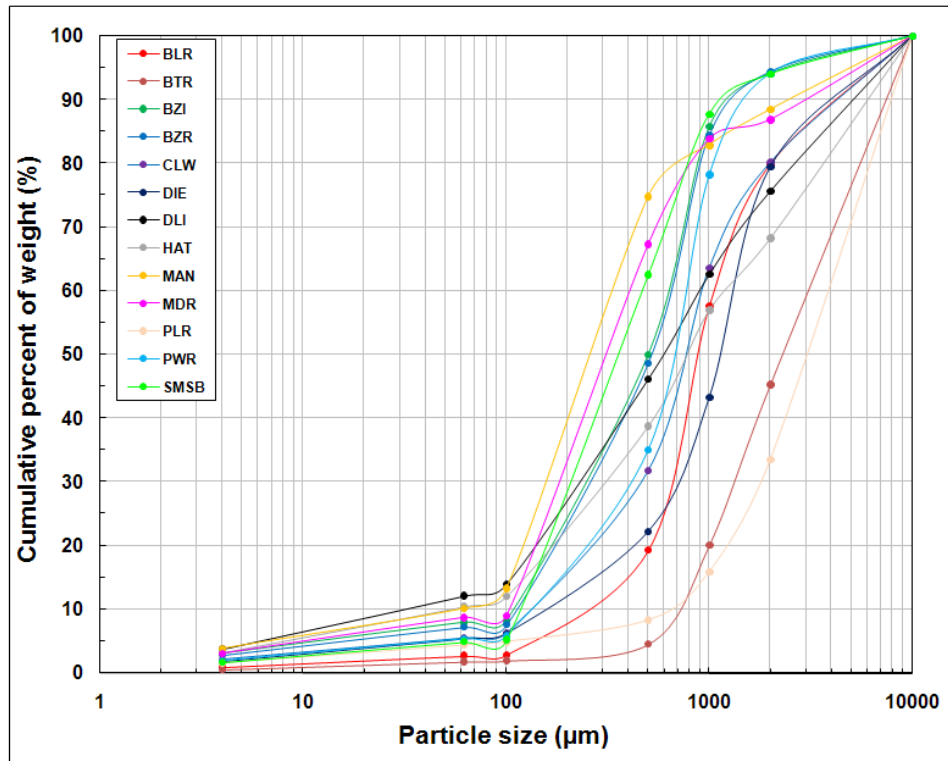
Mean daily sedimentation rates were calculated and compared month to month to illustrate difference over time. Median sedimentation values ranged from 36 400.36 mg/cm<sup>2</sup>/d in July 2008 at Samson Beach (SMSB) to 1.42 mg/cm<sup>2</sup>/d in May 2008 at CLW. With the exception of Bezout Island (BZI) and Boat Rock (BTR), all of the offshore locations exhibited relatively low rates of sedimentation.

It must be noted that the method employed does not allow for any estimation of the net sedimentation rate. The sediment traps do not measure net sedimentation as they measure the amount of sediment settling out of the water column and do not provide a quantitative measure of resuspension. Sediment falling onto corals is unlikely to lead to mortality if it is subsequently resuspended off corals by tidal currents or wave action within a short period of time. Data obtained using sediment traps can therefore only provide a 'ballpark' estimate of natural sedimentation dynamics and the potential for build up of sedimentation. It is also important to note that mean daily sedimentation rate does not provide insights in to the scale or type of sedimentation events for a given period (e.g. similar rates per day over a month versus one large event on a single day during a month).

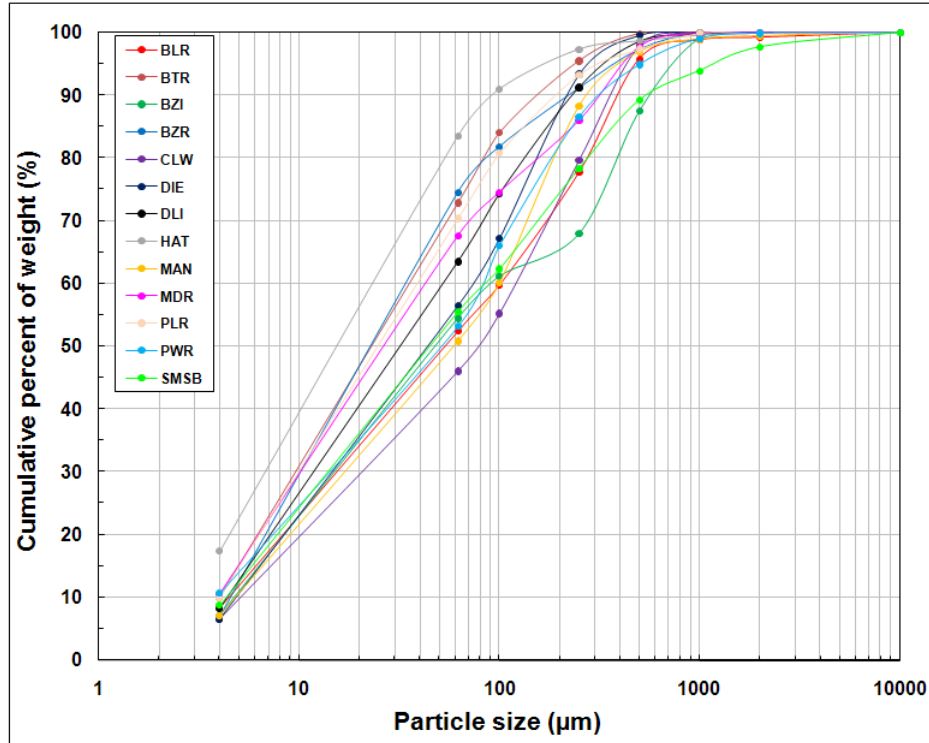
### ***Particle Size Distribution***

Surface sediments for the majority of locations are dominated by medium to coarse sediments, ranging between the 500 and 2000 µm size categories. Pelican Rock (PLR) has the highest percentage of coarse sand with approximately 65% of the sediment >2000 µm. By comparison, DLI contained the highest percentage of silts and clays in the surface sediments when compared to other locations, followed by HAT and MAN respectively. However, at HAT and MAN, the level of silts and clays were still low (<10%).

The PSD of sediments in the water column ranged from 4–1000 µm, with approximately 80% of the sediment below 200 µm. This data suggests that suspended sediment is predominantly very fine sand, silt or clay. The highest percentage of silts and clays in the suspended sediment was recorded at HAT, where approximately 83% of all suspended sediments fell into the silt to clay category (4–62 µm). This is followed closely by Bezout Rock (BZR), Bezout Island (BZI) and PLR with CLW having the lowest percentage of silts/clays. Further detail can be found in the Marine Water Quality Baseline Monitoring Report (SKM 2009b).



■ Figure 3-4 Average particle size distribution measured by sediment cores at all monitoring locations during baseline Port B monitoring



■ Figure 3-5 Average particle size distribution measured by sediment traps at all monitoring locations during baseline Port B monitoring

### 3.6. Sediment Quality

Tributyltin (TBT) has historically been the most common active constituent in marine antifouling paints. It is typically therefore detected in the waters of most major harbours, especially in sediments in the vicinity of berth pockets. Although no longer applied to vessels, TBT is still found on many vessels and will continue to be a source of contamination until vessels are stripped and repainted. TBT is known to accumulate in sediments due the anoxic conditions delaying the normal breakdown to benign levels of tin. The main environmental effect attributed to TBT is as an endocrine disruption in marine gastropods, leading to the condition called imposex. This effect reduces the ability of gastropods to breed, due to abnormally formed reproductive organs and thus gastropod numbers in affected areas are reduced. TBT can also have other detrimental effects on marine biota, such as scleractinian (hard) corals, including the fertilisation of gametes, settlement and metamorphosis of larvae (Negri and Heyward 2001), and effects on growth of branchlets (Smith et al. 2003).

To characterise the sediment chemistry levels of metals, tributyltin (TBT) and particle size in the proposed dredging footprint, diver and / or geotechnical coring surveys of sediments was undertaken for both the proposed original (Oceanica 2008) and the relocated (Oceanica 2010) dredging footprints. Results from both surveys are detailed below. It should be noted that the greater part of the relocated footprint overlaps with that of the original footprint.

Subsequent to the Port B development environmental approvals (Ministerial Statement 849; EPBC 2008/4032; SDP SD2008/0822) the design of the Tug Harbour Extension was amended which included a change in the Tug Harbour Extension dredge footprint. A review of the available sediment quality data was undertaken (Oceanica 2010a) which found that there was extensive overlap between the approved and proposed amended Tug Harbour Extension dredge footprints, including proximity to land and existing infrastructure where potential contamination would have been expected to occur, therefore the 2007 and 2008 data (Oceanica 2008) is considered representative for the sediment within the proposed tug harbour footprint.

#### **Results**

The majority of the sediment in the Port B dredging footprint was found to be free of TBT. Small pockets of marine sediments, however, were found to possess nickel and TBT levels exceeding the screening levels of the National Ocean Disposal Guidelines for Dredged Material (NODGDM). TBT was found to occur at some sites within 450 m of the existing Cape Lambert Port A berth in a westerly direction. The TBT levels in Area A (0–50 cm layer) and Area B (0–50 cm layer) were both below the NODGDM screening level. In contrast, elevated TBT in one sample in the 50–100 cm layer in Area A resulted in an overall exceedence of the NODGDM screening level despite no other samples in the layer returning TBT above the laboratory detection limit.

Elevated levels of TBT were also found within Additional Area A and when combined with the original results (Oceanica 2008) the 95% UCL for both the surface and sub-surface layers were above the National Assessment Guidelines for Dredging (NAGD) trigger level (9 µg SN/kg).

Further analysis, including elutriate and ecotoxicity testing was undertaken from two of the sites where TBT was found at the highest levels. Elutriate results indicated that the (ANZECC and ARMCANZ 2000) 95% and 99% levels of species protection were unlikely to be exceeded during unconfined ocean disposal, particularly after a four hour dilution period.

Note that the Sampling and Analysis Plan (SAP), SAP Implementation Report and the Sea Dumping Permit were submitted under the NODGDM, which has now been superseded by the NAGD (Commonwealth of Australia 2009) that were introduced in early 2009. It should be noted that the revised screening level for TBT has increased from 5 µg SN/kg to 9 µg SN/kg (Commonwealth of Australia 2009); however, the 95% UCL for TBT in Area A still exceeds this level.

Prior to the Cape Lambert Port A upgrade, very high levels of TBT and nickel were found near the existing berth pocket, exceeding any level found during the study for the Port B development. However, ecotoxicological analysis undertaken for the Port A development concluded that the TBT present was not a significant risk to the environment (SKM 2006). Nickel concentrations were observed to be consistently above NODGDM screening levels, but these concentrations were widespread and are believed to be naturally occurring and thus not considered to be anthropogenic. Furthermore, eco-toxicity testing did not find evidence of acute or chronic toxicity linked to nickel. Given that TBT and nickel levels found in the Port B development surveys were considerably lower than the levels found in the Port A survey, the elutriate and eco-toxicity results described above are considered 'worst case' for the sediment within the Port B development dredge area.

It is also the case that the samples in the Port B development survey that contain TBT are spatially close to the existing berth and this strongly suggests a common source for the TBT found in both sets of samples (Port A and Port B). TBT is generally present in sediments as paint flakes which are rubbed off of vessels whilst at berth due to friction between the vessel and fenders. Between the most recent survey for Port A in 2006, the only potential source of TBT is likely to have been the bulk carriers visiting the existing berth. The common source of TBT is further supported by the observation that the concentrations of TBT in the Port B development samples are lower than those recorded for samples collected at Port A. This is logically consistent with the spatial distribution of TBT found in samples collected at Port B, further away from the existing berth. In addition, there is no readily identifiable source of TBT within the region other than the historical use of the existing berths at Port A.

Based on the findings of the combined results (Oceanica 2008, 2010), it was determined that material found within the proposed relocated dredging footprint is suitable for unconfined ocean disposal.

### **3.7. Sediment Plume Dispersion Modelling and Impact Assessment**

A detailed investigation into the potential impacts to BPPH (**Section 6.2.2** of the PER) has been undertaken using sediment plume dispersion modelling (**Appendix A12** of the PER). The modelling provides predictions of potential turbidity and sedimentation patterns associated with the

proposed dredging and dredge spoil disposal. These outputs are summarised in **Section 9** of the PER and are detailed in the BPPH Assessment (**Appendix A11** of the PER). Since the submission of the PER, an alternative wharf design, ~576 m shorter in length, was proposed and subsequently taken into account by the EPA in its assessment of the Port B development. Details pertaining to the updated BPPH assessment are provided in SKM (2009a).

The modelling process included the development of management threshold levels for turbidity (measured as NTU) and sedimentation for potential impacts on BPPH and Benthic Primary Producers (BPP). Thresholds relate specifically to corals because these are considered more sensitive than other BPP to deterioration in water quality. Here, corals have been used as proxy 'sensitive marine receptors' on the valid assumption that all other BPP are much less sensitive to perturbations in turbidity and sedimentation. This assumption will be tested by assessing any potential impacts to corals and other BPP that are attributable to the development.

It is important to make the distinction between 'thresholds' and 'triggers'. 'Thresholds' are based on tolerance limits of receptors and are used to interrogate the model output to predict areas where conditions may deteriorate to the point at which impacts to sensitive receptors may occur. Once the level and areas of impact have been predicted, the next step is to define reactive management 'triggers' which define the point at which management actions will be implemented to minimise any further impact (e.g. 5% net detectable coral mortality at Indicator sites).

The thresholds used to interrogate the plume model and the logic behind values chosen are described extensively in **Appendix 11** of the PER. In summary, the approach used to develop thresholds is inherently conservative because it is assumed to be the upper end of the range of intensity, duration and frequency of elevations in turbidity (NTU) and gross sedimentation that occur naturally. Hence, these thresholds represent the upper bounds of conditions that sensitive marine receptors, like corals, have experienced in the past and can tolerate without resultant mortality. This approach is considered to be conservative because the actual levels of intensity, duration and frequency at which significant mortality would occur may lie well above the range of values observed during the baseline data collection period. These threshold interrogations of the model output were used to estimate a Zone of Potential Impact, a Zone of Influence and a Zone of Theoretical Detection. These are defined below.

### ***Zone of Potential Impact***

The Zone of Potential Impact encompasses areas predicted to be exposed to levels of sedimentation and turbidity, at least once during the dredging program, which can smother habitat (hard substratum) and cause mortality to the BPP attached to it. The Zone of Potential Impact is largely restricted to areas immediately adjacent to the dredge footprint and spoil grounds. The primary reason for this is that the heavier sediment that could potentially smother habitat will fall out of the water column relatively rapidly and close to the dredging activities. Further, NTU is likely to be highest closest to the dredge and at the spoil ground. It is important to note that the Zone of Potential Impact overlies only small areas of habitat supporting BPP. Further, although sediment

plume modelling has predicted impacts associated with the turbidity plume and elevated sedimentation rates within this Zone, impacts are not inevitable because the spatial extent of the Zone of Potential Impact is likely to be an over-prediction given the conservative nature of the model assumptions. This would be consistent with the monitoring findings during the Port A dredging campaign in which there was no detectable loss of BPP at the predicted potential impact monitoring sites.

*In situ* verification exercises of the GEMS model for the Cape Lambert Port A upgrade have demonstrated a high congruence between predicted and observed spatial extent and TSS levels in the dredge plume (GEMS 2006) over the time periods of the test exercises. It should be noted however, that the lack of good quality data (bathymetry, currents) for shallow waters bordering the coastline in the oceanographic model together with the coarse scale of the grid used in the oceanographic model means that predictions for the spatial extent and intensities of the plume in the shallow waters bordering the coastline are less reliable. This higher risk of predictive model error in the shallow waters bordering the coastline, requires that both minimum (best case) and maximum (worst case) estimates of the areas defined within the plume model as zones of potential impact and influence be considered. Therefore, estimates of potential risk of mortality include best-case and worst-case estimates.

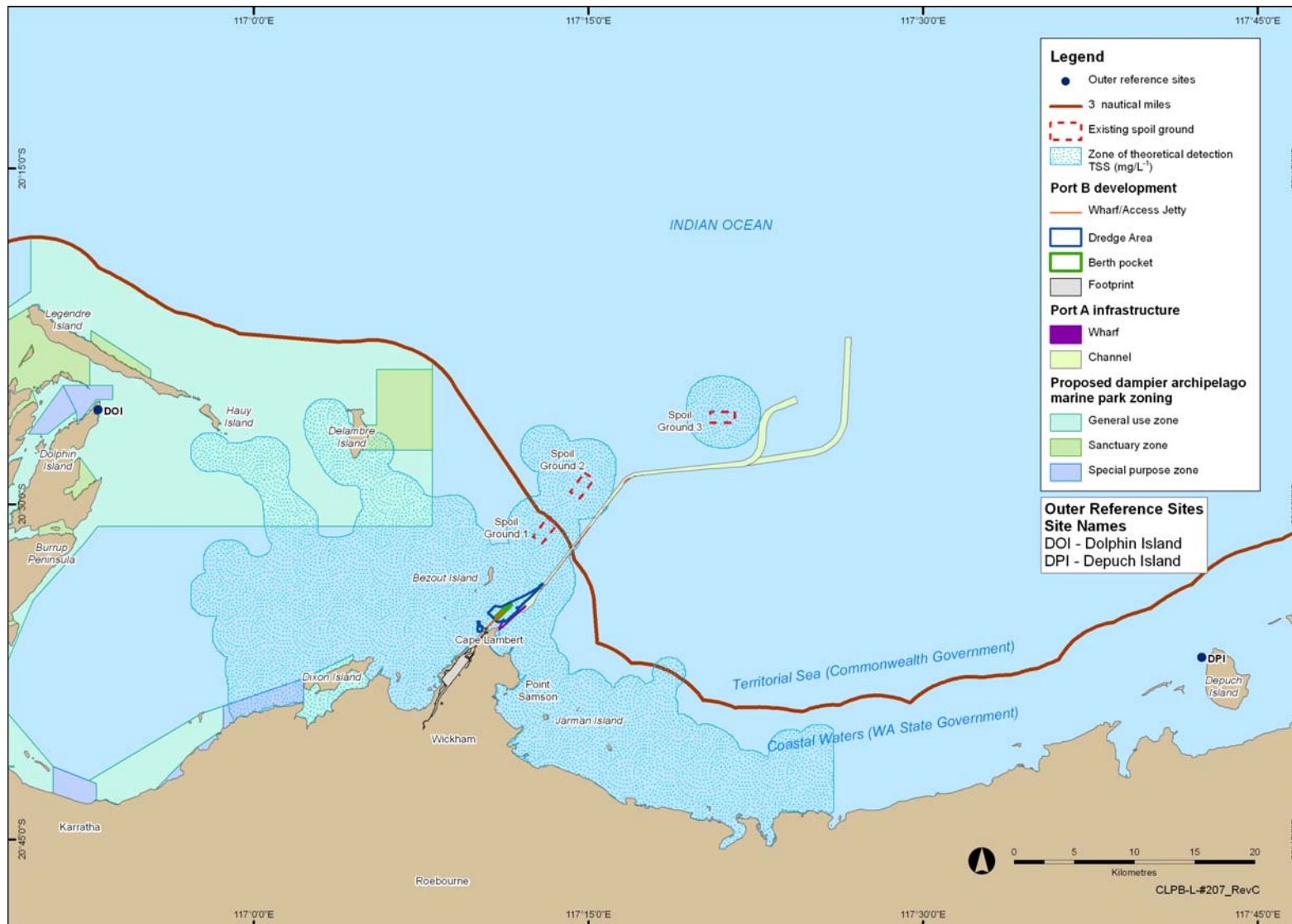
### ***Zone of Influence***

The Zone of Influence is an area where it is anticipated that local turbidity may be influenced by the dredge plume sufficiently to be elevated above the average background conditions for a considerable duration, but not impact corals or other BPP. Observations during the Port A dredging program showed that average conditions can be up to fifteen times lower than the natural fluctuations in the turbidity within inshore environments at Cape Lambert, and the duration of these instances of high natural turbidity can be lengthy. Therefore, none of the BPP present under the Zone of Influence is anticipated to be impacted significantly enough to lead to mortality nor will habitat be smothered by sedimentation associated with the dredge.

### ***Zone of Theoretical Detection***

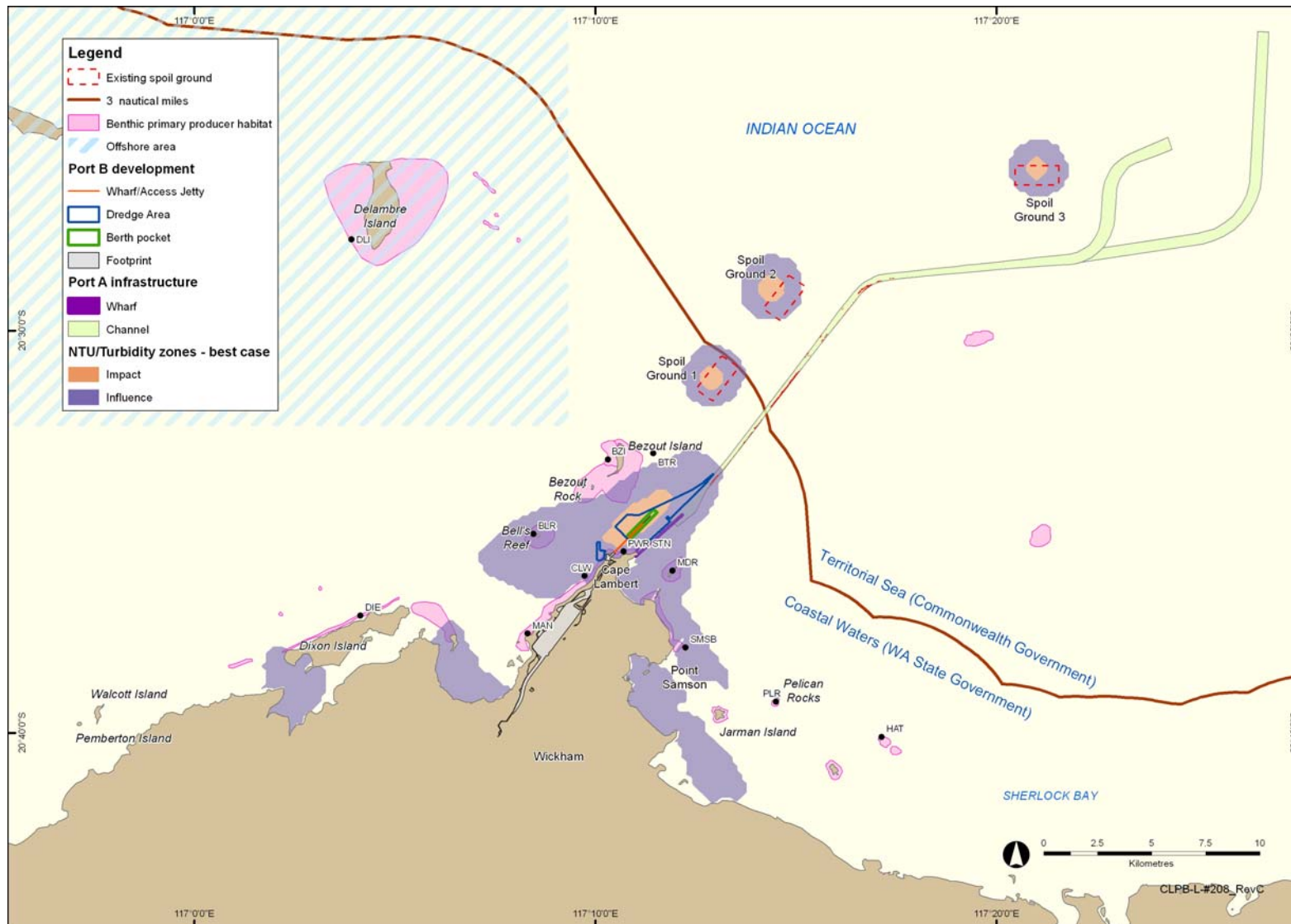
The Zone of Theoretical Detection has been determined at the request of the DEC and is defined as background TSS + (1 mg l<sup>-1</sup> or more). Limitations associated with using this threshold are discussed extensively in the PER (Rio Tinto 2009).

The Zone of Theoretical Detection, Zone of Influence and Zone of Potential Impact for both sedimentation and turbidity events in 'best' and 'worst' case scenarios are shown in **Figure 3-6** through to **Figure 3-10**.



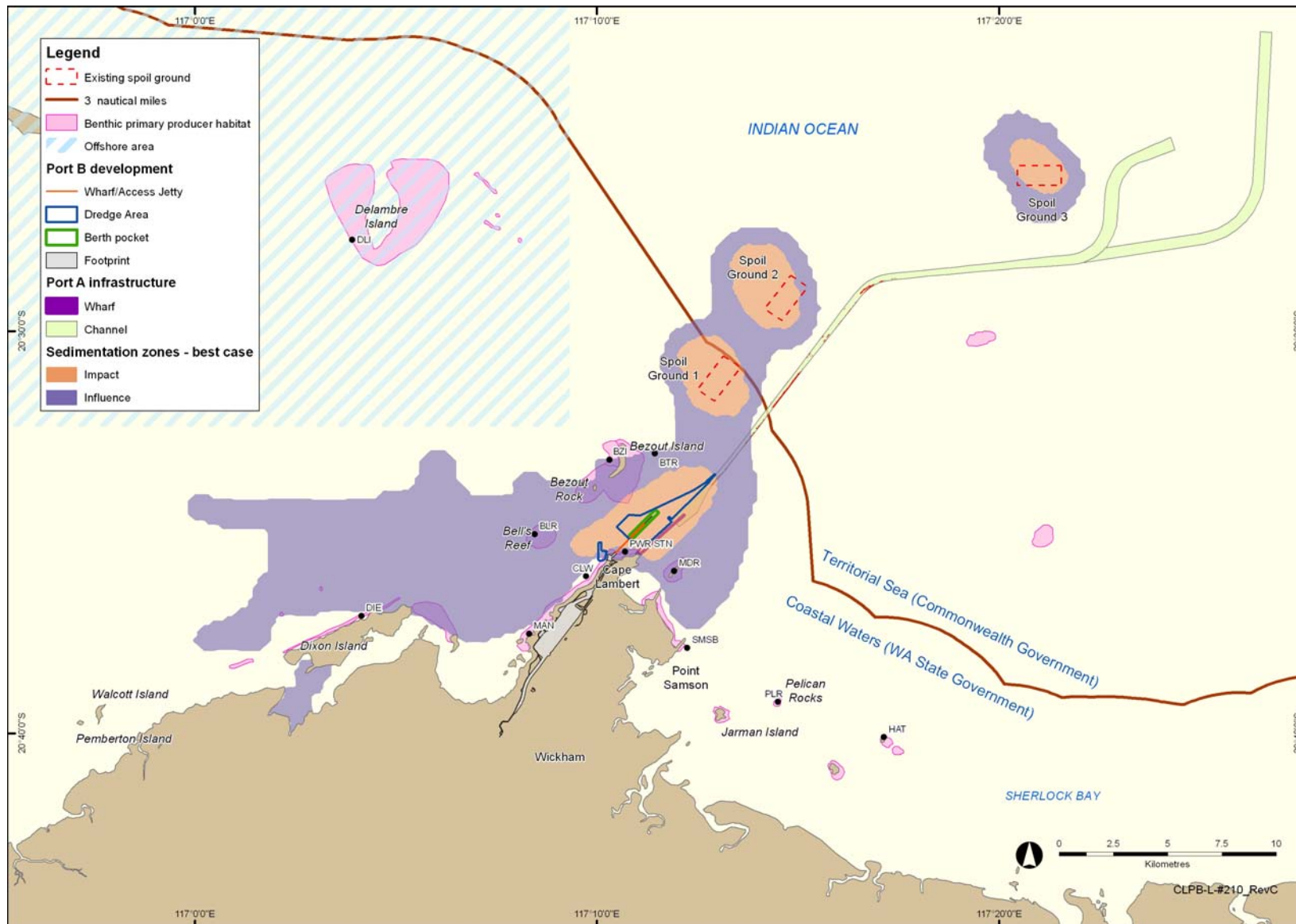
■ **Figure 3-6 Zone of theoretical detection ( $1 \text{ mg l}^{-1}$  above background)**

SINCLAIR KNIGHT MERZ



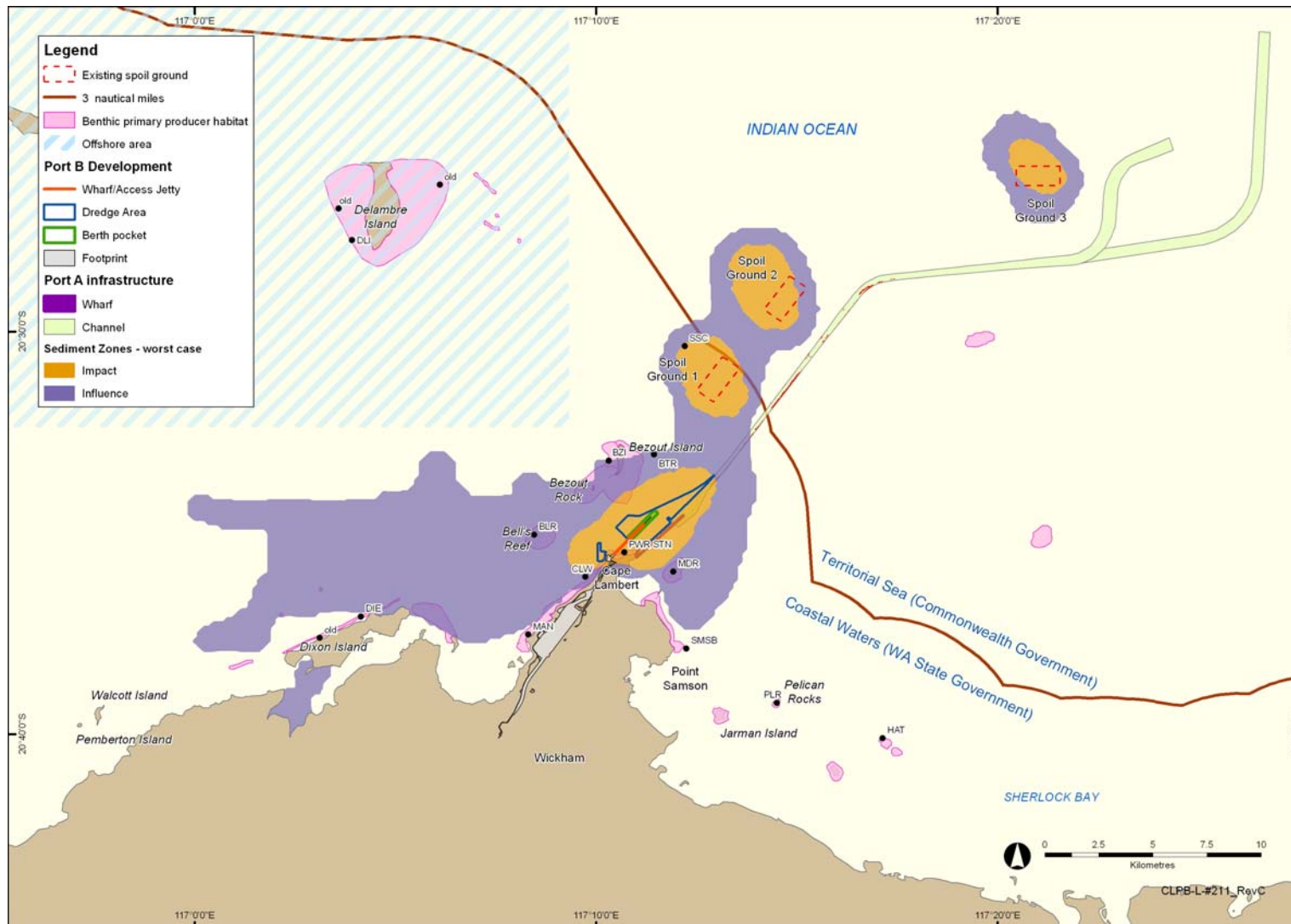
■ Figure 3-7 Potential zones of impact, and influence from turbidity (best case scenario)

**SKM**



■ Figure 3-9 Potential zones of impact, and influence from sedimentation (best case scenario)

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■ **Figure 3-10 Potential zones of impact, and influence from sedimentation (worst case scenario)**

SINCLAIR KNIGHT MERZ

### 3.8. Establishment of Management Targets

Sediment plume modelling and an assessment of impacts to BPPH and BPP communities within the Cape Lambert area has been used to establish management targets for the dredging and spoil disposal activities. The assessment has indicated that BPPH and BPP are present in areas that may be influenced or impacted by dredging and spoil disposal activities. To assist in the management of the dredging and spoil disposal activities, the region has been divided into five management units based on EPA Guidance Statement 29 (**Figure 3-2**). These management units formed the basis for estimates of the historical and predicted cumulative losses that sediment plume modelling has indicated may occur at the project area. Details of this assessment can be found in **Appendix A11** of the PER (Rio Tinto 2009).

Proposed management targets that encompass the percentage estimates of impact are shown in **Table 3-4**. The types of BPPH present within the management units are sub-tidal and intertidal hard substrate supporting a variety of BPP, including corals, macroalgae and turf algae with occasional very limited occurrences of patchy seagrasses. These BPP form a mosaic on the intertidal and sub-tidal hard substratum, with turf algae being the most dominant in terms of seafloor coverage. The habitat is best described as hard substrate BPPH, with a complex association of a variety of BPP, each of which is present in proportions that reflect subtle differences in microhabitats and also the recent history of disturbance. This habitat type is detailed in **Section 6** of the PER (Rio Tinto 2009).

#### 3.8.1. Predicted BPPH Losses due to the Cape Lambert Port B Development within each Management Unit

EPA Guidance Statement No. 29 uses Management Units for the spatial definition of areas that are important at ecosystem level, to set the boundaries of the acceptable losses of BPPH. The proposed Management Units for the Port B development are described in the PER (**Section 9.2.2**) and are based largely on ecological attributes, with the seaward boundaries of the management units based on bathymetry. The Management Units have been defined to encompass all the areas of BPPH reported from the region, predicted to experience potential impacts (both direct and indirect) based on numerical modelling simulations.

Areas where impacts to BPPH are predicted to be impacted (within the Zone of Impact) are located within Management Unit 2, 3 and 5 (SKM 2009a). The predicted most-likely case (the average of the best and worst case predictions) indicates a 1.98%, 8.12% and 0.04% loss of BPPH within the Zone of Impact, within Management Units 2, 3 and 5, respectively (**Table 3-4**). Locations where BPPH are predicted to be lost include the south-east tip of Bezout Rock reef platform and the reefs fringing the tip of Cape Lambert. These areas are the closest areas of BPPH to the dredge footprint. As reported previously, loss of BPPH in these areas is not inevitable as the models included highly conservative assumptions and are likely to have over-estimated the spatial extent of the Zone of Potential Impact. It is important to note that the BPPH includes both the organisms and the substrates that they grow on. It is therefore likely that if any loss of BPPH occurs it would be as a

result of a loss of the corals and not the substrate they grow on. It would also be expected that any loss of corals would not be permanent in a situation where the habitat remains.

Areas within Management Unit 4 may be influenced by the dredge plume (as predicted by the plume model) but no habitat loss is predicted. The upper limit of cumulative loss permitted within each of these units, based on Environmental Assessment Guideline 3 (EPA 2009), is 10% of the total of each of the BPPH types present. Modelling of the estimated extent of the dredge plume indicates that the Cape Lambert dredge operations will not impact or influence any area of the proposed DAMP. A monitoring program aimed specifically at assessing habitat loss (**Section 5.4**) will be undertaken to test the habitat loss predictions relating to Management Units 2, 3 and 5. This program differs from the re-active monitoring program (**Section 5.3**) in that it will be used to assess loss of habitat (e.g. the hard substratum that BPP are attached to), not to measured increases in coral mortality. The re-active monitoring program will include the fortnightly assessment of coral health at sites within the Zone of Influence (Indicator and Influence sites), where no coral mortality is expected to occur.

The loss of mangroves within management unit 5 will be restricted to direct removal within the footprint. The most likely case for the area of mangroves removed within this management unit will be 0.47% (**Table 3-5**). This area is insignificant compared to the remaining amount of mangroves in the management unit.



■ **Table 3-5 Predicted Cumulative Benthic Primary Producer Habitat losses and management targets**

| Mgmt Zone | Type of benthic habitat occurring in mgmt zone | Size of mgmt zone (ha) | Current area of BPPH (ha) | Current historical loss (ha (%)) | Predicted permanent direct loss (ha (%)) | Predicted/indirect (non-permanent) impact (ha (%)) |              |              |              | Cumulative loss (most likely-case) | EPA Category and loss threshold (EPA 2004) |
|-----------|------------------------------------------------|------------------------|---------------------------|----------------------------------|------------------------------------------|----------------------------------------------------|--------------|--------------|--------------|------------------------------------|--------------------------------------------|
|           |                                                |                        |                           |                                  |                                          | Best-case                                          |              | Worst-case   |              |                                    |                                            |
|           |                                                |                        |                           |                                  |                                          | Turbidity                                          | Sediment     | Turbidity    | Sediment     |                                    |                                            |
| 1 A       | Mosaic BPPH                                    | 11 185.1               | 56.4                      | Nil                              | Nil                                      | Nil                                                | Nil          | Nil          | Nil          | 0%                                 | A 0%                                       |
| 1 B       | Mosaic BPPH                                    | 64 606.9               | 1 473.9                   | Nil                              | Nil                                      | Nil                                                | Nil          | Nil          | Nil          | 0%                                 | A 0%                                       |
| 2         | Mosaic BPPH                                    | 17 115.2               | 632.12                    | 0.58 (0.1)                       | Nil                                      | 0.00 (0%)                                          | 0.00 (0%)    | 7.66 (1.21)  | 16.19 (2.56) | 1.98%                              | E 10%                                      |
| 3         | Mosaic BPPH                                    | 28 310.4               | 625.34                    | 5.2 (0.8)                        | 0.4 (0.06)                               | 0.00 (0%)                                          | 12.09 (1.93) | 25.45 (4.07) | 52.75 (8.44) | 8.12%                              | E 10%                                      |
| 4         | Mosaic BPPH                                    | 8 995.8                | 95.51                     | Nil                              | Nil                                      | Nil                                                | Nil          | Nil          | Nil          | 0%                                 | E 10%                                      |
| 5         | Mosaic BPPH                                    | 7 448.9                | 1 118.8                   | Nil                              | Nil                                      | 0.00 (0%)                                          | 0.00 (0%)    | 0.33 (0.03)  | 0.49 (0.04)  | 0.04%                              | E 10%                                      |
| 5         | Mangroves                                      | 7 448.9                | 1 118.8                   | 5 (0.45)                         | 0.3 (0.01)                               | Nil                                                | Nil          | Nil          | Nil          | 0.47%                              | E 10%                                      |

Refer to PER (Section 9.2.2) for management unit definitions. Mosaic BPPH: Hard substrate occupied by a mosaic of corals, turf and macroalgae. Predicted permanent direct loss: habitat loss permanently due to construction of infrastructure. Non-permanent loss: Indirect loss due to increased turbidity and sedimentation unlikely to be permanent. EPA Category and threshold is a cumulative loss threshold to be applied in each management zone as prescribed by the EPA in Environmental Assessment Guideline 3 (EPA 2009). Cape Lambert is considered a development area and falls within category E with a 10% threshold loss, while the proposed Dampier Archipelago–Cape Preston Marine Conservation Reserves surrounding Delambre Island and Dixon Island fall into Category A where 0% loss is acceptable. Most likely case: the average of the best and worst case scenarios values.



### 3.9. Establishment of Management Trigger Levels and Early Warning Criteria

This section describes the coral health trigger levels and water quality early warning criteria that will be used during the reactive monitoring programs.

#### 3.9.1. Coral Health Trigger Levels

The coral health trigger levels for management responses are site-specific and have been established based on the site's distance from the dredge or spoil disposal footprint together with an assessment of the predicted impacts to corals at these sites. Definitions are provided below:

- **Potential Impact sites** are those sites predicted to be at greatest risk of coral mortality due to their proximity to the dredge footprint (hence the name impact sites). Since sediment plume modelling has predicted that up to 100% of BPP communities will be lost from these sites, coral health data from these sites will not be assessed against management triggers during compliance monitoring.
- **Indicator sites** lie within the Zone of Influence near the boundary of the Zone of Impact and share BPPH types that are common with areas that are predicted to be impacted by the dredging and spoil disposal activities. As stipulated in Condition 8-4 of Ministerial Statement 840, the allowable limit of net detectable coral mortality has been set at 5% for these sites. To ensure this level is not exceeded and that impacts do not extend further (spatially), there are three levels of management associated with these sites (**Section 4.2**). The Level 3 management trigger for these sites is 5% net detectable coral mortality, as per Condition 8-4. Level 1 and 2 management triggers have been set at 20% net detectable bleaching and any net detectable coral mortality, respectively, as precautionary levels of coral health that would prompt a management response before the allowable limits of coral mortality for Indicator sites described within Condition 8-4 are reached.
- **Influence sites** are expected to experience anomalous turbidity levels (above background) at some stage during the dredging program, however, modelling predictions indicate that Influence sites are to experience no BPP or BPPH loss as a result of dredging and spoil disposal activities. Therefore, the Level 3 coral health trigger for these sites has been set at zero percent net detectable mortality, as indicated in Condition 8-4 of Ministerial Statement 840. It should be noted that although the trigger levels have been set at 0% the anticipated error in the sampling technique (based on past experience at Cape Lambert) will be at least 3–5%. The actual level of detection can only be demonstrated once the monitoring program is underway. Level 1 and 2 management triggers have been set at 10% net detectable coral bleaching and 20% net detectable coral bleaching, respectively, as precautionary levels of coral health that would prompt a management response before the allowable limits of coral mortality for Influence sites described within Condition 8-4 are reached.
- **Reference sites** will be used to assess natural changes in coral health during the dredging program. Sediment plume modelling has indicated that these sites will not be impacted or influenced by above background sedimentation rates or increased turbidity associated with the

dredging program. However, sediment plume modelling has predicted that these reference sites do lie within the zone of theoretical detection (that is, at one or more times during the dredging program they will experience an increase in TSS of  $1 \text{ mg l}^{-1}$ ). These low level TSS elevations are typically no more than one or two hours in duration and therefore the modelling has not predicted any longer term alterations of the background water quality at these sites. As all monitoring sites typically show fluctuations in TSS (as NTU) much greater than  $1 \text{ mg l}^{-1}$  for similarly short durations, it is highly unlikely these small and short term fluctuations in TSS will have any impact on corals and other BPP.

- **Contingency reference sites** lie outside of the zone of theoretical detection. These sites are well removed from the dredging location and as such are considered to be too remote for fortnightly monitoring to be feasible. They will be used in the unlikely event that the reported water quality data for one or more of the preferred reference sites shows anomalies that suggest they may be influenced by the dredging program. These sites will also be used to assess if any observed bleaching in the project area is due to local stressors or as a result of a much more widespread disturbance events associated with region-wide elevations in water temperatures.

### 3.9.2. Water Quality Early Warning Criteria

While there are no specific Ministerial Conditions for the management of water quality per se, criteria have been developed to provide an early warning of deteriorating water quality (beyond that predicted by sediment plume modelling), that may indicate the potential for unexpected impacts to corals and other BPP during the Port B dredging program. A breach of these criteria would prompt a close examination of recent dredging and spoil disposal activities, plume dispersion and coral health.

In the absence of experimental studies from Pilbara waters that conclusively establish a link between water quality and coral health, a conservative approach to setting water quality criteria has been taken. The method used to calculate water quality early warning criteria is based on the approach used to estimate threshold values for the modelling of the impact zone for the Port B development dredging program. The method applies new techniques to the principles of the approach described by McArthur et al (2002) which suggests using existing baseline water quality data to set acceptable boundaries for water quality and to manage water quality during the monitoring program to stay within these boundaries. McArthur et al (2002) used the 95<sup>th</sup> and 99<sup>th</sup> percentiles to set the acceptable boundaries of turbidity events in terms of intensity (i), duration (d) and frequency (f) and advocated that water quality should be managed to remain within these limits. The underlying philosophy of McArthur et al (2002) has been retained in relation to the use of the baseline data to calculate early warning criteria. The basis of the approach is extensively described in **Appendix A11** of the PER.

Early warning water quality criteria have been developed for each site as detailed baseline studies for both the Port A and B developments (SKM 2009b) demonstrated significant spatial variability in water quality parameters among the monitoring sites. This rendered a generic criterion, even at

the scale of nearshore versus offshore, unworkable. It also recognises that each site where BPPH is present has its own characteristics and an exceedence of criteria at one site may be more significant in a local context than the same level of exceedence at another site.

The site-specific relationships are based on over 12 months of water quality baseline data, where turbidity (NTU) measurements were recorded every 30 minutes at each monitoring location (SKM 2009b). This data was used to calculate the rolling median NTU over a number of durations. However, for practical purposes, it was beneficial to choose a single duration period, from which criteria can be established. Consistent with that used during the Port A development, a 6 hour duration period will be used (Reactive Management Action 1). This is based, in part, on the semi diurnal tidal regime and also on ecological considerations because 6 hour represents half of the number of hours in a day (12 hours) which corals are exposed to light.

The early warning water quality criteria for each site were determined as follows:

- Medians for every 6 hour period of time rolling over the entire baseline period were calculated. With NTU being measured every 30 minutes this equates to a median of 13 values (i.e. median NTU recorded for 12:00 to 18:00; 12:30 to 18:30; 13:00 to 19:00 etc)
- A data set of rolling medians (each made up of 13 raw NTU values) is then established
- The 99<sup>th</sup> percentile is then calculated on the rolling median dataset
- This 99<sup>th</sup> percentile is rounded to the nearest whole number, which then represents the site specific water quality criteria.

The allowable number of exceedences before a ‘true exceedence’ is recorded was then calculated using:

- A count of every time the criteria was equalled or exceeded during the baseline period was recorded (frequency of natural exceedences)
- The frequency was then divided by the number of baseline days from which data was recorded for that specific site. This provided a daily number of allowable exceedences
- To correspond with the monitoring interval the daily number of allowable exceedences was multiplied by 14 to represent the number of allowable exceedences for a two week period.

The water quality criteria for each site are provided in **Table 3-5**.

Median values were selected, rather than mean values, because the former is less influenced by extreme data values and thus adds an extra level of conservatism to the water quality criteria. A percentile is the value of a variable below which a certain percent of observation. The 99<sup>th</sup> percentile represents the upper end of the range of data and was used because corals were exposed to these values during the baseline without any signs of stress or mortality (SKM 2009b).

The approach taken here to develop the criteria is inherently conservative because they are based on data observed to occur within the locality and caused no impact to corals or BPP (SKM 2009b, d, e). That is, corals were exposed to these NTU levels during the baseline period without suffering mortality or stress. In addition, they assume that the upper end of the range of intensity, duration

and frequency of elevations in turbidity (measured as NTU) recorded during the baseline period may represent the upper bounds of what corals can tolerate without resulting in stress (SKM 2009b, d, e).

■ **Table 3-6 Indicative water quality criteria**

| Site names        | Site | Duration class | Days of baseline data | SKM 2009 - 99%ile     |                           |                                   |
|-------------------|------|----------------|-----------------------|-----------------------|---------------------------|-----------------------------------|
|                   |      |                |                       | Criteria (median NTU) | Frequency during baseline | Allowable exceedences per 2 weeks |
| Bells Reef        | BLR  | 6 hours        | 411                   | 18                    | 191                       | 7                                 |
| Boat Rock         | BTR  | 6 hours        | 428                   | 10                    | 206                       | 7                                 |
| Bezout Island     | BZI  | 6 hours        | 525                   | 11                    | 269                       | 7                                 |
| Bezout Rock       | BZR  | 6 hours        | 366                   | 15                    | 190                       | 7                                 |
| Cape Lambert West | CLW  | 6 hours        | 346                   | 17                    | 168                       | 7                                 |
| Dixon Island East | DIE  | 6 hours        | 381                   | 25                    | 186                       | 7                                 |
| Delambre Island   | DLI  | 6 hours        | 408                   | 7                     | 191                       | 7                                 |
| Hat Rock          | HAT  | 6 hours        | 368                   | 25                    | 177                       | 7                                 |
| Mangrove Point    | MAN  | 6 hours        | 355                   | 23                    | 174                       | 7                                 |
| Middle Reef       | MDR  | 6 hours        | 403                   | 21                    | 193                       | 7                                 |
| Pelican Rocks     | PLR  | 6 hours        | 366                   | 23                    | 180                       | 7                                 |
| Power Station     | PWR  | 6 hours        | 353                   | 34                    | 167                       | 7                                 |
| Samson Beach      | SMSB | 6 hours        | 446                   | 15                    | 189                       | 6                                 |

## 4. Management Strategies

### 4.1. Environmental Risk Assessment

The Proponent adopted a qualitative risk-based approach to systematically determine the relevant environmental factors relevant to the Port B development. An internal ERA undertaken by the Proponent identified known and potential environmental risks that may arise during the construction and operation of the Port B development and then identified measures to eliminate, reduce or mitigate any identified risks to ALARP (refer to **Section 1.10**). The approach examines the ecological significance of the risk and potential impact by assessing its spatial and temporal scale, magnitude or intensity and its relevance to the natural impacts on the habitat. Management strategies have been developed for key environmental risks and are described below in **Sections 4.2 to 4.10**.

### 4.2. Strategy 1 – Water Quality, Sedimentation and Benthic Primary Producer Habitat Management

**Management Area:** Water Quality, Sedimentation and Benthic Primary Producer Habitat Management

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Objective:</b>                  | <ul style="list-style-type: none"> <li>■ To manage impacts to water quality and sedimentation to ensure that any subsequent impacts to coral communities, as a sensitive indicator of BPPH, are restricted to within the limits of acceptable loss as defined in the Ministerial Statement 840.</li> <li>■ To provide an understanding of the impacts of dredging and spoil disposal to other BPP types.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Background:</b>                 | <ul style="list-style-type: none"> <li>■ Sediment plume modelling (<b>Section 3.7</b>) has been undertaken to determine zones of theoretical detection, potential influence and potential impact (<b>Figure 3-6 to Figure 3-10</b>).</li> <li>■ Management targets (limits of allowable net detectable coral mortality) for sites within these zones are as follows: <ul style="list-style-type: none"> <li>Impact site - 100%</li> <li>Indicator sites - 5%</li> <li>Influence sites - 0%</li> <li>Reference sites – N/A</li> </ul> </li> </ul> <p><u>Definitions</u></p> <p>Impact sites- sites that lie entirely within Zone of Impact</p> <p>Indicator sites – sites that lie within the Zone of Influence but on the boundary of the Zone of Impact, and share BPPH in common with areas in the Zone of Impact</p> <p>Influence sites- sites that lie entirely within the Zone of Influence, and do not share BPPH common to the Zone of Impact</p> <p>Reference sites – sites that lie outside both the Zone of Impact and the Zone of Influence</p> <ul style="list-style-type: none"> <li>■ Coral Health Trigger Levels were determined based on the method described in <b>Section 3.9.1</b></li> <li>■ Water quality and sedimentation data will be collected to interpret changes in coral health at all sites. In addition, water quality data will provide an early warning of potential impacts to coral health within the Zone of Influence.</li> </ul> |
| <b>Key Performance Indicators:</b> | <ul style="list-style-type: none"> <li>■ The number of coral health triggers exceeded</li> <li>■ The numbers of sites where coral cover declines as a result of dredging and spoil disposal activities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## Management:

### Proactive Management

The following management measures will be implemented throughout the dredging and spoil disposal program:

- A turbidity reducing valve will be used within the overflow pipe of each TSHD.
- Overflow levels will be raised to the highest allowable point during spoil transport to ensure minimum spillage of sediment.
- Hopper door seals will be maintained in good condition to ensure minimum loss of sediment during transport.
- Sailing routes will be selected to minimise the generation of propeller wash.
- Hopper de-watering will be confined to the dredging and spoil disposal areas.
- Well maintained and properly calibrated dredging vessels will be used.
- Vessels will include features such as on-line visualisation of bathymetric charts, loading diagrams, production statistics and vessel movement.

### Reactive Management

#### **Coral Health Triggers**

Reactive management will be tiered and implemented based on three coral health trigger levels derived from either sub lethal indicators (i.e. coral bleaching) or net detectable coral mortality.

Ministerial Statement 840, Condition 8-4 prescribes the Level 3 trigger, as 5% and 0% net detectable mortality, for indicator and influence sites, respectively. A Level 3 exceedence will result in the cessation of dredging and spoil disposal activities, where directly attributable to the proposal implementation. Level 1 and Level 2 triggers have been developed as early warning indicators, in order to minimise the probability of non compliance, through staged management implementation.

Coral bleaching and coral mortality will be determined via a coral health monitoring program (**Section 5.3**).

The coral health trigger levels are as follows:

| Sites           | Trigger Level<br>(% average net* change within a site directly attributable to dredging and spoil disposal activities) |                               |                               |
|-----------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|
|                 | Level 1                                                                                                                | Level 2                       | Level 3                       |
| Impact Sites    | No Trigger                                                                                                             | No Trigger                    | No Trigger                    |
| Indicator Sites | >20% coral bleaching                                                                                                   | Any net* detectable mortality | >5% net* detectable mortality |
| Influence Sites | >10% coral bleaching                                                                                                   | >20% coral bleaching          | Any net* detectable mortality |
| Reference Sites | N/A                                                                                                                    | N/A                           | N/A                           |

\*The actual level of detection of the sampling method will need to be incorporated into this.

In the event that any trigger levels are exceeded the following actions will be implemented (**Figure 4-1**):

- 1) Check reliability of the data (QA/QC procedures)
- 2) Determine if the exceedence is directly attributable to the dredging and spoil disposal activities
- 3) The analysis and reporting of coral health will be provided within 3 business days to the Proponent.

Where the identified exceedence is attributed to the proposal implementation, the following actions specific to each trigger level will be implemented:

#### **Level 1**

- Inform the DEAG that a marked increase in coral bleaching has been identified
- Undertake further investigations into the cause of the exceedence
- Identify potential management measures to be enacted in case of further coral bleaching and / or coral mortality.

#### **Level 2**

- Notify the DEAG
- Determine suitable management measures in conjunction with the DEAG
- Provide details of proposed management response to the DEAG
- Implement management response within 4 days of the decline in coral health being identified.
- Liaise with DEAG to decide on suitable management measures to ensure that the limits of coral loss are not exceeded when dredging recommences in locations that may contribute to further impacts on corals

#### **Level 3**

In the event that coral health monitoring indicates that the net detectable coral mortality at any indicator sites has exceeded 5% as a result of proposal implementation and the circumstances which led to the exceedence still persists or are likely to re-occur, the Proponent shall:

- Immediately cease dredging and disposal activities in locations that are contributing to the decline in coral health
- Implement management responses and provide a report to the CEO and DSEWPaC including evidence which allows the determination the cause of decline in coral health within 4 days of the decline in coral health being identified
- Dredging and spoil disposal activities are to remain suspended until it can be demonstrated to the requirements of the CEO and DSEWPaC that the recommencement of such activities will not contribute to further net mortality of corals at any indicator site where the limit of acceptable loss has been exceeded.

#### **Management Measures**

The management measures that will be applied should coral mortality trigger levels be exceeded as a result of dredging and/or spoil disposal will be determined during the investigation into the cause, extent and nature of the impact and the location of the impacted monitoring site. For example, if disposal activities are identified as causing an impact at a certain site, it is unlikely that reducing overflow during dredging will reduce the impact and as such this may not be an appropriate response.

Proposed measures that may be applied include:

- Reduction or cessation of overflow during times when the dredge plume is likely to further impact the affected corals
- Optimisation of disposal location based on met-ocean conditions and location of affected corals
- A reduction in dredging to 12 hours/day
- Temporary cessation in dredging activities
- Move dredging operation to another location in the development.

#### **Water Quality Early Warning Criteria**

Water quality early warning criteria were developed as per the method described in **Section 3.9.2**. These criteria will provide an early warning of deteriorating water quality within the Zone of Influence that may in turn impact BPP (including corals) and other receptors.

The proposed water quality criteria for Influence sites are based on the baseline water quality data set and therefore serve as an alert that water quality is approaching the boundary of the range of turbidity events observed naturally during the baseline period. There is no evidence currently available to

demonstrate that there will be detrimental impacts to coral health if that boundary is exceeded. As such, these levels are considered conservative.

Note – not applicable to Impact and Indicator sites, given that the water quality is predicted to deteriorate at these sites.

The initial water quality criteria (median NTU) for Influence sites are as follows:

| Monitoring Site   | Duration class | Trigger value (median NTU) | Allowable number of exceedences per 2 weeks |
|-------------------|----------------|----------------------------|---------------------------------------------|
| Bells Reef        | 6 hours        | 18                         | 7                                           |
| Dixon Island East | 6 hours        | 25                         | 7                                           |
| Mangrove Point    | 6 hours        | 23                         | 7                                           |
| Pelican Rocks     | 6 hours        | 23                         | 7                                           |
| Samson Beach      | 6 hours        | 15                         | 6                                           |

An exceedence of these criteria at Influence sites will trigger the following actions (**Figure 4-2**).

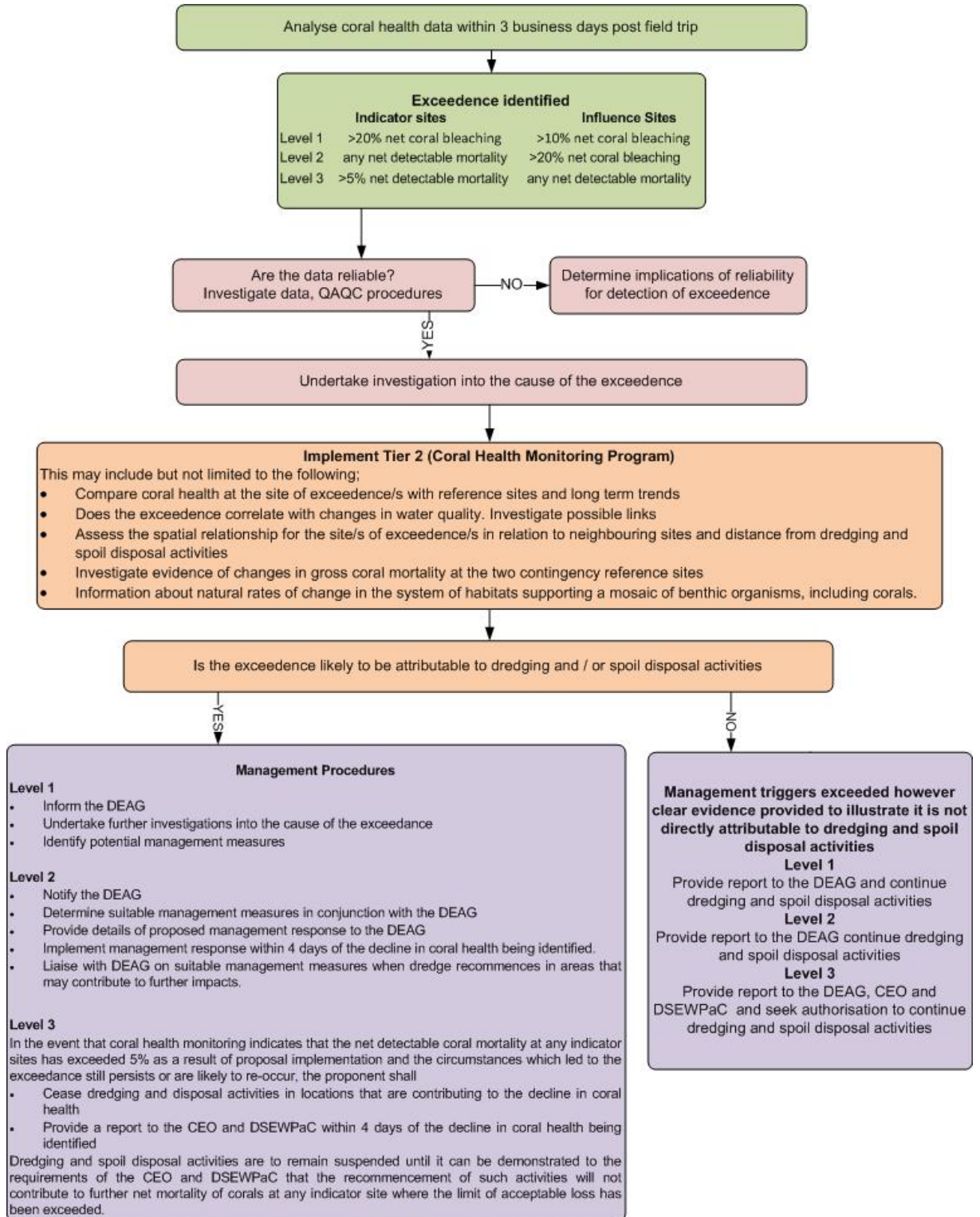
**Action 1:** Assess whether the exceedence is 'real' by checking reliability of the data (QA/QC procedures) and comparing data to reference sites.

**Action 2:** Investigate light data (PAR) to determine whether the amount of light received over the previous monitoring period is sufficient to sustain coral health.

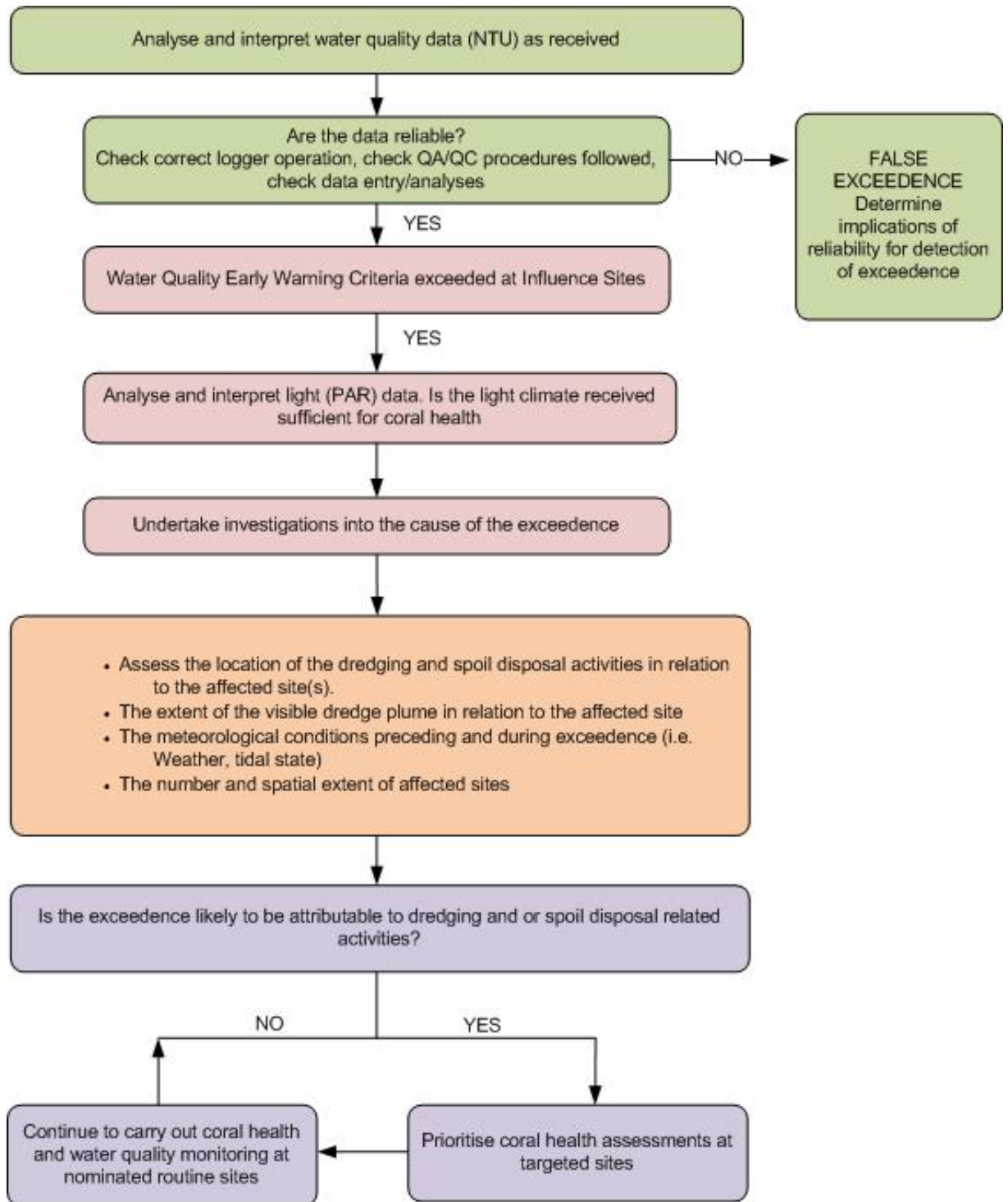
**Action 3:** Investigate the cause of the deterioration in water quality to assess if it is directly attributable to dredging and / or spoil disposal activities and whether the conditions that led to the exceedence still occur or are likely to reoccur.

**Action 4:** Prioritise the next round of coral health assessments and analyses to firstly target site(s) where water quality criteria has been exceeded in order to provide the most rapid assessment of any potential deterioration in coral health.

|                    |                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Monitoring:</b> | <ul style="list-style-type: none"> <li>Reactive Coral Health Monitoring Program (<b>Section 5.3</b>)</li> <li>Water Quality Monitoring Program (<b>Section 5.2</b>)</li> <li>PSD surveys (<b>Section 5.2.6</b>)</li> </ul>                                                                                                                |
| <b>Reporting:</b>  | <ul style="list-style-type: none"> <li>Water quality and coral health reports (<b>Section 6</b>).</li> <li>Report on exceedences and responses to the CEO and DSEWPaC will be provided within four days of the decline in coral health being identified in accordance with Condition 8-7.</li> </ul>                                      |
| <b>Reference:</b>  | <ul style="list-style-type: none"> <li>Existing Marine Environment – PER <b>Section 6</b></li> <li>Marine Impacts and Management – PER <b>Section 6</b>.</li> <li>Monitoring Programs – DSDMP <b>Section 5</b>.</li> <li>BPPH Assessment – PER <b>Appendix A8</b>.</li> <li>Sediment Plume Modelling – PER <b>Appendix A9</b>.</li> </ul> |



■ Figure 4-1 Coral Health Management Process



■ Figure 4-2 Water quality Management Process

#### 4.3. Strategy 2 – Coral Spawning Management

##### Management Area: Coral Spawning

**Objective:** To minimise the risk that dredging and spoil disposal operations adversely affect coral larvae survival and establishment during predicted mass coral spawning events (**Figure 4-3**).

**Background:** Elevated TSS generated as a result of dredging and spoil disposal activities has the potential to impact on the survival of coral larvae during mass coral spawning events. Investigations into the reproductive ecology of corals in the Pilbara region have been undertaken (Simpson 1985, Heyward et al. 2000; Stoddart and Gilmore 2005). The majority of coral species are broadcast spawners, meaning that they release gametes (eggs and sperm) into the water column. Broadcast spawners in the region have two main reproductive events which occur seven to ten nights after the full moon between March and April and a less pronounced spawning event between October and November.

A mass coral spawning event is defined for the purpose for this DSDMP as:

*An event where 50% of the most abundant coral species or genus groups tested within the study area show evidence of potential spawning in the next predicted spawning window.*

The predicted coral spawning windows during dredging activities are:

| Full Moon          | Predicted Spawning Window          |
|--------------------|------------------------------------|
| <b>Spring 2010</b> |                                    |
| 23 September 2010  | 29 September – 3 October 2010      |
| 23 October 2010    | 29 October 2010 – 2 November 2010  |
| 22 November 2010   | 28 November 2010 – 2 December 2010 |
| <b>Autumn 2011</b> |                                    |
| 18 February 2011   | 24 February – 28 February 2011     |
| 20 March 2011      | 26 – 30 March 2011                 |
| 18 April 2011      | 24 – 28 April 2011                 |
| <b>Spring 2011</b> |                                    |
| 12 October 2011    | 18 – 22 October 2011               |
| 11 November 2011   | 17 – 21 November 2011              |
| 10 December 2011   | 16 – 20 December 2011              |

**Key Performance Indicators:** ■ Accurate prediction of mass spawning event(s) and appropriate management of dredging, spoil disposal and drilling and blasting activities during mass spawning events.

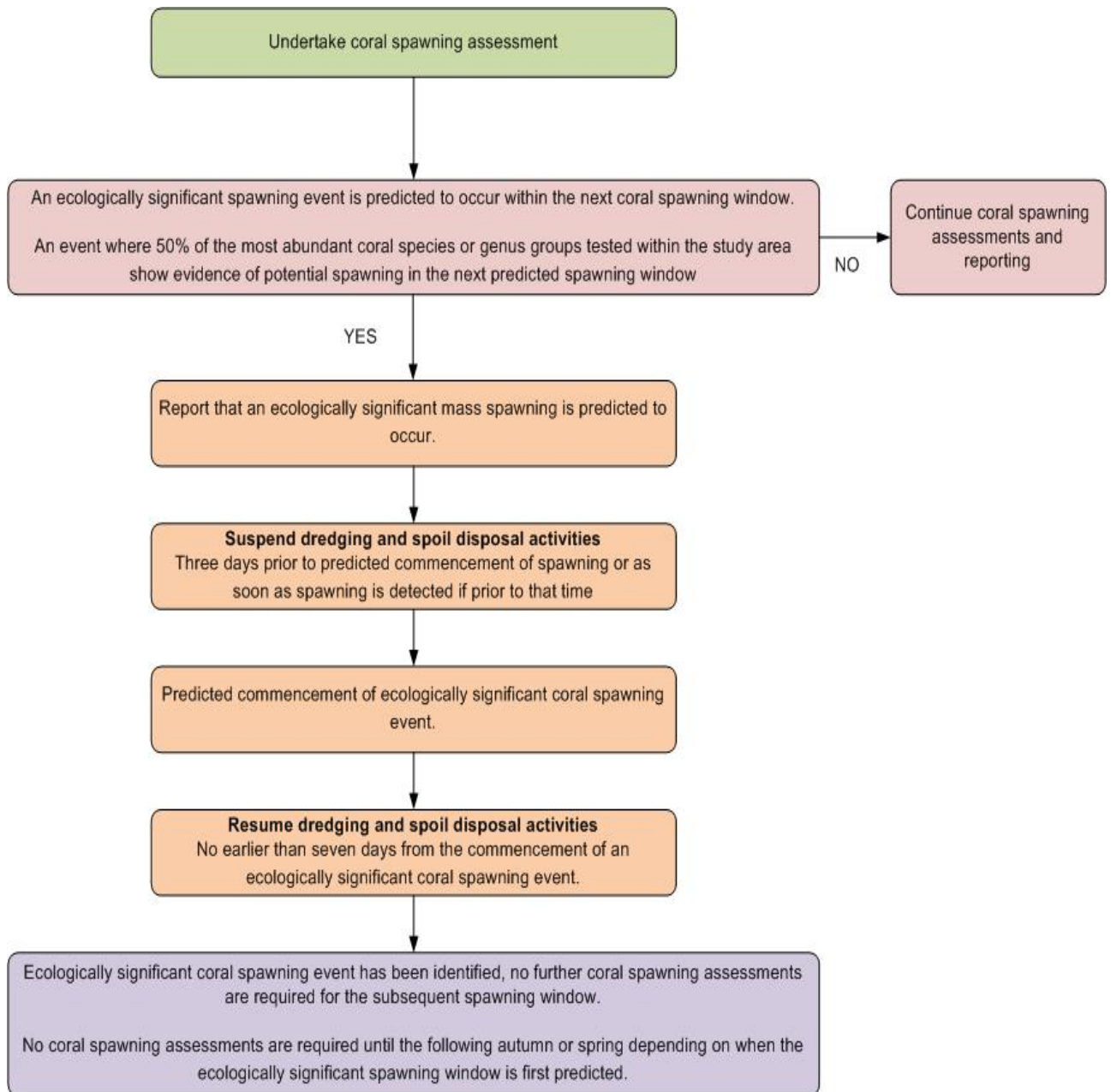
**Management:** ■ Where mass coral spawning is predicted to occur during the next coral spawning window, dredging and spoil disposal activities that may impact on coral larvae survival will cease during the period 3 days prior to the predicted commencement of mass coral spawning or as soon as mass coral spawning is detected if prior to that predicted time.

Dredging and spoil disposal activities are to remain suspended for seven days from the commencement of mass coral spawning.

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|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Monitoring:</b> | <ul style="list-style-type: none"><li>■ Coral spawning assessment to determine if a mass coral spawning event will occur (<b>Section 5.5</b>).</li><li>■ Where a mass coral spawning event is predicted to occur during the next spawning window, monitoring will occur.</li></ul>                                                                                                                                                                                                                                                                                                                                              |
| <b>Reporting:</b>  | <ul style="list-style-type: none"><li>■ Coral spawning assessment reports will be provided to the DEC and DSEWPac within 10 business days of each spawning assessment undertaken, which shall detail the probability of a mass coral spawning event or the likelihood that corals have already spawned.</li><li>■ Coral spawning monitoring reports will be provided to the DEC and DSEWPac within 10 business days of each monitoring survey undertaken</li><li>■ DSEWPac shall be notified (i.e. email / fax statement) if / when dredging and spoil disposal activities have been suspended due to coral spawning.</li></ul> |
| <b>Reference:</b>  | <ul style="list-style-type: none"><li>■ Existing Marine Environment – PER <b>Section 6</b></li><li>■ Marine Impacts and Management – PER <b>Section 6</b></li><li>■ Monitoring Programs – DSDMP <b>Section 5</b>.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                     |

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■ **Figure 4-3 Coral spawning management process**

#### 4.4. Strategy 3 – Marine Mammals and Turtles Management

|                         |                                              |
|-------------------------|----------------------------------------------|
| <b>Management Area:</b> | <b>Marine Mammals and Turtles Management</b> |
|-------------------------|----------------------------------------------|

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Objective:</b> | <p>To detect and mitigate any avoidable impacts to marine mammals and turtles resulting from the dredging and disposal activities.</p> <p>Note: Impacts from drilling and blasting activities are addressed in Strategy 5 – Drilling and Blasting Management. A low risk of impacts to marine mammals and turtles from increased TSS levels is expected and is managed via Strategy 1 – Water quality, sedimentation and BPPH management.</p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Background:</b> | <p><b>Table 4-1</b> presents the species of turtles that are known to occur in the Cape Lambert area.</p> <p><b>Table 4-2</b> presents the seasonal activities for marine fauna likely to be present at Cape Lambert.</p> <p>Turtles in the Cape Lambert area nest between October and March with the peak season occurring between December and January. Hatchlings generally emerge between January and April with most emerging during January and February.</p> <p>A number of species of marine mammals have been recorded in the Cape Lambert region including:</p> <ul style="list-style-type: none"> <li>■ Humpback whales – while generally found in waters deeper than 50 m, humpback whales are known to come close to shore at Cape Lambert during their migration</li> <li>■ Other whales – a number of other whale species have been recorded in the area but rarely frequent the proposed development area</li> <li>■ Dugongs – the Cape Lambert area is unlikely to support any large populations of dugongs due to a lack of seagrass meadows. As such it is unlikely that dugongs will be present within the project area</li> <li>■ Dolphins – Predominately bottlenose dolphins are frequently sighted in the development area.</li> </ul> |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                    |                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Key Performance Indicators:</b> | <ul style="list-style-type: none"> <li>■ No injury or mortality incidents attributable to dredging for turtles and marine mammals.</li> </ul> |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Management:</b> | <p><b><u>Proactive Management</u></b></p> <p>Due to their nature (intelligent and mobile) the risk of direct vessel strike with dolphins is considered low and as such not all management measures described here will apply to dolphins. Management measures to be applied as a result of dolphin sightings will be made on a case by case basis and will be based on the dolphin's location relevant to specific dredge equipment (such as close to the CSD ladder or TSHD dredging pipe). For instance, in the event that an individual dolphin continually approaches and/or remains in high risk areas, operations will be either stopped or modified to manage this risk to that individual.</p> <p><b>Vessel strike impact on marine fauna:</b></p> <ul style="list-style-type: none"> <li>■ Prior to commencement of dredging activities, all crew will receive training from a qualified person. This training will include details of procedures to be followed in the event of marine mammals and turtle sighting, injury or death</li> <li>■ All sightings of marine mammals (except dolphins) will be recorded</li> <li>■ All turtles and marine mammal (including dolphin) injury and</li> </ul> |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

mortality incidents will be recorded and reported (i.e. email / fax statement) to the DEC and DSEWPaC within 24 hours

- Marine mammal and turtle (except dolphin) observation and response procedures including the application of a 300 m exclusion zone will be implemented during dredging and spoil disposal activities (**Figure 4-4** and **Figure 4-5**)
- A lookout will be maintained for cetaceans while the dredge sails between the dredging area and spoil ground. In the event that a cetacean is sighted, vessels speeds and direction will be adjusted to avoid impacting on the observed individual (within the safety constraints of the vessel)
- Turtle exclusion devices will be used, where practicable, on the TSHD when dredging in areas with an under keel clearance in excess of 5 m (safety reasons preclude the use of these devices in shallower water). These devices will be of a similar type to that used commonly during dredging projects in WA waters
- When dredging operations allow the use of the water jetting system, the jets will be used to direct sea turtles away from the drag head thus avoiding direct contact. In this case, the jets will be switched on before the dredge pump is started and will remain on until after the dredge pump is stopped. This operation is not possible during the dredging of low density sediments due to the tendency for the jets to stir up the sediment and create additional turbidity
- The dredge pump will be stopped as soon as possible after the completion of dredging. Where practical within the requirements of the dredging operations, the drag head will not be lifted more than four meters above the seabed until the dredge pump is stopped.
- In conjunction with the management actions outlined within this section of the DSDMP, the Cape Lambert Port B Marine Turtle Management Plan will be implemented along with any subsequent plans prepared.

#### **Impacts from increased TSS levels:**

- Potential direct impacts to turtles and marine mammals from increased TSS and indirect impacts to habitat used by marine fauna from increased TSS and sedimentation will be managed via Strategy 1 – Water Quality, Sedimentation and BPPH management.

#### **Impacts from artificial lighting:**

- Light levels from the dredging works will be limited to those lights that are necessary for the safe operation of the vessels.
- Operational lights will not be directed towards the sea unless required for the safe operation of the vessel
- Operational lights will not be directed towards Cooling Water Beach during turtle nesting season.

#### **Reactive Management**

In the event turtle injury or mortality occurs, as a result of the Port B development. Pilbara Iron will undertake an investigation. The investigation will inform the implementation of three trigger levels to guide the management response. Provisional triggers include:

##### **Level 1 - An injured or dead turtle is found that is attributable to proposal-related activities**

Should it be determined that current management measures are not being followed, appropriate action will be taken to correct this deficiency. If management measures are being followed, an increased level of observation for further injured or dead turtles will be implemented over the following week.

**Level 2 - Three injured or dead turtles are found per seven-day period, or six per 28-day period, that are attributable to proposal-related activities**

A review of current management measures will be undertaken in consultation with the DEAG to identify alternative or additional practical management measures that could be undertaken. While the review is undertaken, interim management measures to prevent possible source, or sources, of harm will be implemented, where practicable, to reduce the risks of further turtle injury or mortality.

**Level 3 - Four injured or dead turtles are found per seven-day period, or nine per 28-day period, that are attributable to proposal-related activities**

Immediate action will be taken to implement alternative and/or additional management measures to the likely source, or sources, of harm, including temporary relocation or suspension of activities. A review of management measures will be undertaken in consultation with the DEAG to identify longer-term alternatives or additional management measures to reduce the risks of further turtle injury or mortality.

For Level 2 or Level 3 incidents, records of injury or casualty are made on a rolling-day or rolling-monthly basis i.e. a count on Day 8 will be totalled for the previous 7 day period; a count on Day 9 will be totalled for the previous 7 day period, etc. Following the implementation of management actions associated with an event, the effectiveness of the process and actions shall be periodically reviewed. The results will guide the adaptive management decisions and further actions as required.

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**Monitoring:**

- Marine mammal and turtle activity will be monitored throughout the dredging and spoil disposal activities as part of the marine mammal management procedures (**Figure 4-4** and **Figure 4-5**).
- Should marine mammals be sighted, all relevant vessels operating in the area as a component of the Cape Lambert Port B development will be notified

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**Reporting:**

- Marine mammal and turtle (except dolphins) sightings will be recorded
- Marine mammal and turtle (including dolphins) injury and mortality incidents to be reported (i.e. email / fax statement) to the DEC and DSEWPac within 24 hours of detection.
- This Strategy will be implemented in conjunction with the Cetacean Management Plan and the Marine Turtle Management Plan that have been prepared for the Port B development.

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**Reference:**

- Existing Marine Environment – PER **Section 6**
- Marine Impacts and Management – PER **Section 6**
- Monitoring Programs – DSDMP **Section 5**
- Cape Lambert Port B Marine Turtle Management Plan (Biota 2008) and its updates
- Cape Lambert Port B Cetacean Management Plan (SKM 2009f) and its updates.

■ **Table 4-1 Species of turtles known from the Cape Lambert area**

| Species                                          | Status (EPBC Act 1999)                    | Status (Wildlife Conservation (Specially Protected Fauna) Notice 2006) | Presence at Cape Lambert |          |           |
|--------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------|--------------------------|----------|-----------|
|                                                  |                                           |                                                                        | Nesting                  | Foraging | Migrating |
| Flatback<br>( <i>Natator depressus</i> )         | Marine Vulnerable                         | Rare <sup>2</sup>                                                      | ✓                        | ✓        | ✓         |
| Green<br>( <i>Chelonia mydas</i> )               | Marine Vulnerable                         | Rare                                                                   | ✓                        | ✓        | ✓         |
| Hawksbill<br>( <i>Eretmochelys imbricate</i> )   | Marine Vulnerable                         | Rare                                                                   | ✓                        | ✓        | ✓         |
| Loggerhead<br>( <i>Caretta caretta</i> )         | Marine Endangered                         | Rare                                                                   | ✓                        | ✓        | ✓         |
| Leatherback<br>( <i>Dermochelys coriacea</i> )   | Marine Critically Endangered <sup>1</sup> | Rare                                                                   | -                        | ✓        | ✓         |
| Olive ridley<br>( <i>Lepidochelys olivacea</i> ) | Marine Endangered                         | Rare                                                                   | -                        | ✓        | ✓         |

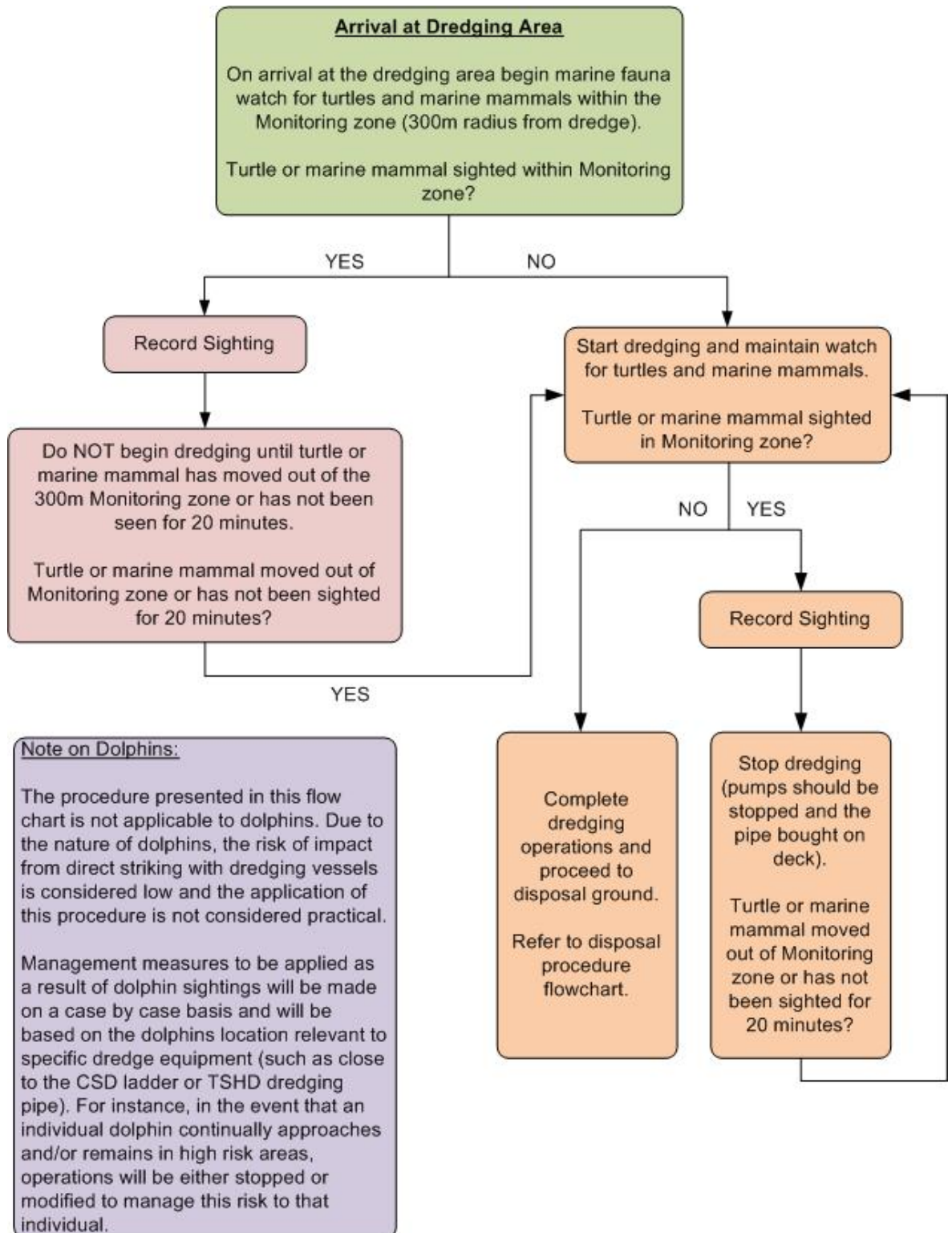
Source: Guinea 2008

<sup>1</sup> Leatherback turtles are subject to nomination from Vulnerable to Critically Endangered under the EPBC Act.

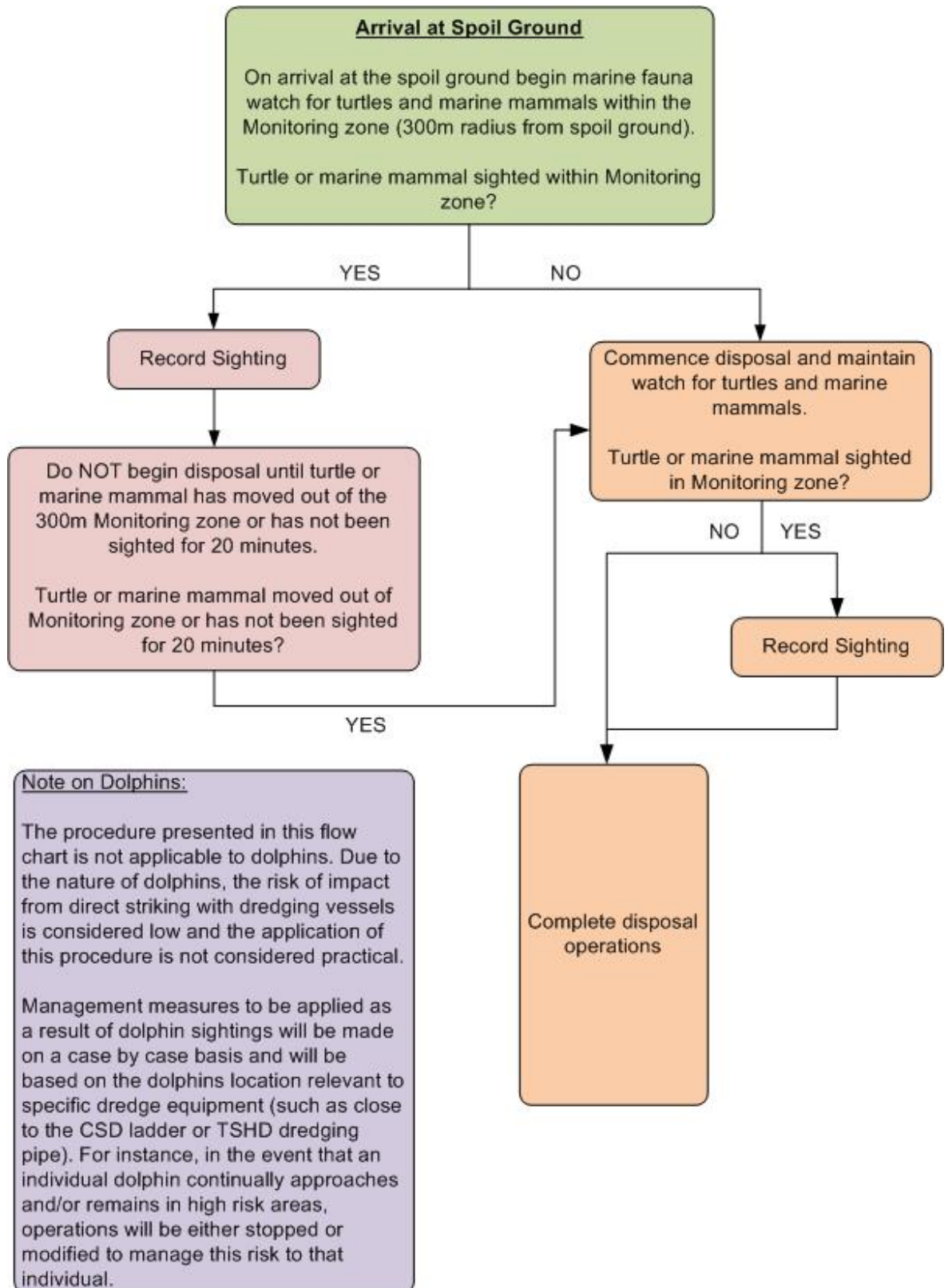
<sup>2</sup> Rare or Likely to Become Extinct in Wildlife Conservation (Specially Protected Fauna) Notice 2006(2).

■ **Table 4-2 Predictable occurrence periods for sensitive marine fauna in the Cape Lambert area**

| Receptor            | Month |                      |     |     |     |                      |     |     |     |                   |     |     |
|---------------------|-------|----------------------|-----|-----|-----|----------------------|-----|-----|-----|-------------------|-----|-----|
|                     | Jan   | Feb                  | Mar | Apr | May | Jun                  | Jul | Aug | Sep | Oct               | Nov | Dec |
| Turtle nesting      |       |                      |     |     |     |                      |     |     |     |                   |     |     |
| Emerging hatchlings |       |                      |     |     |     |                      |     |     |     |                   |     |     |
| Humpback whales     |       |                      |     |     |     |                      |     |     |     |                   |     |     |
| Coral spawning      |       |                      |     |     |     |                      |     |     |     |                   |     |     |
| Legend              |       | Predicted occurrence |     |     |     | Potential occurrence |     |     |     | Unlikely to occur |     |     |



■ **Figure 4-4 Marine mammal and turtle management procedure – dredging**



■ Figure 4-5 Marine mammal and turtle management procedure – spoil disposal

#### 4.5. Strategy 4 –Invasive Marine Species Management

| Management Area                    | Invasive Marine Species                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Objective:</b>                  | <p>To prevent the introduction of invasive marine species (IMS) to the marine environment at Port Walcott via vessels, including dredges and associated immersible equipment.</p> <p>This strategy applies to all non-trading vessels and associated immersible equipment that are either owned by the Proponent, or contracted for construction, maintenance, port operations or decommissioning of the Cape Lambert Port B proposal, including dredge and pile driving barges.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Background:</b>                 | <p>Introduced marine species are marine biota that are translocated into waters outside of their natural geographical distribution range and subsequently settle and survive. An introduced species is considered an invasive marine species (IMS) if it forms a common component of the habitats and communities into which it spreads, and or colonises a relatively wide geographical area.</p> <p>A survey commissioned by the Proponent and undertaken by URS in late 2006 <i>provided no direct or indirect evidence for the establishment of any of the targeted marine pests (invasive marine species) in or near Port Walcott</i> (URS 2007). The report on the survey also concluded that dredge vessels involved in future dredging projects provide one of the most likely vectors for the incursion of IMS into the area.</p> <p>Key vectors where IMS may be present on dredges and associated vessels include:</p> <ul style="list-style-type: none"> <li>■ vessel hull / external niches;</li> <li>■ internal niches (i.e. internal seawater systems);</li> <li>■ immersible equipment;</li> <li>■ ballast water; and</li> <li>■ sediment.</li> </ul> |
| <b>Key Performance Indicators:</b> | <ul style="list-style-type: none"> <li>■ Vessels and immersible equipment classified as low risk prior to the commencement of operations, unless excluded under Condition 9-1</li> <li>■ Vessels found to be free of IMS or sediments during vessel inspections prior to operations</li> <li>■ Zero establishment of IMS within waters adjacent to the development as a result of the dredging and spoil disposal activities.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Management:</b>                 | <p>A Vessel Clearance Procedure (VCP) will be developed and submitted to DoF for approval (<b>Figure 4-6</b>).</p> <p>This procedure will detail the following requirements:</p> <ul style="list-style-type: none"> <li>■ Compliance with Australian Quarantine inspection Service (AQIS) mandatory ballast water requirements (<b>Figure 4-7</b>).</li> <li>■ All vessels will be inspected or undergo a vessel risk assessment prior to operations, unless excluded under Condition 9-1.</li> <li>■ Low risk vessel, as determined by the vessel risk assessment process may apply to DoF for an exemption.</li> <li>■ All high / uncertain risk vessels, as determined by the vessel risk assessment process will undergo a vessel inspection prior to operations either:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               |

- a) Immediately (no more than 48 hours) prior to vessel or immersible equipment departure for Cape Lambert Port B; or
  - b) Within 48 hours following arrival of vessel within Port Walcott
- Vessels that have spent more than seven days in coastal waters (less than 50 m depth) between inspection and their arrival at Port Walcott shall also be inspected during the sixth week after arrival at Port Walcott.
  - Only vessels considered low risk (as a result of the risk assessment and/or completion of risk reduction measures – i.e. inspections / treatments) shall be allowed to begin operations

#### Exclusions – Condition 9-1

Tug vessels and other support vessels that move between the Proponents Dampier and Cape Lambert operations and between John's Creek Marina at Point Samson to these operations and remain in Western Australia's territorial waters are excluded from all requirements detailed in Condition 9-1 and 9-2.

#### Exemption – Condition 9-2

Specified vessels and immersible equipment and vessels used to undertake single or multiple bunkering or other routine operational activities at neighbouring ports (Dampier and Port Hedland), will be exempt from the IMS management and inspection requirements detailed within Condition 9-1. Issue of a written exemption by the CEO on advice from the Department of Fisheries will be based on the VCP, including a risk assessment supported by documentation, demonstrating biofouling management measures and a vessel activity profile since the most recent dry-dock cleaning.

#### Invasive Marine Species Responses

In the event that IMS or significant amounts of sediment (as deemed by the inspector) are found on a vessel during the inspection the following measures will be taken:

- The appropriate State, Commonwealth or Port regulatory agency will be informed and guidance sought as to the appropriate actions. This may include either vessel movement to a designated quarantine area (if in Australian waters) (i.e. water depth of at least 50 m and / or at least 12 nm offshore).
- The vessel will be required to undergo appropriate cleaning / treatment, re-inspection and subjected to assessment through the VCP.

Note In-water cleaning of vessels is generally not permitted in Australian waters in accordance with the Australian and New Zealand Environment Conservation Council (ANZECC) Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance (1997) (currently under review). In certain circumstances, some states or territories may, under permit, allow propeller polishing and cleaning of sea chests, sea suction grids and other hull apertures. Vessel operators wishing to undertake such cleaning are advised to contact the relevant state or territory authority for specific advice.

The monitoring program currently in place will be superseded, and a targeted IMS Monitoring program consistent with the design, implementation and reporting standards set out as part of the National Monitoring Network for the Prevention and Management of Marine Pest Incursions (National system) will be implemented to detect the establishment of any invasive marine species in the waters surrounding the development.

In the event that the monitoring program detects the presence of invasive marine species in the waters adjacent to the development, an invasive marine species strategy with the objective of controlling or eradicating the invasive marine species will be developed and implemented in consultation with the DoF and DEC.

#### Vessel Departure Clearance

- Departure VRA will be undertaken to determine if an inspection is required. This process will take into account current monitoring outcomes, the bioregion of the proposed operational area and if applicable, the IMS commitments of the contracting party prior to vessel's departure.

---

|                    |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| <b>Monitoring:</b> | Monitoring every three years will be undertaken in accordance with the National System. |
|--------------------|-----------------------------------------------------------------------------------------|

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|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reporting:</b> | <ul style="list-style-type: none"> <li>■ Refer to <b>Table 4-3</b>.</li> <li>■ In accordance with Condition 9-4 (Ministerial Statement 840) and Condition 14 (SDP 2008/822), the Proponent shall, throughout the life of the project notify (i.e. email / fax statement) the CEO, DoF and DSEWPaC of any known IMS detected in the waters within the marine leases held by the Proponent at or adjacent to Cape Lambert within 48 hours (to the CEO and DoF) and 24 hours (to DSEWPaC) following detection or following subsequent sample analysis undertaken as part of inspection or monitoring activities. The summary report to DSEWPaC will outline the incident and what measures were implemented.</li> <li>■ In accordance with Condition 9-5, in the event that any IMS are detected during either the inspection of non-trading vessels and immersible equipment, or during monitoring surveys, the Proponent shall, in consultation with the CEO and DoF develop and implement an agreed IMS Management Strategy 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 within Western Australia.</li> </ul> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

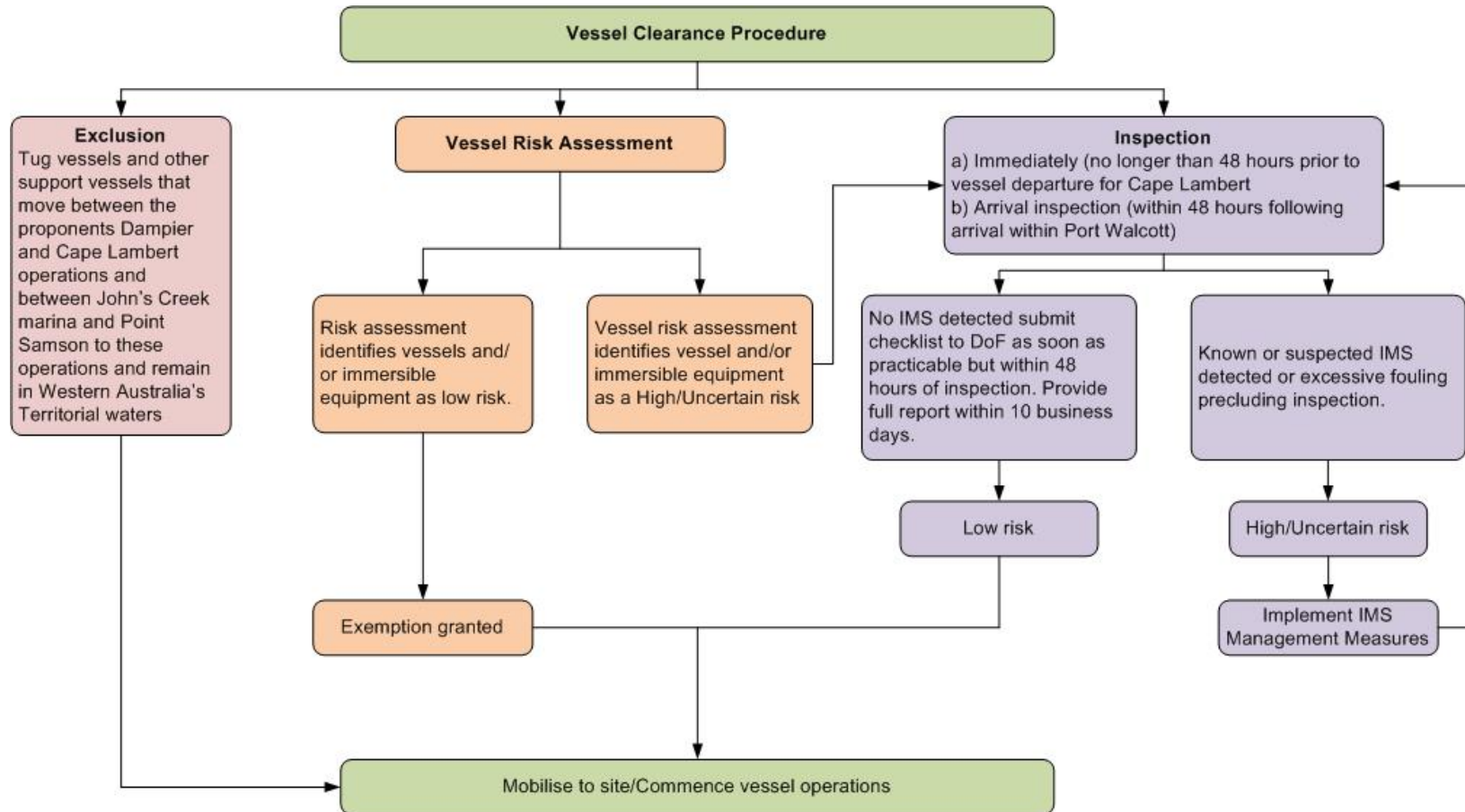
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|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>References:</b> | <ul style="list-style-type: none"> <li>■ Existing Marine Environment – PER <b>Section 6</b></li> <li>■ Marine Impacts and Management – PER <b>Section 6</b></li> <li>■ Monitoring Programs – DSDMP <b>Section 5</b></li> <li>■ Cape Lambert Operations Marine Environmental Quality Management Plan (draft) - RTIO-HSE-0042966</li> <li>■ Department of Agriculture, Fisheries and Forestry, Biosecurity New Zealand, 2006. Marine Pest Monitoring Manual: Version 1</li> <li>■ ANZECC, 1997. Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance.</li> </ul> |
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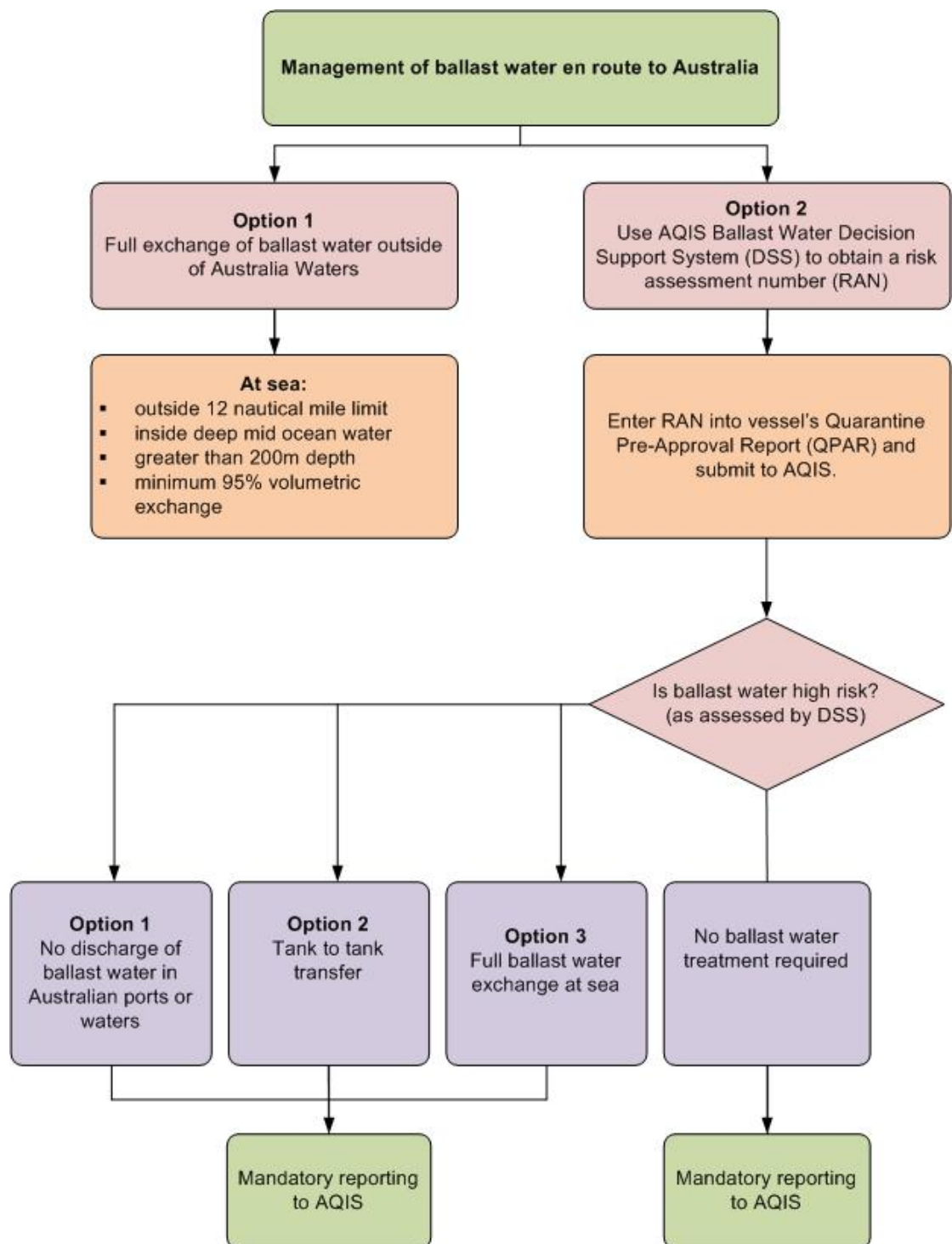
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■ **Table 4-3 Reporting and personnel requirements for IMS Management**

| Activity                    | Personnel                                                                                                                                                | Timing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vessel Risk Assessment      | Appropriately qualified marine scientist with experience in biosecurity                                                                                  | <ul style="list-style-type: none"> <li>■ Approved arrival VRA report and supporting documents to be submitted to DoF demonstrating low risk status of vessel prior to operations</li> <li>■ Departure VRA will be undertaken to determine if a vessel inspection is required. This process will take into account current monitoring outcomes, the bioregion of the proposed operational area and if applicable, the IMS commitments of the contracting party prior to vessel's departure.</li> </ul> |
| Vessel Inspection           | Appropriately qualified marine scientist with a demonstrated knowledge of IMS and experience in undertaking vessel and immersible equipment inspections. | <ul style="list-style-type: none"> <li>■ A single vessel inspection will be undertaken prior to operations. Within either 48 hours prior to mobilisation to site or within 48 hours of arrival on site</li> <li>■ Vessels will be subjected to further inspections where cleaning / treatments etc have occurred to confirm low risk status of the vessel.</li> </ul>                                                                                                                                 |
| Vessel Inspection Checklist | Appropriately qualified marine scientist with a demonstrated knowledge of IMS and experience in undertaking vessel and immersible equipment inspections. | <ul style="list-style-type: none"> <li>■ Completed Vessel Inspection checklists including a summary of inspection outcomes will be provided to DoF as soon as practicable but within 48 hours of the completion of the inspection.</li> </ul>                                                                                                                                                                                                                                                         |
| Vessel Inspection Report    | Appropriately qualified marine scientist with experience in biosecurity                                                                                  | <ul style="list-style-type: none"> <li>■ Final report detailing all relevant information and justification will be provided within 10 business days after the completion of the inspection and any associated treatments. Where species confirmation is still outstanding, a preliminary report will be provided within this timeframe, with a final report to be submitted as soon as species ID is confirmed by a taxonomist.</li> </ul>                                                            |



■ Figure 4-6 Vessel clearance procedure



■ Figure 4-7 Australian Quarantine Inspection Service (AQIS) mandatory ballast water requirements

#### 4.6. Strategy 5 – Marine Drilling and Blasting Management

##### Management Area:

##### Marine Drilling and Blasting

##### Objective:

To manage any potential drilling and blasting activities in the marine environment in a manner that minimises the risk of adverse impacts on marine fauna and social values from noise and vibrations.

##### Background:

Geotechnical information indicates that there is currently a low risk that the pre-treatment of any consolidated material via drilling and blasting in the marine environment will be required. As such, the Proposal does not currently include drilling and blasting.

Any requirement for drilling and blasting activities to be undertaken will be identified during the early stages of the dredging program and will be based on the CSD's ability to cut the *in situ* rock and the capacity of the BHD to remove material in the Tug Harbour area.

The course of action to be undertaken in the event that drilling and blasting is required is presented within this management strategy.

The activity of drilling and blasting produces significant noise and vibration which has the potential to adversely impact marine fauna (turtles, marine mammals, fish, sea birds) within the immediate vicinity of the works.

Noise generated by drilling and blasting activities also has the potential to adversely impact the social values (e.g. recreational aesthetics) within the vicinity and adjacent to the works.

##### Key Performance Indicators:

- No injury or mortality to turtles or marine mammals resulting from drilling and blasting activities
- Limited injury or mortality to sea birds resulting from drilling and blasting activities.

##### Management:

A marine drilling and blasting management plan will be developed at least two months prior to the commencement of such activity. The drilling and blasting management plan will be prepared in consultation with the DEC (and the State DoT and DoF) and DSEWPaC in the event that marine drilling and blasting is required. No drilling or blasting will be undertaken until a Drilling and Blasting Management Plan has been approved in writing by the Minister for the Department of Sustainability, environment, Water, Population and Communities. The plan will include the following

- A description of the blast methodology
- An assessment of the amount of drilling and blasting required including geographical extent
- Nomination of the likely blast pressures and potential environmental impacts of these pressures
- Monitoring for the presence of listed threatened and migratory species, including exclusion zones, prior to and during blasting
- Commitments that any blasting activities will not be undertaken at night or during turtle nesting or hatchling seasons
- Post blast inspection for injured fauna including management and reporting to the Department of injured fauna
- Details of responsible parties for each action described in the BMP, including reporting requirements

In the event that marine drilling and blasting is required, the drilling and blasting management plan will be implemented and made publicly available

|                    |                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Monitoring:</b> | <ul style="list-style-type: none"><li>■ To be developed as part of drilling and blasting plan.</li></ul>                                                                                                                                                              |
| <b>Reporting:</b>  | <ul style="list-style-type: none"><li>■ To be developed as part of drilling and blasting plan</li><li>■ All incident involving mortality of turtles or marine mammals will be reported (i.e. email / fax statement) to the DEC and DSEWPaC within 24 hours.</li></ul> |
| <b>Reference:</b>  | <ul style="list-style-type: none"><li>■ Existing Marine Environment – PER <b>Section 6</b>.</li><li>■ Marine Impacts and Management – PER <b>Section 6</b>.</li></ul>                                                                                                 |

#### 4.7. Strategy 6 - Spoil Ground Management

##### Management Area:

##### Spoil Grounds

##### Objective:

To manage the spoil disposal activities and spoil grounds in a manner that ensures potential environmental impacts are minimised.

##### Background:

The spoil grounds to be used for the disposal of dredged material are shown in **Figure 2-1**.

The conditions and requirements applicable to the disposal activities and spoil grounds will be specified within the applicable Sea Dumping Permit (SDP).

Note: Impacts on water quality and sedimentation and the related potential impacts on marine fauna and flora will be managed via Strategy 1 – Water Quality, Sedimentation and BPPH Management.

##### Key Performance Indicators:

- Complete compliance with conditions of the SDP.

##### Management:

- Establish by Differential Global Positioning System that immediately prior to dumping the vessel is within an approved disposal site
- Each load of dredged material will be disposed evenly over the area within the spoil grounds
- The hopper doors on the TSHD will be completely closed prior to leaving the disposal ground at the end of each spoil disposal event
- Any dredge used in connection with the disposal activities and any associated towing vessels must comply with the relevant state, national or international standards with respect to seaworthiness, safety and environmental requirements, or any rules or conditions laid down by the certifying classification society, and be capable of disposing dredge material at the disposal locations in accordance with the SDP.

##### Monitoring:

- Surveyed dredged quantities (net measured *in situ* prior to dumping) will be recorded and compared daily to the approved disposal quantities
- Bathymetric surveys will be undertaken on all spoil grounds within one month and again within 12 months of the completion of all disposal activities, authorised under the SDP. A digital copy of each of the bathymetric surveys will be provided to the RAN Hydrographer.

##### Reporting:

- Weekly plotting sheets including the following are to be retained for audit purposes:
  - 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 disposal run, with the inclusion of the path of each disposal run
  - c) A means of estimating the volume of dredge spoil (in cubic meters) disposed and quantity in dry tonnes at each of the disposal sites for the specified operational period.
- Within two months of the final bathymetric surveys being undertaken, a digital copy of each bathymetric survey will be provided to the RAN hydrographer,
- A report on the bathymetric surveys will be provided to the

DSEWPaC within two months of the final bathymetric survey being undertaken. This report will include a chart showing the change in sea floor bathymetry as a result of disposal and include written commentary on the volume of disposed material that appears to have been retained within each of the spoil grounds

- To facilitate annual reporting to the International Maritime Organization, the Proponent will report to the Minister by 31 January each year, including on the day of the expiry of the sea dumping permit or completion of all dredging under the sea dumping permit, information at Appendix 2 to the sea dumping permit, or in a format as approved by the Minister from time to time

---

**Reference:**

- Sea Dumping Permit (**Appendix C**)

#### 4.8. Strategy 7 - Hydrocarbon and Chemical Management

##### Management Area:

##### Hydrocarbons and Chemicals

##### Objective:

- To minimise the risk of hydrocarbon or chemical spills
- To minimise the potential impact of hydrocarbon and chemical spills.

##### Background:

Hydrocarbons (including diesel fuel, heavy fuel oil (HFO), hydraulic oils, engine oils, greases and lubricants) and chemicals are used and handled everyday during the dredging operations. The accidental release of these substances presents a potential risk to the environment. The main potential sources of release of hydrocarbons and chemical into the marine environment are:

- diesel or HFO spills during refuelling (bunkering);
- hydraulic oil spills due to equipment failure (for example, burst hydraulic hose);
- incorrect storage and handling of hydrocarbons and chemical;
- release of oily bilge waters; and
- contaminated deck wash.

The prevention of oil pollution from ships in Australia is based on Annex 1 of the MARPOL 73/78 Convention to which Australia is a signatory.

##### Key Performance Indicators:

- Complete compliance with hydrocarbon and chemical management requirements
- Complete compliance with Annex 1 of the MARPOL 73/78 Convention.

##### Management:

##### Bunkering

Bunkering will be undertaken at the Port of Dampier, the Cape Lambert Service Wharf, or over water as per results of risk assessments and operating procedures.

- A work instruction will be prepared to provide guidance to crew and staff with regards to minimising the risk of spills during bunkering
- Bunkering will be undertaken using suitable equipment and experienced personnel who will continuously monitor the bunkering equipment and tanks
- Bunkering will not take place during adverse conditions
- Spill avoidance devices such as 'dry couplings' and spill trays will be employed.

##### Hydraulic oil spills

- The hydraulic oil system will be of a high quality, well maintained and regularly inspected
- Each dredging vessel will be equipped with standard low pressure alarms and shut down systems to minimise hydrocarbon loss in the event of a burst hydraulic hose.

##### Storage and Handling

- All chemicals and detergents will be stored below deck in appropriate holds
- Oil and grease drums will be stored below deck in appropriate holds. Hydrocarbons stored above deck will be stored within bunded areas to contain any leaks or spills.

#### Bilge Waters

- The discharge of bilge waters will be undertaken in accordance with MARPOL 73/78 Annex I requirements. No bilge waters with an oil content of more than 15 parts per million will be discharged. Any discharge of bilge waters will be undertaken whilst en route with oil discharge monitoring, filtering and control systems operating.

#### Contaminated Deck Wash

- Drainage water that is potentially contaminated with hydrocarbons will be contained and directed into bilge waters tanks where practicable.

#### Spill Response

- Spill response will be undertaken in accordance with the existing Cape Lambert Oil Spill Contingency Plan (OSCP)
- Each vessel will maintain a Ship Board Oil Pollution Emergency Plan (SOPEP) in accordance with Australia Government requirements and the MARPOL 73/78 convention
- Suitable and sufficient oil spill response equipment (spill response kits) including oil absorbent booms and pads will be available and easily accessible in case of a hydrocarbon spill
- Only Australian Maritime Safety Authority (AMAS) approved dispersants will be used at any time.

---

#### **Monitoring:**

- Audits of each vessels hydrocarbon and chemical handling procedures and equipment including spill kits will be undertaken before operations commence and on a regular ongoing basis by the EPCM.

---

#### **Reporting:**

- DSEWPaC will be notified (i.e. email, fax statement) within 24 hours of any hydrocarbon and chemical spills into marine environment. A report will be provided within a further 72 hours detailing management actions implemented.
- Reporting will be undertaken in accordance with the *National Greenhouse and Energy Reporting Act 2009 (NGER)*

---

#### **Reference:**

- Existing Marine Environment – PER **Section 6**
- Marine Impacts and Management – PER **Section 6**
- Cape Lambert Oil Spill Contingency Plan
- Cape Lambert Operations Marine Environmental Quality Management Plan (draft) – RTIO-HSE-0042966.

#### 4.9. Strategy 8 - Waste Management

**Management Area:**
**Solid Waste, Hazardous Waste and Sewage**
**Objective:**

To minimise the risk of polluting the marine environment by ensuring proper management of solid waste, hazardous waste and sewage. (Note: this section only covers waste associated with vessel operations.)

**Background:**

The accidental release of wastes has the potential to impact adversely on the marine environment. Waste streams requiring management include:

- solid wastes (domestic wastes, packaging etc)
- hazardous wastes (used oil spill equipment, hazardous substance storage containers, waste oil, etc)
- sewage and grey water.

The discharge of these wastes into the marine environment is regulated by the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cwth) which is based on the MARPOL 73/78 Convention Annex IV (sewage) and Annex V (Garbage) to which Australia is a signatory.

**Key Performance Indicators:**

Zero incidents involving the loss of solid and hazardous waste into the marine environment.

**Management:**
Solid Waste

- Solid waste will be placed in suitable containers (e.g. skip bins) and recycled or disposed of via a licensed contractor
- Records of waste disposal will be kept.

Hazardous Wastes

- Hazardous waste will be stored in an appropriate manner prior to disposal
- Empty oil and chemical containers will be returned to the supplier for recycling where appropriate
- Hazardous waste will be disposed of via a licensed contractor to a licensed hazardous waste facility
- Records of disposal of hazardous wastes will be kept.

Sewage and Grey Water

- An IMO certified sewage treatment system will be used on all major vessels
- All discharge of sewage and grey water will be conducted in accordance with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cwth) / MARPOL 73/78 requirements
- No untreated sewage will be discharged within 12 nm of the nearest land
- Sewage and grey water treated via an IMO approved system will not be discharged within 3 nm of the nearest land
- Sewage and grey water from vessels without an International Maritime Organisation (IMO) approved system will be stored on board and discharged to shore via a licensed contractor.

**Monitoring:**

Not Applicable

**Reporting:**

- Waste disposal records will be maintained and will be made available upon request.  
Reporting will be undertaken in accordance with the *National Greenhouse and Energy Reporting Act 2009 (NGER)*

---

**Reference:**

- Existing Marine Environment – PER **Section 6**
- Marine Impacts and Management – PER **Section 6.**

#### 4.10. Strategy 9 - Vessel Management

**Management Area:**
**Vessel Management**
**Objective:**

- To minimise the risk of vessel collision and the resulting environmental impacts
- To minimise the impact of the vessel operations on recreational boating/fishing activities.

**Background:**

The dredging activities will be undertaken in a working port which presents the risk of vessel collision and subsequent environmental impacts. It should be noted however, that co-ordination between dredging operations and shipping is a common activity in the Cape Lambert and Dampier areas, and the dredging and spoil disposal activities associated with the Port B development are not considered to present significantly different or increased risks than existing operations with respect to vessel safety.

Other potential impacts include conflict with other marine users (for example, no access zones, increased shipping).

**Key Performance Indicators:**

No vessel collisions resulting from the dredging and spoil disposal activities.

**Management:**

- Notice to Mariners will be issued prior to commencement of the dredging and disposal activities
- Notices (e.g. signboards) will be posted at suitable locations such as at John's Creek Marina, advising of the dredging activities
- An opportunity for residents from nearby towns to be advised/briefed on the pending dredging works will be provided through an information session that will be advertised in the local newspaper
- A lookout will be maintained from the dredges at all times
- All port related vessels will be made aware of the locations of the dredges and associated equipment such as floating or submerged pipelines, cables and support vessels. Information will be exchanged between involved parties with regards to planned shipping movements and dredging activities
- Prior to commencement of dredging and construction activities, all crew will receive training from a qualified person. This training will include details of procedures to be followed in the event of marine mammals sighting, injury or death
- Marine mammals (except dolphin) observation and response procedures including the application of a 300 m exclusion zone will be implemented during dredging or spoil disposal
- A lookout will be maintained for cetaceans while any dredging or construction vessels travel within the project area. In the event that a cetacean is sighted, vessels speeds and direction will be adjusted to avoid impacting on the observed individual (within the safety constraints of the vessel)
- All sightings of marine mammals (except dolphins) will be recorded
- All marine mammal (including dolphin) mortality incidents will be recorded and reported to the DEC and DSEWPac within 24 hours.

**Monitoring:**

Not applicable

**Reporting:**

Incidents will be reported as per the AMSA guidelines.

---

**Reference:**

- Existing Socio-Economic Environment – PER **Section 7**
- Socio Economic Impacts and Management – PER **Section 10**
- Cape Lambert Port B Cetacean Management Plan
- Strategy 3 – Marine Mammals and Turtle Management.

## 5. Monitoring Programs, Surveys and Inspections

### 5.1. Overview

To support the management measures presented in **Section 4** and to ensure compliance with the Ministerial Conditions and DSEWPaC approval conditions relevant to each activity, the following monitoring programs, surveys and inspections will be undertaken.

- Water Quality Monitoring;
- Particle Size Distribution Analysis;
- Remote Sensing Water Quality Monitoring;
- Coral Health Monitoring;
- Benthic Primary Producer Habitat Monitoring;
- Coral Spawning Assessment and Monitoring; and
- Invasive Marine Species Management.

### 5.2. Water Quality Monitoring

#### 5.2.1. Overview

Dredging and spoil disposal activities will result in changes in water quality through the suspension of sediment, which will increase turbidity and rates of sedimentation. Elevations in turbidity may reduce the quantity and quality of light available to BPP (including corals), which in turn, may reduce BPP photosynthetic production and health. In addition, increased sedimentation may result in sub-lethal effects to coral through the increased expenditure of energy required to remove sediments, or can cause mortality to coral and other BPP through smothering. Increased sedimentation may also result in reduced recruitment of BPP in areas where sediment covers hard substratum.

A water quality monitoring program will be implemented in accordance with the requirements of Condition 8-2 (**Appendix A**), to manage potential indirect impacts to corals from increased turbidity, and to interpret any changes in coral health that may occur. This program is detailed in subsequent sections, which are structured as follows:

- Monitoring Schedule – Details the requirements of the collection and analysis of water quality information prior to the commencement of dredging, during the period of dredging and spoil disposal activities and describes the requirements of water quality monitoring to be undertaken following the cessation of dredging and spoil disposal activities
- Monitoring Sites – details the location and site characteristics of each of the monitoring locations

- Monitoring Methods – standard monitoring methods to be used across all monitoring periods
- Monitoring Actions – details the strategic approach to be implemented if a nominated site specific water quality criterion is exceeded at any site to reduce reaction time and ensure management measures are implemented as soon as practicable
- Quality Assurance and Control Procedures – describes the procedures undertaken in the field and office to ensure that quality standards are maintained as far as practicable.

### **5.2.2. Monitoring Schedule**

#### ***Baseline***

The baseline water quality monitoring program commenced in February 2008 and ceased in May 2009. The program involved measuring a suite of parameters at the 13 primary sites (impact, indicator, influence and reference), including turbidity (NTU), temperature (°C), light climate (PAR), gross sedimentation and PSD. Refer to **Section 3.5** for details of the parameters, sampling design and results.

Additional light climate characterisation was undertaken for a period of three months prior to the commencement of dredging activities from May to August 2010. The aim of this additional monitoring was to better characterise the light climate at each of the monitoring sites. This has been undertaken on a fortnightly basis, using loggers deployed *in situ* to measure the light climate near the corals every 30 min, 24 hours a day.

#### ***Dredging and Spoil Disposal***

Compliance water quality monitoring will be undertaken in accordance with Condition 8-2 (Ministerial Statement 840). The program shall include the collection and analysis of turbidity (NTU), temperature (°C), light climate (PAR), sedimentation ( $\mu\text{mol}/\text{m}^2/\text{day}$ ) and PSD, as described in **Section 5.2.4**.

Monitoring data will be collected at intervals of 14 days or less at the 13 primary monitoring sites (including one ‘impact’, five ‘indicator’, five ‘influence’ and two ‘reference’), while data collection at the two contingency reference sites will be as required, as a component of the ‘*lines of evidence*’ investigation.

The monitoring program shall be implemented prior to the commencement of dredging and spoil disposal activities.

#### ***Post Dredging***

In accordance with Condition 8-5 (Ministerial Statement 840), water quality monitoring will be undertaken at the same frequency for a period of two months from the cessation of dredging and spoil disposal activities.

### **5.2.3. Monitoring Sites**

The monitoring sites were selected to encompass a wide area around the Cape Lambert Port with the potential to be affected by a dredge and spoil disposal program. The monitoring sites were selected on the basis of previous monitoring (Port A), dredge plume modelling, recent BPPH mapping and upon the application of professional and local knowledge of the area. New sites were established for the purpose of this study, and these along with existing water quality and coral monitoring sites from the Port A monitoring study, provide a set of 13 primary monitoring sites in the vicinity of Cape Lambert and two additional sites (contingency references) that lie further afield (Dolphin Island and Depuch Island).



■ Table 5-1 Water Quality and Coral Health Monitoring Sites (GDA94 datum)

| Site Name         | Site Code | Latitude      | Longitude      | Water Quality Monitoring |                                      |                                             | Coral Health Monitoring |                                    |
|-------------------|-----------|---------------|----------------|--------------------------|--------------------------------------|---------------------------------------------|-------------------------|------------------------------------|
|                   |           |               |                | Depth (m)**              | Site Characteristics***              | Parameters measure                          | Site Function           | Community type                     |
| Bells Reef        | BLR *     | 20°35.052'S   | 117°08.456'E   | 3                        | Rocky outcrop, nearshore, West       | NTU, Temperature, Light, Sedimentation, PSD | Influence               | Porites                            |
| Boat Rock         | BTR       | 20°33.750'S   | 117°10.621'E   | 12                       | Rocky outcrop, strong currents, West | NTU, Temperature, Light, Sedimentation, PSD | Indicator               | Faviid                             |
| Bezout Island     | BZI *     | 20°33.213'S   | 117°10.311'E   | 3                        | Fringing island reef, West           | NTU, Temperature, Light, Sedimentation, PSD | Indicator               | <i>Acropora/ Pavona</i>            |
| Bezout Rock       | BZR *     | 20°33.823'S   | 117°09.682'E   | 4                        | Rocky outcrop, nearshore, West       | NTU, Temperature, Light, Sedimentation, PSD | Indicator               | <i>Faviid/ Turbinaria/ Porites</i> |
| Cape Lambert West | CLW *     | 20°36.090'S   | 117°09.756'E   | 4                        | Nearshore, West                      | NTU, Temperature, Light, Sedimentation, PSD | Indicator               | <i>Turbinaria/ Acropora</i>        |
| Dixon Island East | DIE *     | 20°37.084'S   | 117°04.143'E   | 3                        | Fringing island reef, West           | NTU, Temperature, Light, Sedimentation, PSD | Influence               | <i>Faviid/Porites/ Turbinaria</i>  |
| Delambre Island   | DLI *     | 20°27.736'S   | 117°03.916'E   | 9                        | Offshore fringing island reef, West  | NTU, Temperature, Light, Sedimentation, PSD | Reference               | <i>Acropora/Faviid</i>             |
| Hat Rock          | HAT       | 20°40.105'S   | 117°17.136'E   | 4                        | Rocky outcrop, East                  | NTU, Temperature, Light, Sedimentation, PSD | Reference               | <i>Faviid/Porites</i>              |
| Mangrove Point    | MAN       | 20°37.555'S   | 117°07.988'E   | 3                        | Nearshore, West                      | NTU, Temperature, Light, Sedimentation, PSD | Influence               | <i>Faviid/Porites</i>              |
| Middle Reef       | MDR       | 20°35.817'S   | 117°11.862'E   | 3                        | Nearshore rock outcrop, East         | NTU, Temperature, Light, Sedimentation, PSD | Indicator               | <i>Porites/Turbinaria/ Faviid</i>  |
| Pelican Rock      | PLR       | 20°39.249'S   | 117°14.415'E   | 3                        | Rocky outcrop, East                  | NTU, Temperature, Light, Sedimentation, PSD | Influence               | <i>Faviid/ Porites</i>             |
| Power Station     | PWR STN   | 20°35.440'S   | 117°10.685'E   | 6                        | Nearshore, West                      | NTU, Temperature, Light, Sedimentation, PSD | Impact                  | <i>Faviid/ Porites</i>             |
| Samson Beach      | SMSB      | 20°37.337'S   | 117°11.890'E   | 4                        | Nearshore, East                      | NTU, Temperature, Light, Sedimentation, PSD | Influence               | <i>Turbinaria</i>                  |
| Depuch Island     | DPI       | 20°36'52.40"S | 117°42'29.09"E | N/A                      | East                                 | N/A                                         | Contingency Reference   | <i>Porites/Faviid</i>              |

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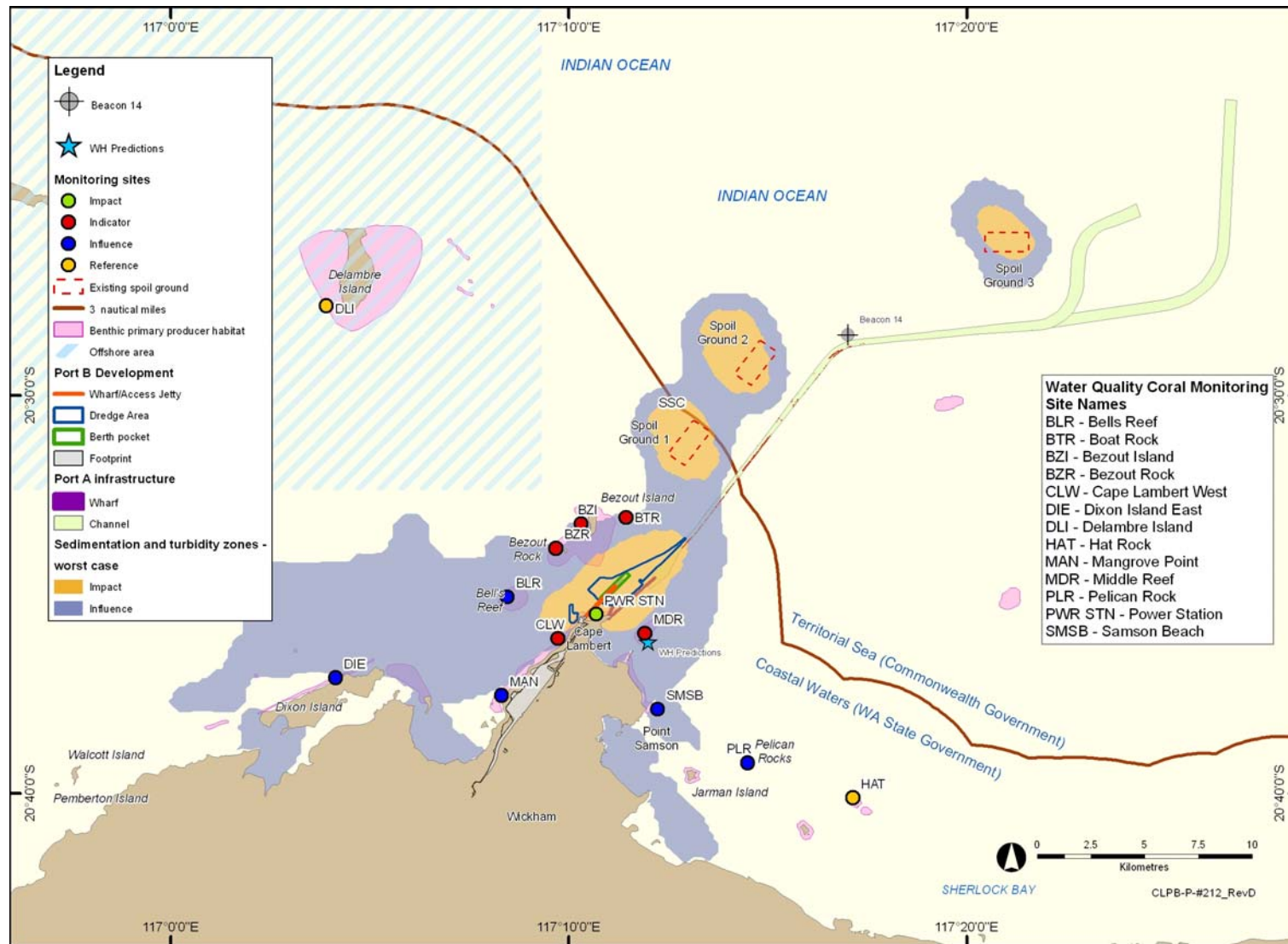


| Site Name      | Site Code | Latitude    | Longitude    | Water Quality Monitoring |                         |                    | Coral Health Monitoring |                       |
|----------------|-----------|-------------|--------------|--------------------------|-------------------------|--------------------|-------------------------|-----------------------|
|                |           |             |              | Depth (m)**              | Site Characteristics*** | Parameters measure | Site Function           | Community type        |
| Dolphin Island | DOI       | 20°25'811"S | 116°53.011"E | N/A                      | West                    | N/A                | Contingency Reference   | <i>Porites/Faviid</i> |

\* Indicates sites used in the previous Cape Lambert Port Upgrade 85 Mtpa monitoring program.

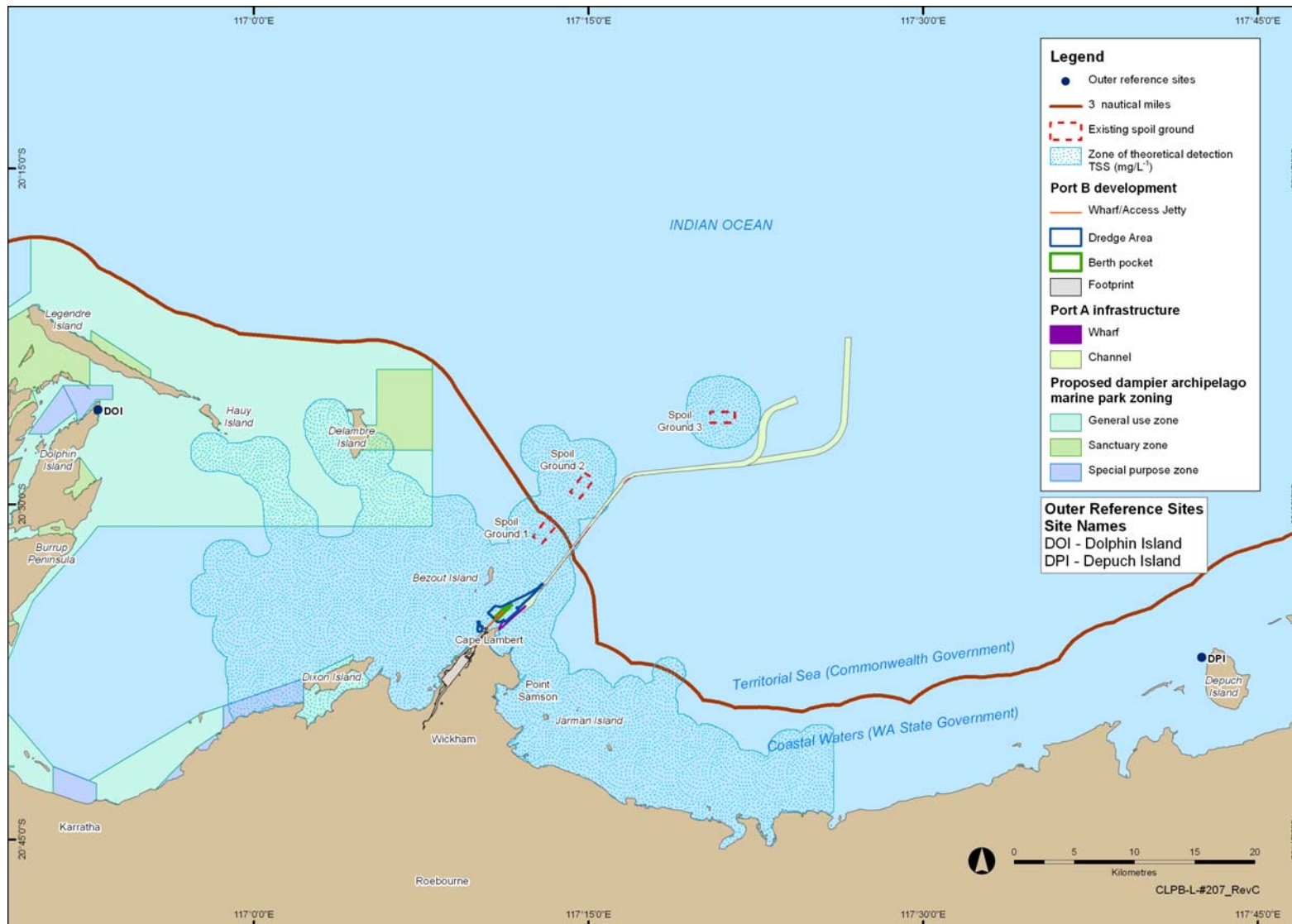
\*\* Chart Datum

\*\*\* East and West refers to the site location relative to the existing Cape Lambert wharf



■ **Figure 5-1 Water Quality and Coral Health Monitoring Sites**

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■ **Figure 5-2 Contingency Reference Sites**

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#### 5.2.4. Monitoring Methods

The sampling approach is consistent with that used during the Cape Lambert Port A dredging program. The period between water quality sampling trips aligns with the expected 14 days between coral monitoring surveys for the Cape Lambert Port B development dredging and spoil disposal program. In addition, sampling routines have been kept to an approximately fortnightly frequency to limit the impact of biofouling on instrument performance.

The following water quality measurements will be collected during the dredging and spoil disposal program:

- turbidity (NTU) – *in situ* logging, every 30 min, 24 hours a day, data to be collected approximately every 14 days;
- temperature (°C) - *in situ* logging, every 30 min, 24 hours a day, data to be collected approximately every 14 days;
- light (PAR-  $\mu\text{mol}/\text{m}^2/\text{day}$ ) - *in situ* logging, every 30 min, 24 hours a day, data to be collected approximately every 14 days;
- gross sedimentation rates ( $\text{mg}/\text{cm}^2/\text{d}$ ) – sediment traps, every fortnight; and
- particle size distribution – sediment traps and surrounding benthos – at a minimum of pre, during and post dredging.

These parameters were selected to encompass a variety of factors which are known to be impacted by dredging activities. These parameters provide a way of monitoring the influence of dredging activities on the local environment.

Sampling will be undertaken approximately every fortnight, weather permitting, and the following procedures will be used:

#### ■ Table 5-2 Water Quality related task that will be undertaken during each field trip

| Area       | Task descriptions                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| In-water   | <ul style="list-style-type: none"> <li>■ Logger will be retrieved by ADAS qualified divers</li> <li>■ Take in-situ QA/QC photographs of the loggers in water</li> <li>■ Retrieve all loggers and sediment traps</li> <li>■ Redeploy all loggers and sediment traps</li> </ul>                                                                                                                       |
| On-surface | <ul style="list-style-type: none"> <li>■ Take QA/QC photos of loggers and sensor</li> <li>■ Decant the contents of the retrieved sediment traps into sample bottles</li> <li>■ Clean loggers and sediment traps</li> <li>■ Download loggers – experienced personal only</li> <li>■ QA/QC data and undertake maintenance</li> <li>■ Fill in QA/QC sheet</li> </ul>                                   |
| On shore   | <ul style="list-style-type: none"> <li>■ Undertake an assessment of early warning water quality criteria</li> <li>■ Send water quality data to Perth for analysis and reporting and a duplicate copy carried by field staff to Perth to maintain data security.</li> <li>■ Refrigerated, decanted sample bottles containing sediment trap samples to be sent to laboratory for analysis.</li> </ul> |

### 5.2.5. Monitoring Actions

As discussed in **Section 3.9.2**, water quality early warning criteria will be used to target coral health monitoring at particular sites to determine when additional management measures are required to reduce the risk of environmental damage. The analysis of water quality monitoring data will also:

- provide early warning of deteriorating water quality that may impact on BPPH
- provide contextual data in the investigation of any exceedences of the management trigger levels.

To reduce potential impacts to BPP, the following procedures will be implemented to limit the reaction time and to ensure management measures are implemented as soon practicable. The turbidity data will be examined in the field to determine if nominated criteria have been exceeded. If so, the following actions will occur where practicable:

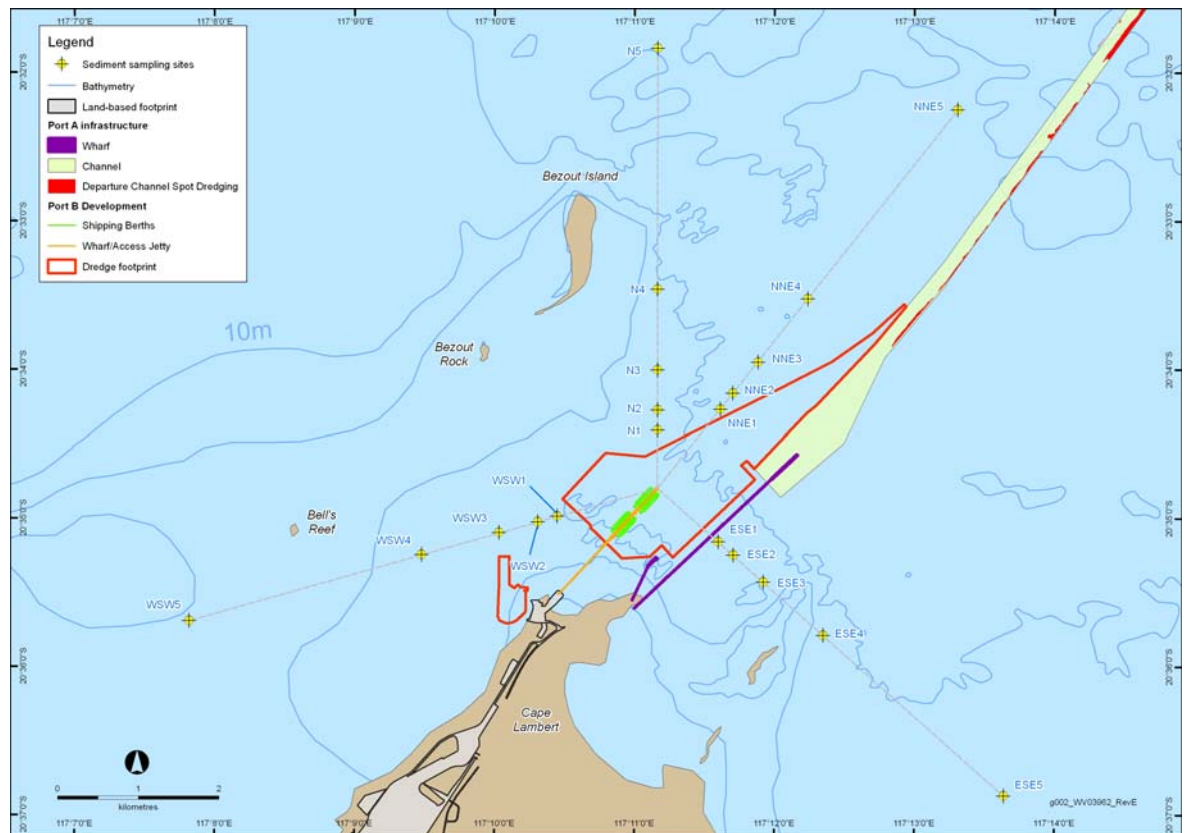
#### *Procedures – nominated early warning criteria are exceeded*

- before mobilising to site, the location and activities of the dredge will be provided to the field team to gain an appreciation of the sites that have been mostly influenced. This will assist in targeting specific areas and relating an exceedence to the dredging and spoil disposal activities for the previous 14 days
- light data will be examined during operations, to determine if the corals are receiving enough light to maintain current health. The assessment will consider whether the impact on the available light is likely to have detrimental impact on the corals present by reference to the literature, and the information on light climate for each affected site
- if the assessment concludes that the scale and duration of an exceedence has impacted coral health because of significant curtailment of the available light then coral health monitoring and data analysis will be prioritised for sites where an exceedence has occurred.

### 5.2.6. Particle Size Distribution Analysis

Particle Size Distribution (PSD) data will not be used in any formal trigger assessments. The PSD of surface sediments in areas adjacent to the dredging area will be surveyed, both pre and post dredging, to assess the extent of any change in sediment characteristics as a result of the dredging and spoil disposal activities.

Surveys will be undertaken before and after the dredging and spoil disposal activities. Sediment samples of the top 10cm of surface sediment will be taken with increasing distance (250 m, 500 m, 1000 m, 2000 m and 5000 m) along 4 axes originating from the dredging footprint to record potential spatial variability in sediment characteristics within the areas adjacent to the dredging footprint (**Figure 5-3**)



■ Figure 5-3 Indicative locations of sampling sites

PSD at each location will be determined in the laboratory using laser diffraction and wet sieving techniques.

For the purposes of reporting, sediment PSD data from the pre-dredging survey will be compared against the post-dredging data to assess the spatial extent of any changes in sediment characteristics attributable to the dredging and spoil disposal program.

#### **5.2.7. Plume Model Verification**

In recent monitoring programs, a model verification exercise has been undertaken to evaluate how accurately modelling has predicted the likely sediment plume magnitude, distribution and behaviour. Such an assessment may provide some confidence around the suitability of the zones of impact and influence determined during the environmental impact assessment. During the Port A dredge monitoring program, an evaluation of the predictive ability of the dredge plume model showed there was a high degree of congruence between model predictions and the actual distribution of plume related TSS around the dredging site.

The most reliable method for verifying modelling predictions would involve using a combination of *in situ* sampling, and remote sensing methods (e.g. MODIS) to collect a three dimensional data set for the plume. These data could then be used to verify model predictions of the plume behaviour under the same set of tide conditions, weather, sea state, season, sediment type (PSD) and dredge activities.

*In situ* sampling at point locations along transects in and adjacent to the plume will provide data, such as TSS profiles for fine scale spatial and temporal comparison with model predictions. Remote sensing methods provide data that will allow comparison of measured and predicted data over much broader spatial scales at a particular point in time (i.e. at time of satellite overpass). It should always be remembered that any modelling has limited ability to reproduce and represent complex, real world situations. Any comparison of measured and modelled data should always focus on whether the general patterns and behaviour of a plume have been predicted correctly, rather than on whether the modelling was able to accurately predict the absolute magnitudes of the likely plume.

#### **5.2.8. Remote Sensing Water Quality Monitoring**

The main purpose of the Remote Sensing Water Quality Monitoring is to use Near Real Time (NRT) MODIS imagery to track and identify changes in water quality at a regional scale in order to support management decisions, both proactive and reactive. The application of MODIS Terra 250 m satellite images for analysing coastal waters was examined in the Port A dredge monitoring program. MODIS satellite images (from both the Aqua and Terra satellite platforms) can be processed to derive and map the concentration of surface layer TSS (1–6 m deep) across the study area. This allows the quantification of the sediment plume distribution and magnitude throughout the dredging program and provides important water quality information, including identifying the occurrence of natural sediment plumes, during the monitoring program.

#### **5.2.9. Quality Assurance and Quality Control Procedures**

As a part of the water quality monitoring program for the Cape Lambert Port B development, thorough details of actions carried out during the program will be documented for quality assurance and quality control (QA/QC) purposes. The following measures will be adhered to throughout the life of the monitoring program, given the importance of the data collection:

- All data sheets forwarded between parties will be accompanied with corresponding 'metadata' which outlines the key details of the data obtained
- All types of data collected will be aligned against a consistent time-stamp to allow accurate comparisons and analysis using computer modelling
- In cases where data gaps are present, the time series will be continued to remain consistent so that any data gaps are obvious
- The original downloaded data will always be stored as a 'raw' copy and will not be altered in any way; all modification and analysis of the data will be made from a copy of the 'raw' data
- Details of deployment, data retrieval, photographs, observations, etc will be recorded on field sheets for the turbidity, temperature and light loggers for QAQC purposes
- Maintenance regime for the loggers will recorded.

### 5.2.10. Reporting

Water quality reporting requirements as detailed within **Section 6**, are as follows.

- Water quality and Coral Health Monitoring Four Weekly Reports will consist of two fortnightly surveys. Reports will be submitted to DEC and DSEWPac within 10 business days after the second monitoring survey for that period. The water quality components of these reports will typically consist of the following:
  - water quality results including trends (for example, medians, minimum/maximum turbidity)
  - exceedence(s) of a nominated water quality early warning criteria and associated response actions including details on the light climate, dredging and spoil disposal activities and location
  - level of fouling / logger condition
  - reliability/usefulness of data obtained
  - brief interpretation of results.
- Sediment PSD Assessment Report detailing the pre- and post dredging assessments and interpretation will be submitted to the DEC within 3 months after the post dredging survey.

## 5.3. Coral Health Monitoring

### 5.3.1. Overview

The Cape Lambert Port B development has the potential to directly impact BPPH by direct removal or smothering of habitat and indirectly impact upon adjacent BPP communities by altering water quality, resulting in a reduction of light available for photosynthesis. This section details the coral health monitoring program that will be implemented to manage such impacts, as required under Conditions 8-2 to 8-8 of Ministerial Statement 840.

The coral health monitoring program has been designed to provide a quantitative measure of coral health (percent bleaching or mortality) which can then be assessed against management triggers as per **Section 4-2**. The details of the program are provided in the sections below.

- Monitoring Schedule – Details the requirements of the collection and analysis of coral health information prior to the commencement of dredging, the routine and reactive coral health monitoring requirements during the period of dredging and spoil disposal activities and describes the requirements of coral health monitoring to be undertaken at the cessation of dredging and spoil disposal activities (**Section 5.2.2**).
- Monitoring Sites – details the type, location and site characteristics of each of the monitoring locations (**Section 5.2.3**).
- Monitoring Methods (**Section 5.2.4**)
- Monitoring Actions (**Section 5.2.5**)

- Quality Assurance and Control Procedures – describes the procedures undertaken in the field and office to ensure quality is maintained (**Section 5.2.9**)
- Management Actions (**Section 4.2**)
- Reporting requirements (**Section 5.3.5**)

### 5.3.2. Monitoring Schedule

#### *Baseline*

- Coral health monitoring was undertaken as a part of the subtidal BPPH monitoring study. The study was undertaken over 12 months and consisted of four surveys (one each season) (SKM 2009e). The coral health component of the study followed the methods and analyses described in **Section 5.2.4**
- Additional baseline data has been collected at all impact, indicator, influence and reference sites for a period of three months prior to the commencement of dredging and spoil disposal operations (May to August 2010). The surveys were undertaken fortnightly and have provided estimates of the baseline rate of change of mortality of tagged corals at all sites. Monthly surveys at the contingency reference sites have also been undertaken for three months prior to the commencement of the dredging and spoil disposal operations. The study was conducted using the methods and analyses described in **Section 5.3.4**.

#### *Dredging and Spoil Disposal*

- Routine Site Monitoring – throughout the duration of the dredging and spoil disposal activities monitoring of coral health will be undertaken at the impact, indicator, influence and reference sites, as per methods described in **Section 5.3.4**.
- Contingency Site Monitoring – in the event that water quality or coral health has deteriorated at the two primary reference sites, the two contingency reference sites will then be monitored.

#### *Post dredging*

- Following the completion of the dredging and spoil disposal activities coral health monitoring will be undertaken at the impact, indicator, influence and reference sites, approximately every fortnight for a period of 2 months after the cessation of dredging as per methods described in **Section 5.3.4**.

### 5.3.3. Monitoring Sites

**Table 5-1** presents the coordinates, function and community types for each monitoring site. The proposed monitoring sites are presented in **Figure 5-1** and **Figure 5-2**. The site function relates to how these sites will be used in the assessment of impacts. The site functions are as follows:

- **Impact sites** are those sites predicted to be at greatest risk of coral mortality due to their proximity to the dredge footprint. Sediment plume modelling has predicted that up to 100% of

corals will suffer mortality at these sites as a worst case outcome. These sites will be monitored fortnightly during the dredging program.

- **Indicator sites** are those sites that are near the boundary of the Zone of Influence and Impact and share common BPPH with areas that lie within the Zone of Impact. These sites will be monitored at a fortnightly frequency throughout the dredging and spoil disposal program
- **Influence sites** will experience anomalous turbidity levels (above background) at some stage during the dredging program, but no loss of corals is predicted at these sites. Coral monitoring at these sites will be carried out fortnightly.
- **Reference sites** will be used to assess natural changes in coral health during the dredging and spoil disposal program. Sediment plume modelling has indicated that these sites will not be impacted or influenced by above background sedimentation rates or increased turbidity associated with the dredging program. However, sediment plume modelling has predicted that these reference sites do lie within the zone of theoretical detection (that is, at one or more times during the dredging program they will experience an increase in TSS of  $1 \text{ mg l}^{-1}$ ). These low level TSS elevations are typically no more than one or two hours in duration and therefore the modelling has not predicted any longer term alterations of the background water quality at these sites. As all monitoring sites typically show fluctuations in TSS (as NTU) much greater than  $1 \text{ mg l}^{-1}$  for similarly short durations it is highly unlikely that these small and short term fluctuations in TSS will have any impact on corals and other BPP, or could be attributed reliably to the actions of the dredge. Coral monitoring at these sites will be carried out fortnightly.
- **Contingency reference sites** lie outside of the zone of theoretical detection. These sites are well removed from the dredging location and as such are considered too remote for fortnightly monitoring to be feasible. They will be used in the unlikely event that the reported water quality data for one or more of the preferred reference sites shows anomalies that suggest they may be influenced by the dredging program.

#### 5.3.4. Monitoring Methods

##### 5.3.4.1. Field Procedures

The proposed monitoring methods are non-destructive and comparatively easy to deploy under normal weather/sea conditions.

Sixty corals will be tagged, photographed and identified to genus level at each site. The selection of the corals will ensure, where possible that:

- the colonies are representative of each site in terms of size, condition and position with respect to the seabed
- at each site, corals from up to five genera are selected (where possible considering diversity and abundance at the site)
- corals chosen will include highly sensitive species (such as *Acropora*) and less sensitive species (such as *Porites*), whenever such genera are present in sufficient numbers.

At each site, a target of a minimum of fifty tagged corals (identified to species level) will be examined each fortnight to determine the per cent live coral cover. This subset will be used at a minimum from the sixty tagged corals to allow for damage/loss of some coral colonies over the life of the program or to account for some unusable images or data. *In situ* observations on coral colour, predation and sediment cover will also be made to inform the interpretations of observed partial or full mortalities of corals during the monitoring program.

#### **5.3.4.2. Analysis of Field Results**

Coral mortality will be assessed by analysing each coral photo with Coral Point Counter with Excel extensions (CPCe; (Kohler and Gill 2006). This software was developed by the US National Coral Reef Institute (Dania Beach, Florida) and is used by numerous organisations including US National Oceanic and Atmospheric Administration (NOAA) to estimate percentage cover. This method of assessment was used during the Cape Lambert Port A coral health monitoring program.

Corals will be scored using the CPCe program. The extent of each coral will be overlain by a symmetrical 9 by 9 grid. Points falling outside the perimeter of the coral colony will be excluded from analysis and points falling within the perimeter will be scored as one of the following:

1. live coral;
2. pale coral (potentially bleached);
3. white coral (potentially bleached);
4. dead coral;
5. sediment;
6. turf algae;
7. coral disease;
8. encrusting sponge; and
9. Unknown.

Class 1 is considered to be 'healthy' live coral. Classes 2 and 3 represent coral bleaching (or potential bleaching). Classes 4–8 are summed to represent a partial mortality figure for each coral image.

The analysis of mortality and bleaching for at least 50 colonies from each site will be used to estimate an average level for each site.

#### **5.3.4.3. Comparison of Data Against Management Triggers**

To assess whether observed coral bleaching or coral mortality exceeds management trigger levels at Influence and Indicator sites, a two level approach to analysis and interpretation will be undertaken:

- Statistical Comparison Method – To test whether Net Bleaching or Net Mortality for a given site exceeds the management trigger at a significance level of 0.05

- Lines of Evidence Method – if a statistical difference is recorded, the second level of analysis is based on an investigation into lines of evidence with respect to the contribution of dredging and spoil disposals to the observed impacts.

#### **Statistical Comparison Method**

The primary objective test of whether changes in bleaching or mortality observed at Indicator or Influence sites exceed management triggers will be a statistical test of significance (t-test). This test will include the following components:

- Calculation of the net change in bleaching or mortality at a site (compared to baseline)
- Calculation of the net change in bleaching or mortality at a site (subtract any changes observed at Indicator/Influence sites from changes observed at Reference sites)
- Statistical comparison (t-test) of whether the net change in bleaching or mortality at a site is greater than management trigger values.

#### **Lines of Evidence Method**

In the event that the Statistical Comparison Method indicates an exceedence of a trigger level, a Lines of Evidence comparison will be undertaken. This will include an assessment of the potential influence of the dredging and spoil disposal program on receptors at a site. This approach is already a component of the monitoring programs undertaken for monitoring of dredging programs where water quality data is routinely used in the assessment of the potential for turbidity related effects on sensitive receptors at a site. In the event that Statistical Comparison Method indicates an exceedence of a trigger level, a Lines of Evidence comparison will be undertaken. This will include an assessment of the potential influence of the dredging and spoil disposal program on receptors at a site. This approach is already a component of the monitoring programs undertaken for monitoring of dredging programs where water quality data is routinely used in the assessment of the potential for turbidity related effects on sensitive receptors at a site. In addition to water quality data, other components that may be used in the lines of evidence approach are provided, but not limited to the following:

- The spatial distribution of observed increases in bleaching or mortality. The area covered by the monitoring program is large, and if a threshold for bleaching or coral mortality at a site is exceeded, then the spatial relationships of that site to all the other sites, dredging and disposal activities, and the extent of the dredge plume, will provide important information on the likelihood that what has been observed as an exceedence of a mortality trigger is a consequence of the dredging and spoil disposal activities. The spatial relationship assessment would also require an understanding of the local weather and tide conditions in the period immediately preceding the exceedence of a mortality trigger level at a site.
- Evidence of changes in gross coral mortality or bleaching at the two contingency reference sites. In circumstances where the spatial assessment of change in gross coral mortality at a

site/s during a survey period cannot be adequately explained by reference to the spatial relationships of apparent effects, then the two contingency sites may be utilised to look for evidence of change on a larger scale than the fortnightly coral health monitoring program. The expectation is that these sites will not normally be required to be included in an assessment, but may be useful in determining whether there is regional variability in the influence of natural events (such as temperature induced bleaching) on corals during the dredge monitoring program.

- Information about natural rates of change in the system of habitats supporting a mosaic of benthic organisms, including corals. There is a tendency to assume that all change observed during a dredge program can be easily attributed to the activities of the dredge, particularly if the observed changes are not reported at the reference sites. However, there is a lack of suitable reference sites available for this monitoring program. It is also the case that anecdotal evidence strongly suggests the hard substrates occupied by corals in the region vary markedly through time in terms of the benthic primary producers that are present (for example in community composition or per cent cover). These apparent changes may be driven by a variety of factors including regular, cyclical factors such as the seasons, or more random events such as cyclones. Understanding of the historical and current trends of change at all sites would provide a powerful tool for the assessment of the likelihood that an exceedence of coral mortality triggers at a site is dredge related, or part of a wider cycle of dynamic change. A monitoring program has been completed at a number of the sites to monitor change in benthic communities on hard substrates over a 12 month period. Results support the variable nature of the coral communities within the region (SKM 2009e). This data will provide much needed insights into the background dynamics of the reefs in the area, against which to assess the results of the coral health monitoring program. The data will also provide a much better assessment of the potential impact of loss of one or more areas of coral in terms of how long the impact is likely to persist and the scale of the impact within a context of a dynamic system where regular turnover of the benthic organisms on a reef may be commonplace.

#### **5.3.4.4. Assessment of Coral Bleaching Against Management Triggers at Indicator and Influence Sites**

*Aim: To assess whether net coral bleaching at an Indicator or Influence site exceeds management triggers and whether this exceedence is attributable to dredging and / or spoil disposal activities.*

Procedure to be followed will include:

1. Analyse each of the coral images using CPCe software
2. Establish the percent cover of bleaching for each colony. Coral bleaching is defined as the sum of pale and white cover identified on each coral. Each coral image is assigned a per cent bleaching (for coral i – PMi) where:
  - $PMi = (\text{points scored as bleaching} / \text{number of points within the coral boundary})$

- PMix is the bleaching of coral i at survey x.

The coral bleaching estimate for a site is the average of the corals scored at that site for that survey. For example for Site BLR in Survey 2:

- $PM(BLR2) = \sum PMi2/N$
- where i goes from 1 to N corals.

3. Establish the overall coral bleaching at a given site. The coral bleaching at a site is the difference between the survey result and the baseline level, which is calculated as (for example, for site BLR at Survey 2)
  - $PM(BLR2) = \sum (PMi2 - PMiB)/N$
  - where i goes from 1 to N corals with N corals being the corals measured at time 2 and iB those same corals from the baseline survey.
4. Determine the overall Net bleaching at a given site. Net bleaching at a site is the coral bleaching at that site during survey x less the average coral bleaching of all reference sites during survey x.
5. Test whether net coral bleaching exceeds trigger levels
  - Paired t-test – compare baseline and survey x results for each coral at a site
  - The trigger level is input as the minimum difference between means for the test (in effect the test of a sample mean being significantly greater than a constant).
6. Should the test of coral bleaching show the exceedence of a trigger level to be significant at the 95% level then the test is repeated with the effect size being the trigger level plus the average coral bleaching of the Reference sites
7. Should the latter test be significant at the 95% level then the coral bleaching level is deemed to have exceeded the trigger level.
8. Investigate multiple lines of evidence to determine whether the exceedence is attributable to dredging and/or spoil disposal activities.

#### 5.3.4.5. **Assessment of Coral Mortality Against Management Triggers at Indicator and Influence Sites**

*Aim: To assess whether net detectable coral mortality at indicator sites exceeds management triggers and whether this exceedence is attributable to dredging and / or spoil disposal activities. A sampling error of at least 3-5% is predicted based on experience gained during the previous dredging operation at Cape Lambert (SKM 2007). This level may be larger or smaller depending on how variable each set of tagged corals are in terms of mortality changes over time. The actual level can only be determined once the monitoring program commences and will change between survey episodes.*

The program has been designed to achieve a power of at least 0.8 to detect small changes in coral health as per Ministerial Condition 8-2. However, the actual level of detectability and power can only be determined once monitoring commences and may change between survey episodes due to natural changes in mortality. If there is a significant level of natural mortality during dredging, it may be required at times to change/add tagged colonies to the program to maintain a high level of power.

Procedure to be followed will include:

1. Analyse each of the coral images using CPCe software
2. Establish the percent cover of Partial Mortality. Partial mortality is defined as the sum of classes, dead coral, sediment, turf algae, coral disease, encrusting sponge, on each coral. Each coral image is assigned a per cent partial mortality (for coral i – PMi) where:
  - $PM_i = (\text{points scored as partial mortality} / \text{number of points within the coral boundary})$
  - PMix is the partial mortality of coral i at survey x.

The Partial Mortality estimate for a site is the average of the corals scored at that site for that survey. For example for Site BLR in Survey 2:

- $PM(BLR2) = \sum PM_{i2} / N$
- where i goes from 1 to N corals.

3. Establish the overall Gross Mortality at a given site. The Gross Mortality at a site is the difference between the survey result and the baseline level, which is calculated as (for example, for site BLR at Survey 2)
  - $PM(BLR2) = \sum (PM_{i2} - PM_{iB}) / N$
  - where i goes from 1 to N corals with N corals being the corals measured at time 2 and iB those same corals from the baseline survey.
4. Determine the overall Net Mortality at a given site. Net Mortality at a site is the Gross Mortality at that site during survey x less the average Gross Mortality of all reference sites during survey x.
5. Test whether net mortality exceeds the numeric trigger levels
  - Paired t-test – compare baseline and survey x results for each coral at a site
  - The trigger level is input as the minimum difference between means for the test (in effect the test of a sample mean being significantly greater than a constant).
6. Should the test of net mortality show the exceedence of a trigger level to be significant at the 95% level then the test is repeated with the effect size being the trigger level plus the average coral mortality of the Reference sites.

7. Should the *latter test be significant* at the 95% level then the *Net Mortality level* is deemed to have exceeded the trigger level.
8. Investigate multiple lines of evidence to determine whether the exceedence is attributable to dredging and/or spoil disposal activities.

#### **5.3.5. Reporting**

The results of the coral health monitoring program will be reported to the DEC on a four-weekly basis as detailed within **Section 6**. In the event of an exceedence of Level 3 Management Triggers, a written report will be provided to the CEO and DSWEPaC within four days of the decline in coral health being identified.

#### **5.3.6. Quality Assurance and Control Procedures**

The following procedures will be undertaken to ensure strict QA/QC procedures are adhered to for coral health assessments:

- A 'processed' folder will be created to ensure that the raw unchanged images are untouched as a backup to compare to if needed.
- Images of each tagged coral taken on the first baseline survey will be numbered and labelled. These images will be printed in colour, laminated and compiled into a set of waterproof coral colony identification cards to assist divers in confirming the location and correct identification of tagged colonies in subsequent trips.
- Whilst in the field, images will be checked to make sure they are of sufficient quality before leaving the site. Any images that are not of sufficient quality will be re-taken.
- A copy of the raw images (as downloaded from the camera) will be retained in a 'raw images' folder and will remain unaltered.
- A 'processed' folder will be created and any alteration or processing of the images will be saved within this folder. All CPCe technicians will undergo QA/QC training before commencing any analyses of images. Extracted data will be periodically tested against that extracted by a highly trained observer to maintain a high level of accuracy and consistency of analysis during the monitoring program.

#### **5.4. Benthic Primary Producer Habitat Monitoring**

A pre-dredging BPPH survey has been undertaken and post-dredging BPPH surveys will be undertaken to assess and evaluate compliance with Conditions 8-1 and 8-10 of the Ministerial Statement 840.

*Condition 8-1 - The Proponent shall ensure that the implementation of the proposal does not cause a direct loss of Benthic Primary Producer Habitat in excess of 0.7 ha.*

*Condition 8-10 – At 6 months and 18 months from completion of construction the Proponent shall report to the CEO the permanent loss of Benthic Primary Producer Habitat and any loss of Benthic Primary Producer (BPP) Communities within the six local assessment units shown on Figure 4b and 4c. The reports shall include co-ordinates and a map showing the areas of loss of BPPH and BPP Communities caused by the proposal and the results of water quality monitoring correlated with coral health, to the requirements of the CEO.*

To demonstrate compliance with the Ministerial Conditions, the data from the pre- and post-dredging BPPH surveys will be compared to determine if any change in BPP communities has occurred, and to evaluate whether any change can be attributed to dredging and spoil disposal activities.

It is important to recognise that attempting to estimate BPPH loss (expressed as hectares or other spatial unit) and the extent of change in BPP communities in highly turbid marine environments and over relatively large areas will inevitably result in estimates with moderate to large levels of uncertainty.

##### **5.4.1. General Approach**

The pre-dredging BPPH monitoring used towed video methods to collect baseline data along replicate transects within potential impact and reference sites to quantify the areal extent of BPPH and composition and percent cover of BPP communities (coral, macro algae and turf algae) within the 6 local assessment units. The post-dredging BPPH monitoring will use the same methods to repeat the sampling so that pre- and post-dredging percent data can be analysed to evaluate whether there has been any change in BPPH areal extent and BPP community composition and/or percent cover. If a change is detected, data from a gradient of sites at varying distances from dredging activities will be used to infer whether this change was likely to be attributable to dredging and/or spoil disposal activities. In addition, data from the water quality and reactive coral health monitoring programs will also be used to assist in the interpretation of whether any detected changes in BPPH or BPP communities can be attributed to dredging and/or spoil disposal activities

If change in BPPH is detected in pre- versus post-dredging data, and is considered to be a consequence of dredging or spoil disposal activities, summed BPPH losses will be compared against allowable limits described under Condition 8-1 of the Ministerial Statement 840.

### 5.4.2. Monitoring Locations

BPPH monitoring will be undertaken at 19 sites, consisting of the existing 13 coral health survey sites (SKM 2010) plus an additional six potential impact sites (**Table 5-3**). The six additional BPPH monitoring sites were selected in representative areas containing BPPH on the south east tip of Bezout Island (three additional sites), the tip of Cape Lambert (one additional site) and on the east of Middle Reef (two additional sites) (**Table 5-3**). The six additional impact sites were also selected so as to represent a distance gradient from the Zone of Impact. This configuration of sites will enable comparison of the condition of BPPH and BPP categories at different distances from the Port B development to provide some insight into whether any potential changes recorded post-dredging are likely to be attributable to dredging or spoil disposal activities.

■ **Table 5-3 BPPH Monitoring Site Locations**

| Existing Coral Health Survey Sites used for BPPH Monitoring |           |           |           |           |
|-------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Name                                                        | Label     | Function  | Latitude  | Longitude |
| Bells Reef                                                  | BLR       | Influence | -20.58420 | 117.14093 |
| Boat Rock                                                   | BTR       | Impact    | -20.55093 | 117.19065 |
| Bezout Island                                               | BZI       | Impact    | -20.55355 | 117.17185 |
| Bezout Rock                                                 | BZR       | Impact    | -20.56372 | 117.16137 |
| Cape Lambert West                                           | CLW       | Impact    | -20.60167 | 117.16222 |
| Dixon Island                                                | DIE       | Influence | -20.61807 | 117.06905 |
| Delambre Island                                             | DLI       | Reference | -20.46227 | 117.06527 |
| Hat Rock                                                    | HAT       | Reference | -20.66842 | 117.28560 |
| Mangrove                                                    | MAN       | Influence | -20.62552 | 117.13851 |
| Middle Reef                                                 | MDR       | Impact    | -20.59945 | 117.19862 |
| Pelican Rocks                                               | PLR       | Influence | -20.65376 | 117.24171 |
| Power Station                                               | PWR       | Impact    | -20.59148 | 117.17830 |
| Samson Beach                                                | SMSB      | Influence | -20.63131 | 117.20405 |
| Additional BPPH Monitoring Sites                            |           |           |           |           |
| Cape Lambert West (West)                                    | CLW west  | Impact    | -20.59528 | 117.1689  |
| Middle Reef north                                           | MDR North | Impact    | -20.59477 | 117.19838 |
| Middle Reef south                                           | MDR South | Impact    | -20.60158 | 117.18727 |
| Bezout Island SE1                                           | BZI SE1   | Impact    | -20.56512 | 117.17280 |
| Bezout Island SE2                                           | BZI SE2   | Impact    | -20.56973 | 117.17410 |
| Bezout Island SE3                                           | BZI SE3   | Impact    | -20.57130 | 117.17671 |

### 5.4.3. Reporting

At 6 months and 18 months from completion of dredging, the Proponent shall report to the CEO the permanent loss of BPPH and any loss of BPP communities within the six local assessment units shown. The reports shall include co-ordinates and a map showing the areas of loss of BPPH and BPP communities caused by the proposal and the results of water quality monitoring correlated with Coral health (Condition 8-10, Ministerial Statement 840). These reports will also be provided to DSWEPaC.

#### 5.4.4. Quality Assurance and Control Procedures

QA/QC procedures are as per those outlined for coral health monitoring (**Section 5.4.4**).

### 5.5. Coral Spawning Assessment and Monitoring

#### 5.5.1. Objective

The objectives of the coral spawning assessment and monitoring surveys are to:

- determine the dominant (most abundant) coral species or genera present at the monitoring sites
- predict with a high level of confidence if mass coral spawning events will occur during predicted coral spawning windows
- prompt the initiation of a management response to minimise the impact of dredging activities on the predicted mass coral spawning event.

#### 5.5.2. Coral Spawning Assessment Timing

Recent findings (SKM 2007) suggest that the spring spawning event at Cape Lambert may only be a minor spawning event and that ‘mass’ spawning is most probably occurring during other times of the year. Other studies of the timing of coral spawning in WA (Babcock et al. 1994; Rosser and Gilmour 2008; Simpson 1985) support the idea that the ‘mass’ spawning of coral takes place during the autumn months. Typically corals in the Pilbara region spawn 6–10 nights after the full moon in autumn (Stoddart and Gilmour 2005). The full moons and the corresponding predicted coral spawning windows for the next year is shown in **Table 5-3**.

#### ▪ Table 5-3 Coral spawning windows

| Full Moon          | Predicted Spawning Window          |
|--------------------|------------------------------------|
| <b>Spring 2010</b> |                                    |
| 23 September 2010  | 29 September – 3 October 2010      |
| 23 October 2010    | 29 October 2010 – 2 November 2010  |
| 22 November 2010   | 28 November 2010 – 2 December 2010 |
| <b>Autumn 2011</b> |                                    |
| 18 February 2011   | 24 February – 28 February 2011     |
| 20 March 2011      | 26 – 30 March 2011                 |
| 18 April 2011      | 24 – 28 April 2011                 |
| <b>Spring 2011</b> |                                    |
| 12 October 2011    | 18 – 22 October 2011               |
| 11 November 2011   | 17 – 21 November 2011              |
| 10 December 2011   | 16 – 20 December 2011              |

#### 5.5.3. Definition of mass coral spawning event

A mass coral spawning event is defined for the purpose of this DSDMP as:

An event where >50% of the dominant (most abundant) coral species or genus group examined within the study area show evidence of potential spawning in the next spawning window.

#### 5.5.4. Coral Spawning Assessment Sites

Three coral spawning assessment sites will be chosen from the monitoring sites within the zone of influence (**Figure 5-1**). It is expected that if synchronised mass spawning takes place it will occur at a regional level, therefore sampling at three sites would capture a mass spawning event if it were to occur. Prior to the first coral spawning assessment survey, the location of each coral spawning assessment site will be determined by GPS and the site will be marked with a centrally placed buoy. The corals will be selected within a 100 m radius of the buoy.

#### 5.5.5. Methodology – Coral Spawning Assessment

##### 5.5.5.1. Selection of coral colonies

At each site, twenty colonies of the most dominant coral species or genus group will be selected randomly for coral spawning assessments. Where possible, larger coral colonies will be selected to ensure the colony is sexually mature. Coral spawning assessments of the dominant coral species or genus groups will be made within one week of the full moon prior to the start of each predicted coral spawning window shown in **Table 5-3**.

##### 5.5.5.2. Assessment of egg development

During each survey a coral fragment will be collected from each randomly selected colony. The coral fragments will be examined visually *in situ* for the presence of pigmented eggs. In the case of coral genera with small polyps (e.g. *Porites* spp or *Turbinaria* spp), the coral fragment will be collected and examined for the presence of pigmented eggs using a dissecting microscope onshore.

The results of the examination will be scored based on egg development i.e. the presence and pigmentation of the eggs. This examination provides a guide as to when the coral colony is likely to spawn (**Table 5-4**)

##### ■ Table 5-4 Gamete development scoring criteria

| Egg Development Status        | Interpretation                                                                                          |
|-------------------------------|---------------------------------------------------------------------------------------------------------|
| Eggs present and pigmented    | Spawning will occur in upcoming spawning window                                                         |
| Eggs present and un-pigmented | Spawning will not occur in upcoming spawning window but is likely to occur in following spawning window |
| No eggs present               | Spawning will not occur in upcoming spawning window                                                     |

#### 5.5.6. Predicting a mass spawning event

A mass coral spawning event would be predicted to occur if the dominant coral species or genus group (aggregate from the individual sites) indicate that the percentages of females with pigmented eggs is in excess of 50%.

For hermaphroditic species this would mean that at least 50% of the species were observed to have pigmented eggs. For gonochoristic species, the percentage of individuals showing pigmented eggs will need to be adjusted by the estimated sex ratio. For example, if a sex ratio of 50:50 is expected, the sample size will be multiplied by 50% meaning that a significant spawning event would be predicted if 25% of the individuals sampled were observed to have pigmented eggs.

In the event that coral spawning surveys at the beginning of either spring or autumn spawning windows indicate that there will not be a mass spawning event for several months, i.e. the complete absence of eggs, then it is proposed to reduce the number of individuals to be surveyed in subsequent months to a minimum of 10 individuals of the dominant species or genus group. If pigmented eggs are detected in any of these surveys then the sample size will be increased to 20 colonies. Reduction in sample numbers is proposed to reduce the destruction of individual coral colonies.

Once a mass coral spawning event is identified for a particular spawning window, no further coral spawning assessments are required for the subsequent spawning window. In addition, no coral spawning assessments are required until the following autumn or spring depending on when the mass coral spawning is first predicted.

#### **5.5.7. Informing the Initiation of a Management Response**

Once a mass coral spawning event is identified for a particular spawning window management responses will be instigated to minimise the impact of the dredging and spoil ground activities on coral spawning.

In accordance with Condition 8-9 of Ministerial Statement 840, where mass coral spawning is predicted to occur during the next coral spawning window, dredging and spoil disposal activities that may impact on coral larvae survival will cease during the period 3 days prior to the predicted commencement of mass coral spawning or as soon as mass coral spawning is detected if prior to that predicted time.

Dredging and spoil disposal activities are to remain suspended for seven days from the commencement of mass coral spawning.

Surveys of the dominant coral species or genus groups will determine that these corals have finished spawning. The end of the mass spawning will be deemed to have occurred when surveys of 10 dominant coral colonies at each site during the window indicate that >50% of these corals have no pigmented eggs present. No further spawning assessment will be carried out until the following year at the same time indicated by the timing of the first mass coral spawning event.

#### **5.5.8. Reporting**

Reporting shall be undertaken in accordance with **Section 6** and as follows:

- Coral spawning assessment reports will be provided to the DEC and DSEWPaC within 10 business days of each spawning assessment undertaken, which shall detail the probability of a mass coral spawning event or the likelihood that corals have already spawned.
- Coral spawning monitoring reports will be provided to the DEC and DSEWPaC within 10 business days of each monitoring survey undertaken.
- DSEWPaC shall be notified (i.e. email / fax statement) if / when dredging and spoil disposal activities have been suspended due to coral spawning.

## **5.6. Invasive Marine Species Management**

### **5.6.1. Overview**

An increase in the number of vessels mobilising to Port Walcott associated with the dredging and spoil disposal program pose a risk of introducing known or suspected IMS of concern to the area. To minimise the risk of introducing IMS of concern to the proposed operational area, a risk management approach will be undertaken. This process includes vessel risk assessment (VRA) to determine the risk status of the vessel, and where outcomes suggest a high/ uncertain risk of harbouring IMS of concern to the Cape Lambert marine environment, vessels will undergo subsequent mitigation measures, including inspections and if necessary cleaning / treatment procedures.

This VRA and subsequent risk reduction measures (i.e. vessel inspections / treatments) will be undertaken by qualified marine scientists with knowledge of IMS and experience in vessel inspections and treatment.

### **5.6.2. Vessel Risk Assessments**

#### **5.6.2.1. Objectives**

The objective of the risk assessment process is to identify the level of risk of any non-trading vessels, entering the operational area, poses if no additional risk reduction mitigation and management measures are implemented.

In accordance with Condition 9-2 of Ministerial Statement 840 exemptions from on-site inspections can be sought where certified low risk is established, as detailed below.

*“Specified vessels and immersible equipment and vessels used to undertake single or multiple bunkering or other routine operational activities at neighbouring ports (Dampier and Port Hedland), will be exempt from the invasive marine species risk mitigation measures referred to in condition 9-1 if, prior to arriving or departing from Port Walcott, the CEO, on advice from the Department of Fisheries, has issued a written exemption for that specified vessel and immersible equipment to enter Port Walcott prior to an identified date, based on comprehensive information submitted by the Proponent that includes a risk assessment supported by documentation*

*demonstrating biofouling management measures and a vessel activity profile since the most recent dry-dock cleaning.”*

#### **5.6.2.2. Procedure**

The risk assessment process will consider the known transmission vectors and the vessels operational and maintenance history to assess the overall risk status of a vessel. The VRA will consider, but not limited to the following factors:

- Vessel type;
- Recent vessel inspection and cleaning history;
- Fouling control systems;
- Vessel origin and proposed area of operation; and
- Ballast/ trim tank sea water origin.

As a result of the risk assessment process, any vessel that is classified as a high / uncertain risk of harbouring IMS of concern to the Cape Lambert marine environment will undergo subsequent mitigation measures, including inspections and if necessary cleaning / treatment procedures.

#### **5.6.2.3. Reporting**

Approved arrival VRA Report and supporting documents to be submitted to DoF demonstrating low risk status prior to operations in order seek exemption from further management measures. Supporting documents include, but are not limited to, the following factors that may influence IMS establishment and survival.

- Presence and condition of fouling control coatings (internal and external);
- Operation and maintenance history (i.e. home port and last port of call); and
- Previous inspections and IMS mitigation and management measures.

Departure VRA will be undertaken to determine if an inspection is required. This process will take into account the bioregion of the proposed operational area and if applicable, the IMS commitments of the contracting party prior to vessel's departure.

### **5.6.3. Inspections**

#### **5.6.3.1. Objectives**

Vessel inspections will be undertaken to determine the presence / absence of invasive marine species as listed in the revised Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) Trigger List, and marine species demonstrating invasive characteristics. These inspections will focus on confirming that the vessel (including any residual sediment) presents a low risk of introducing invasive marine species to the area.

As per Condition 9-1 of Ministerial Statement 840, non-trading vessels and immersible equipment associated with the dredging and spoil disposal program, will be inspected to certify that:

- 1) *there is no sediment on or within the non-trading vessel and equipment;*
- 2) *ballast water (if any) has been, or will be, managed according to the Australian Quarantine Inspection Service ballast water requirements.*
- 3) *No invasive marine species (as listed within the Revised CCIMPE Trigger List) or any other species demonstrating invasive characteristics, have been identified on or within any vessel or immersible equipment inspected; and*
- 4) *Any cleaning or treatment activities undertaken to address invasive marine species risk, has been undertaken to an extent that the non-trading vessel or associated immersible equipment is considered to represent a low risk to the West Australian marine environment.*

#### **5.6.3.2. Procedure**

As stipulated in Condition 9-1 of Ministerial Statement 840, vessel inspections will be conducted:

- a) *Immediately (no more than 48 hours) prior to vessel or immersible equipment departure for Cape Lambert Port B; or*
- b) *Within 48 hours following arrival of vessel or immersible equipment within Port Walcott; and*
- c) *Vessels that have spent more than seven days in coastal waters (less than 50 meters depth) between inspection and their arrival at Port Walcott shall also be inspected during the sixth week after arrival at Port Walcott.*

These inspections will be undertaken either in 'dry dock' or via divers in water with sufficient visibility to conduct a proper inspection. Inspections will be supervised by a qualified marine scientist with experience undertaking IMS inspections and the taxonomic identification of species of concern. The inspector will conduct a general inspection of the following, where applicable:

- vessel hull and associated external niche areas;
- internal and external niches (including anchor lockers, bow thrusters outlets, sea water strainers and cooling systems);
- vessel deck;
- immersible equipment;
- dredging equipment;
- interview with chief engineer or review of chief engineers logbook to determine evidence of bio-fouling within internal seawater systems. Symptoms include restricted water flow / engine overheating; and
- vessel Ballast Water Log Book to ensure AQIS approval of ballast water management.

Photographs or video images will be taken during the inspection to demonstrate the degree of bio-fouling and overall risk status of the vessel.

In the event that sediment or known or suspected IMS are identified, photographic or video images showing the species will be taken, including the full extent of the fouling clearly visible. In addition, samples will be taken and sent for expert taxonomic identification, where required (if found on vessels within Australian waters). The management strategy presented in **Section 4.5** will be implemented when suspected or known marine pest are identified.

Note that as per Condition 9-1 of Ministerial Statement 840, *Tug vessels and other support vessels that move between the Proponents Dampier and Cape Lambert operations and between Johns Creek marina at Point Samson to these operations and remain in Western Australia's territorial waters, are excluded from the requirements of this condition and Condition 9-2.*

### **5.6.3.3. Reporting**

A vessel inspection checklist will be completed following each inspection. This checklist will be provided to the DoF as soon as practicable but within 48 hrs after completion of inspection and before the commencement of operations for each vessel. The submitted checklist will include a statement from the inspector providing an assessment on the status of the vessel in terms of degree of bio-fouling, identification of any known or suspected IMS, compliance with the AQIS mandatory ballast water requirements and presence and condition fouling control systems.

In the event that an IMS is identified on vessel already in state waters, the DoF will be notified as soon as practicable but within 48 hours (following species confirmation).

An inspection report including details of the risk assessments, vessel history, antifouling coat status and inspection results will be provided to the DoF within ten business days of completion of the inspection. Where species confirmation is outstanding, a draft report will be submitted with a clause stating that taxonomic confirmation is pending.

### **5.6.4. Targeted IMS Monitoring**

#### **5.6.4.1. Objective**

Central to the management of invasive species is an understanding of the invasive species already present at the site. This is also required in order to assess the risk that vessel demobilising from the site will spread IMS to unaffected areas.

As stipulated in Condition 9-3 of Ministerial Statement 840, IMS monitoring shall:

*1) be consistent with monitoring design, implementation and reporting standards set out as part of the National Monitoring Network for the Prevention and Management of Marine Pest Incursions, as approved by the Monitoring Design Assessment Panel of the National Introduced Marine Pest Coordinating Group;*

*2) include a review of target priority species prior to each monitoring survey;*

- 3) include a range of sample sites focusing on habitats considered most capable of facilitating the establishment of priority target species throughout all areas of port activities including anchorages, wharves, jetties, slipways, harbours and natural substrates;*
- 4) be undertaken a minimum of every three years for the life of the project; and*
- 5) include opportunistic sampling and analysis of specimens removed during port and vessel maintenance activities.*

#### **5.6.4.2. Methods and Reporting**

The monitoring design, implementation and reporting shall be consistent with the standards set out as part of the National Monitoring Network for the Prevention and Management of Marine Pest Incursions, as approved by the Monitoring Design Assessment Panel of the National Introduced Marine Pest Coordinating Group.

Outcomes from the monitoring program will be fed into the departure VRA, in order to assess the risk of non-trading vessels demobilising from Port Walcott. Targeted IMS monitoring will be undertaken at least every three years for the life of the project.

## 6. Reporting and Auditing

### 6.1. Dredging and Spoil Disposal Management Plan

**Table 6-1** summarises the regulatory reporting requirements associated with the implementation of this DSDMP.

#### ■ Table 6-1 Reporting requirements

| Report Name                                                                         | Contents                                                                                                                                       | Recipients        | Frequency / Schedule                                                                                       |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------|
| <b>Water Quality, Sedimentation and Benthic Primary Producer Habitat Management</b> |                                                                                                                                                |                   |                                                                                                            |
| Water Quality / Coral Health Monitoring Four Weekly Reports                         | Results of the water quality/ coral monitoring program. Two fortnightly surveys reported in each four weekly report.                           | DEC, DSEWPaC      | Submitted 10 business days after the last monitoring field trip                                            |
| Water Quality / Coral Health Final Report                                           | Summary report detailing the water quality and coral health monitoring data collected during the dredging and post dredging monitoring period. | DEC, DSEWPaC      | Submitted within 3 months of completion of final Water Quality and Coral Health surveys.                   |
| Sediment PSD Assessment Report                                                      | Comparison of pre and post dredging survey results                                                                                             | DEC               | Submitted within 3 months of completion of post dredging Sediment PSD assessment                           |
| Model Validation Report                                                             | Results from model validation study                                                                                                            | DEC               | Upon completion of monitoring program                                                                      |
| BPPH Monitoring Report – 6 month post dredging report                               | Comparison of pre dredging BPPH survey with the 6 month post dredging survey results                                                           | CEO, DSEWPaC, DEC | Submitted within 3 months of completion of 6 month BPPH survey                                             |
| BPPH Monitoring Report – 18 month post dredging report                              | Comparison of pre dredging BPPH survey, 6 and 18 month post dredging survey results                                                            | CEO, DSEWPaC, DEC | Submitted within 3 months of completion of 18 month BPPH survey                                            |
| <b>Coral Spawning Management</b>                                                    |                                                                                                                                                |                   |                                                                                                            |
| Coral Spawning Assessment Report                                                    | Results of each coral spawning assessment.                                                                                                     | DEC, DSEWPaC      | Within 10 business days of completion of assessment when the assessment is required (refer to Section 5.5) |
| Coral Spawning Monitoring Report                                                    | Results of each coral spawning monitoring event                                                                                                | DEC, DSEWPaC      | Within 10 business days of completion of monitoring when the monitoring is required (refer to Section 5.5) |
| <b>Turtles and Marine Mammals Management</b>                                        |                                                                                                                                                |                   |                                                                                                            |
| Marine Fauna Incident Reports                                                       | Details of incidents involving injury or mortality to turtle or marine mammals.                                                                | DEC, DSEWPaC      | Per occasion, within 24 hours of incident                                                                  |
| <b>Marine Invasive Species Management</b>                                           |                                                                                                                                                |                   |                                                                                                            |
| IMS Inspection Checklists                                                           | Checklist completed during vessel inspections including assessment of vessel pest status.                                                      | DoF               | Within 48 hours of each inspection                                                                         |

| Report Name                                                                                                                                            | Contents                                                                                                                                                                                                                                                                                  | Recipients                             | Frequency / Schedule                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| IMS Inspection Report                                                                                                                                  | Report on vessel inspection including vessel history.                                                                                                                                                                                                                                     | DoF                                    | Within 10 business days of inspection                                                                                    |
| <b>Spoil Ground Management</b>                                                                                                                         |                                                                                                                                                                                                                                                                                           |                                        |                                                                                                                          |
| Weekly plotting sheets                                                                                                                                 | <ul style="list-style-type: none"> <li>- Times and dates of each dumping run.</li> <li>- Position and track plot of each dumping run.</li> <li>- Volume of each dumping run.</li> </ul>                                                                                                   | Retained for audit/ reporting purposes | Weekly                                                                                                                   |
| Spoil ground bathymetry                                                                                                                                | A digital copy of each of the bathymetry surveys                                                                                                                                                                                                                                          | RAN Hydrographer                       | Within two months of the final bathymetric survey being undertaken                                                       |
| Spoil ground bathymetry                                                                                                                                | <ul style="list-style-type: none"> <li>- A report on the bathymetry, including a chart showing the change in seafloor bathymetry as a result of dumping and including a written commentary on the volumes of dumped material that have been retained within the disposal site.</li> </ul> | DSEWPaC                                | Within two months of the final bathymetric survey being undertaken                                                       |
| IMO Reporting                                                                                                                                          | <ul style="list-style-type: none"> <li>- Permit details.</li> <li>- Details on the quantity and type of sediment disposed.</li> <li>- Other details listed in Appendix 2 of the Sea Dumping Permit (or in a format as approved by the Department from time to time)</li> </ul>            | DSEWPaC                                | Annually, by 31 January each year and upon expiry of the permit or completion of all dumping activities under the permit |
| <b>Hydrocarbon and Chemical Management</b>                                                                                                             |                                                                                                                                                                                                                                                                                           |                                        |                                                                                                                          |
| Hydrocarbon spill report                                                                                                                               | Report on any hydrocarbon spills into the marine environment.                                                                                                                                                                                                                             | DSEWPaC, DEC                           | Per occasion, within 24 hours of incident                                                                                |
| <b>Other Reporting</b>                                                                                                                                 |                                                                                                                                                                                                                                                                                           |                                        |                                                                                                                          |
| Any unexpected environmental incident or environmental risk identified during the course of dumping activities (as required by the Sea Dumping Permit) | <ul style="list-style-type: none"> <li>- Details of the incident or risk;</li> <li>- Measures taken to mitigate the risk or the impact;</li> <li>- Success of those measures in addressing the incident or risk and any additional measures proposed to be taken.</li> </ul>              | DSEWPaC                                | Per occasion, within 24 hours of incident                                                                                |

## 6.2. Compliance Auditing and Reporting

### 6.2.1. Compliance Audit Schedule

A compliance audit schedule will be developed based on the conditions contained within the various approvals documents. An example of a compliance audit schedule which was used for the Cape Lambert Port A dredging program is presented in **Appendix D**. The finalised audit criteria schedule will be provided to the DEC and DSEWPaC for approval.

### **6.2.2. Auditing and Reporting – State Government**

The Proponent will submit to the CEO of the OEPA environmental compliance reports annually, reporting on the previous twelve-month period.

The environmental compliance reports will address each element of the audit program (**Appendix D**).

### **6.2.3. Auditing and Reporting – Commonwealth Government**

An independent audit of compliance with this DSDMP and the relevant SDP will be conducted by an approved auditor. The audit criteria and the independent auditor will be approved by DSEWPac prior to the commencement of the audit. This audit will be undertaken as per the requirement of the SDP and EPBC approval. A report on the audit results will be provided to the DSEWPac once completed.

The DSDMP will undergo periodic reviews. Where improvements measures are identified, the plan will be updated accordingly.

### **6.2.4. Access for Observers**

Upon request, at least two Australian government nominees will 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. Sea Dumping Permit Application Requirements

**Table 7-1** presents the requirements of a SDP application and reference to details of how the requirement has been fulfilled.

■ **Table 7-1 Cross reference of sea dumping permit application requirements**

| Requirements of a Sea Dumping Application |                                                       | Reference/ PER Section                                     |
|-------------------------------------------|-------------------------------------------------------|------------------------------------------------------------|
| Presence of Contaminated Sediment         |                                                       | Section 6.3.5 & Appendix 17                                |
| Previous Testing and Monitoring           |                                                       | WQ: Section 6.3.3<br>Sediment: Section 6.3.5 & Appendix 17 |
| Description of Material to be Dumped      | Type of Material                                      | Section 6.3.5, Section 4.3.1 & Appendix 17                 |
|                                           | Volume of Material to be disposed                     | Section 4.3.1                                              |
|                                           | Location of Material to be Disposed                   | Section 4.3.1                                              |
| History of Dredging                       |                                                       | DSDMP Section 1.3                                          |
| Physical Description of Material          | PSD                                                   | Section 6.3.5 & Appendix 17                                |
| Chemical Description of Material          | Sediment Metals                                       | Section 6.3.5 & Appendix 17                                |
|                                           | Sediment Polycyclic Aromatic Hydrocarbons (PAHs)      | Section 6.3.5 & Appendix 17                                |
|                                           | Sediment Organotins                                   | Section 6.3.5 & Appendix 17                                |
|                                           | Contaminants Above Screening                          | Section 6.3.5 & Appendix 17                                |
|                                           | Contaminants Above Background                         | Section 6.3.5 & Appendix 17                                |
|                                           | Elutriate Testing                                     | Appendix 17                                                |
|                                           | Bioavailability Testing                               | Appendix 17                                                |
|                                           | Sediment Toxicity Testing                             | Appendix 17                                                |
| Biological Assessment                     | Marine Pest Species Survey                            | Section 9.4.4                                              |
|                                           | Introduced Marine Organisms                           | Section 9.4.4                                              |
|                                           | Potential for Translocation                           | Section 9.4.4                                              |
| Waste Audit and Waste Management Options  | Waste Prevention Audit                                | Section 9.5.3                                              |
|                                           | Alternatives to Sea Disposal                          | Section 4.3.1                                              |
|                                           | Comparative Risks to Human Health and the Environment | Section 9.4.2                                              |
|                                           | Reasons for Discarding Options                        | Section 4.3.1                                              |
| Disposal Site and Procedures              | Dredging or Loading Procedures                        | Section 4.3.1 & DSDMP                                      |
|                                           | Disposal Ground                                       | Section 4.3.1                                              |
|                                           | Location of Sites                                     | Section 4.3.1                                              |
|                                           | Sensitive Areas and Marine Park                       | Section 6.4.10                                             |
|                                           | Characteristics of the Disposal Site                  | Section 6.3.4                                              |
|                                           | Bathymetry                                            | Section 6.3.4                                              |
|                                           | Sediment Characteristics                              | Section 6.3.5 & Appendix 17                                |
|                                           | Biological Characteristics                            | Section 6.4.1                                              |

| Requirements of a Sea Dumping Application |                                  | Reference/ PER Section                     |
|-------------------------------------------|----------------------------------|--------------------------------------------|
|                                           | History of the Disposal Site     | <b>Section 4.3.1</b>                       |
|                                           | Disposal Procedures              | <b>Section 4.3.1</b>                       |
|                                           | Projected Impact of Disposal     | <b>Section 9</b>                           |
|                                           | Water Quality Monitoring Program | DSDMP <b>Section 5</b>                     |
|                                           | Coral Monitoring Program         | DSDMP <b>Section 5</b>                     |
| Impact Hypothesis                         |                                  | <b>Section 9</b>                           |
| Monitoring                                |                                  | <b>Section 9.4.2 &amp; DSDMP Section 5</b> |
| National Environmental Significance       |                                  | <b>Section 6.4.9</b>                       |

## 8. References

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## **Appendix A Ministerial Statement 840**



## Minister for Environment; Youth

Statement No. 840

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED  
(PURSUANT TO THE PROVISIONS OF THE  
ENVIRONMENTAL PROTECTION ACT 1986)**

**CAPE LAMBERT PORT B DEVELOPMENT -  
SHIRE OF ROEBOURNE**

**Proposal:** The proposal is to construct and operate a second port (Port B) at Cape Lambert to process and export up to 130 million tonnes of ore per annum.

**Proponent:** Pilbara Iron Pty Ltd

**Proponent Address:** Level 22, Central Park, 152 – 158 St George's Terrace,  
PERTH WA 6000

**Assessment Number:** 1717

**Appeal Determination:** 59 to 61 of 2010

**Report of the Environmental Protection Authority:** Report 1357

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

**1 Proposal Implementation**

- 1-1 The proponent shall implement the proposal as assessed by the Environmental Protection Authority and described in Schedule 1 of this statement subject to the conditions and procedures of this statement.

Published on

**30 SEP 2010**

## **2 Proponent Nomination and Contact Details**

- 2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.
- 2-2 The proponent shall notify the Chief Executive Officer of the Office of the Environmental Protection Authority (CEO) of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

## **3 Time Limit of Authorisation**

- 3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void within five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.
- 3-2 The proponent shall provide the CEO with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

## **4 Compliance Reporting**

- 4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the CEO.
- 4-2 The proponent shall submit to the CEO, the compliance assessment plan required by condition 4-1 at least six calendar months prior to the first Compliance Assessment Report required by condition 4-6 or prior to implementation, whichever is sooner. The compliance assessment plan shall indicate:
  - 1. the frequency of compliance reporting;
  - 2. the approach and timing of compliance assessments;
  - 3. the retention of compliance assessments;
  - 4. reporting of potential non-compliance and corrective actions taken;
  - 5. the table of contents of compliance reports; and
  - 6. public availability of compliance reports.
- 4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.

- 4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the CEO.
- 4-5 The proponent shall advise the CEO of any potential non-compliance within two business days of that non-compliance being known.
- 4-6 The proponent shall submit its first Compliance Assessment Report within 15 months following the date of issue of this statement addressing the twelve-month period from the date of issue of this statement and then annually from the date of submission of the first Compliance Assessment Report. The compliance assessment report shall:
1. be endorsed by the proponent's Managing Director or a person approved in writing by the CEO, delegated to sign on the Managing Director's behalf;
  2. include a statement as to whether the proponent has complied with the conditions;
  3. identify all potential non-compliances and describe corrective and preventative actions taken;
  4. be made publicly available in accordance with the approved compliance assessment plan; and
  5. indicate any proposed changes to the compliance assessment plan required by condition 4-1.

## **5 Fauna – Short Range Endemics**

- 5-1 The proponent shall not clear or disturb:
1. the ground or any vegetation beyond the proposal footprint depicted in Figure 1 and defined in Table 2 of this Statement; and
  2. more than a total combined area of 19.2 hectares of vegetation from those portions of the development footprint that extends over *Lerista neviniae* habitat as outlined in Figure 1 and defined in Table 3 of this Statement.
- 5-2 The proponent shall not clear *Lerista neviniae* habitat; to access borrow, or for the purpose of laydown or storage, or for any purpose other than that essential for the construction of port infrastructure.
- 5-3 The proponent shall submit a ground disturbance report to the CEO to demonstrate ongoing compliance with conditions 5-1 and 5-2 above initially bi-monthly from the commencement of ground disturbing activities, during

construction, and then annually during the operation of Cape Lambert Port B. The report shall include:

1. a clear, top down (not oblique) aerial image captured at the end of each month from the commencement of ground disturbing activities and then annually during the operation of Cape Lambert Port B for those areas of *Lerista neviniae* habitat within the proposal footprint depicted in Figure 1 and defined in Table 3 of this Statement; and
2. a spatial analysis that provides the actual total combined area of *Lerista neviniae* habitat disturbance.

5-4 The proponent shall, in consultation with the Department of Environment and Conservation, for the whole duration of the Cape Lambert Port B development project, actively manage *Lerista neviniae* habitat as defined by primary and secondary dune vegetation and outlined in Figure 1, within the industrial lease area to ensure that its habitat value is maintained or enhanced. Active management shall include:

1. feral animal control;
2. the prohibition of stock;
3. weed control;
4. limited and controlled vehicle and pedestrian access through fencing and signage; and
5. the control of wild fires.

5-5 The proponent shall:

1. within six months of the first shipment of iron ore from Cape Lambert Port B, rehabilitate those areas of the footprint that were cleared during the construction phase but which are not required during the operational phase of the Cape Lambert Port B proposal; and
2. within five years of the cessation of port operations at Cape Lambert Port B, remove all marine and terrestrial infrastructure and rehabilitate all areas disturbed by the Cape Lambert Port B development.

5-6 All plant material used in rehabilitation is to be of local provenance, sourced from coastal plain and near coastal plain communities of the Roebourne Plain, south of Balla Balla and Whim Creek, and north of Cape Preston and the Fortescue River. The dominant species, general species composition, percentage cover and community structure in rehabilitated areas are to be comparable with suitable reference sites on nearby land which has not been disturbed by industrial

development. Reference sites are to be chosen in consultation with the Department of Environment and Conservation.

## **6 Turtle Management**

- 6-1 At all stages of the Cape Lambert Port B development proposal including construction, operations and decommissioning, the proponent shall ensure that, other than the area labelled 'direct light' on Figure 3 and defined in Table 9 of this Statement, the whole of Bell's Beach from the line labelled 'beach boundary' on Figure 3 and defined in Table 9 up to, and including coastal vegetation within which turtle nesting occurs, is maintained in the shade at ground level and is not subject to direct light from Port infrastructure or activities during the turtle nesting and hatching seasons defined as 20 October to 10 March in any year.
- 6-2 The proponent shall implement the *Cape Lambert Port B Development Marine Turtle Management Plan* dated December 2008, and subsequent Cape Lambert Port B Turtle Management Plans prepared in consultation with the Department of Environment and Conservation and in accordance with the review procedures outlined in section seven of the *Cape Lambert Port B Development Marine Turtle Management Plan* dated December 2008.
- 6-3 The proponent shall make the Turtle Management Plan required by condition 6-2, and the results of monitoring programs outlined in the Turtle Management Plan, publicly available in a manner approved by the CEO.
- 6-4 The proponent shall establish, in consultation with the Chief Executive Officer of the Department of Environment and Conservation, protocols to detect, rescue and release adult and hatchling turtles that are or have been mis-orientated or disorientated by light spill.
- 6-5 The proponent shall report any mortality of marine turtles or other threatened or specially protected fauna to the Department of Environment and Conservation within 24 hours following detection.

## **7 Pile Driving**

- 7-1 The proponent shall engage a dedicated Marine Fauna Observer or Observers who must:
  - 1. demonstrate a knowledge and experience of marine wildlife species and their behaviours in the Pilbara region;
  - 2. have the capacity, subject to safety considerations, to move independently between pile driving barges and within the exclusion zones surrounding piling operations;

3. be on duty during all daylight hours when pile-driving operations are conducted; and
4. maintain a log of:
  - (a) observed cetaceans in a format consistent with the National Cetacean Sightings and Strandings Database;
  - (b) other marine fauna observations, including fish kills and wildlife injuries within 500m of piling operations;
  - (c) fauna behaviours, in particular any behaviours that could be attributed to piling activities;
  - (d) management responses in relation to dead and injured wildlife, including the suspension of piling activities as required under condition 7-5; and
  - (e) observation effort in relation to piling activities.

7-2 The proponent shall:

1. make available, on request from the Office of the Environmental Protection Authority, the log prepared by the Marine Fauna Observer or observers, required under condition 7-1; and
2. within six months of completing pile driving operations for Cape Lambert Port B, lodge cetacean records with the National Cetacean Sighting and Strandings Database at the Australian Antarctic Division.

7-3 No pile driving shall commence during daylight hours between sunrise and sunset, until the designated Marine Fauna Observer or observers required by condition 7-1 have verified that no whales or marine turtles have been observed within an area 500 metres from the planned piling operation during the 15 minute period immediately prior to commencement.

7-4 Prior to commencement of full power pile driving, the proponent shall implement soft start-up procedures that slowly increase the intensity of noise emissions over a period of no less than 15 minutes.

7-5 If the Marine Fauna Observer or observers required by condition 7-1, or any other person, should observe a whale or turtle enter within 100 metres of a single piling operation, or 150 metres of each concurrent piling operation, the piling operation within that distance from the whale or turtle is to be suspended.

- 7-6 Pile driving that has been suspended in accordance with condition 7-5 shall not recommence until all whales and turtles have moved beyond 500 metres from the suspended piling operation and beyond 150 metres of all concurrently operating pile-driving operations. Pile driving that has been suspended for more than 15 minutes shall recommence with soft start-up procedures as required by condition 7-4.
- 7-7 No pile-driving shall occur between the hours of sunset and sunrise during:
1. the turtle nesting season defined as 20 October to 10 March in any year; and
  2. the peak southern migration of mother and calf humpback whale pods defined as 15 September to 10 October in any year.
- 7-8 The proponent shall, to the satisfaction of the CEO design and implement, in partnership with an expert or experts in the field of noise propagation modelling in the marine environment, an underwater noise monitoring program during the Cape Lambert Port B pile driving operation to:
1. measure underwater noise from pile driving operations to establish a library of sound signals:
    - (a) at varying distances from the noise source;
    - (b) when driving piles of different sizes and types;
    - (c) during the concurrent piling of different numbers of piles; and
    - (d) in conditions of different water depths.
  2. review the predictive capacity of the noise propagation model used for Cape Lambert Port B and make recommendations for improving the accuracy of underwater noise modelling in the future.
- 7-9 The results of the noise monitoring and modelling review are to be published within three years after the completion of the Cape Lambert Port B pile driving operation in a manner approved by the CEO.

## **8 Marine Dredging**

- 8-1 The proponent shall ensure that the implementation of the proposal does not cause a direct loss of Benthic Primary Producer Habitat in excess of 0.7 hectares. Benthic Primary Producer Habitat is shown on Figure 4a.

8-2 Prior to the commencement of dredging, the proponent shall establish a monitoring program to monitor water quality and coral health. The monitoring program shall include:

1. the collection and analysis of water quality and coral health monitoring data including turbidity (NTU), temperature (°C), light ( $\mu\text{mol.m}^2/\text{day}$ ), gross sedimentation rates ( $\text{mg.cm}^2/\text{day}$ ), particle size distribution and coral health;
2. monitoring for all the nominated parameters is to be undertaken at the 15 monitoring sites as listed in Table 6 and shown on Figures 4b and 4c in Schedule 1;
3. Data recording and downloading frequencies for all the nominated parameters at the 13 monitoring sites (including one 'impact', five 'indicator', five 'influence' and two 'reference' sites) listed in Table 6 of this Statement, as set out below, unless otherwise approved by the CEO:
  - (a) coral health monitoring is to be undertaken at intervals of 14 days or less;
  - (b) particle size distribution monitoring should, as a minimum, occur prior to, during and post dredging;
  - (c) sedimentation deposition data is to be collected at intervals of 14 days or less using sediment traps;
  - (d) all other parameters, including NTU and temperature, are to be recorded at intervals not exceeding 30 minutes and downloaded at intervals of 14 days or less.
4. the two 'contingency reference' sites listed in Table 6 of this Statement, shall be monitored as required in order to provide evidence of the spatial distribution of any observed trends in water quality or coral health at the 13 monitoring sites.

This program shall be designed to allow net coral mortality at any 'indicator' site listed in Table 6 of this Statement to be calculated with a statistical power of 0.8 or greater, or an alternative statistical power determined by the CEO.

8-3 Prior to the commencement of dredging the proponent shall implement the monitoring program required by condition 8-2 to the satisfaction of the CEO.

8-4 The proponent shall ensure that net detectable coral mortality at any 'indicator' site listed in Table 6 of this Statement, which is a result of proposal implementation, is less than 5 percent and the net detectable coral mortality at any 'influence' site listed in Table 6 is zero.

- 8-5 The proponent shall monitor water quality and coral health for the duration of the dredging and/or spoil disposal activities and for at least two months after cessation of all dredging and spoil disposal activities.
- 8-6 In the event that the coral health monitoring required by condition 8-3 is not undertaken during any 28 day period (i.e., two consecutive coral health monitoring surveys) at any 'indicator' or 'influence' site, the proponent shall immediately cease dredging and disposal activities which may affect water quality at that site until such a time as the net detectable coral mortality at that site can be assessed and demonstrated to be no greater than that stated in condition 8-4.
- 8-7 In the event that monitoring required by conditions 8-3 and 8-5 indicates that the coral criterion in condition 8-4 is not being met at any 'indicator' site as a result of proposal implementation and the circumstances which led to the exceedance still persist or are likely to re-occur, the proponent shall:
1. immediately cease dredging activities that could contribute to the decline in coral health at the affected 'indicator' site(s); and
  2. report such findings including evidence which allows the determination of the cause of the decline in coral health.
- The proponent shall report the above to the CEO within 4 days of the decline in coral health being identified.
- 8-8 The proponent shall not recommence dredging and/or spoil disposal activities following any cessation required under condition 8-7 until it can be demonstrated to the requirements of the CEO that the recommencement of such activities will not contribute to further net mortality of corals at sites where non compliant levels of net detectable coral mortality have occurred.
- 8-9 The proponent shall not conduct any dredging and/or spoil disposal activities or drilling and blasting activity during the period 3 days prior to the predicted commencement of mass coral spawning or as soon as mass coral spawning is detected if prior to that predicted time, and dredging and spoil disposal activities are to remain suspended for seven days from the commencement of mass coral spawning.
- 8-10 At 6 months and 18 months from completion of construction the proponent shall report to the CEO the permanent loss of Benthic Primary Producer Habitat and any loss of Benthic Primary Producer Communities within the six local assessment units shown on Figures 4b and 4c. The reports shall include co-ordinates and a map showing the areas of loss of Benthic Primary Producer Habitat and Benthic Primary Producer Communities caused by the proposal and

the results of water quality monitoring correlated with Coral health, to the requirements of the CEO.

For the purpose of conditions 8-1 to 8-10, the terms 'benthic primary producers', 'benthic primary producer communities', 'benthic primary producer habitats', 'permanent loss' and 'direct loss' are defined in EPA Environmental Assessment Guideline Number 3; *Protection Of Benthic Primary Producer Habitats In Western Australia's Marine Environment* (EAG3).

## **9 Non-Indigenous Marine Species**

9-1 The proponent shall ensure that all non-trading vessels and associated immersible equipment, that are either owned by the proponent, or contracted for construction, maintenance, port operations or decommissioning of the Cape Lambert Port B proposal, (including dredges and pile driving barges) are appropriately cleaned, maintained and inspected by a Department of Fisheries Officer or a suitably qualified marine pest expert approved by the Department of Fisheries, and provide evidence to the satisfaction of the CEO on advice from the Department of Fisheries, certifying that:

1. there is no sediment on or within the non-trading vessel and equipment;
2. ballast water (if any) has been, or will be, managed according to the Australian Quarantine Inspection Service ballast water requirements;
3. no invasive marine species (as listed within the Revised Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) Trigger List - refer to condition 9-5) or any other species demonstrating invasive characteristics, have been identified on or within any vessel or immersible equipment inspected;
4. any cleaning or treatment activities undertaken to address invasive marine species risk, has been undertaken to an extent that the non-trading vessel or associated immersible equipment is considered to represent a low risk to the West Australian marine environment; and
5. vessel and immersible equipment inspections shall be conducted either;
  - (a) immediately (no more than 48 hours) prior to vessel or immersible equipment departure for Cape Lambert Port B; or
  - (b) within 48 hours following arrival of vessel or immersible equipment within Port Walcott; and
  - (c) vessels that have spent more than seven days in coastal waters (less than 50 meters depth) between inspection and their arrival at Port Walcott shall also be inspected during the sixth week after arrival in Port Walcott.

Tug vessels and other support vessels that move between the proponents Dampier and Cape Lambert operations and between Johns Creek marina at Point Samson to these operations and remain in Western Australia's territorial waters, are excluded from the requirements of this condition and condition 9-2.

- 9-2 Specified vessels and immersible equipment and vessels used to undertake single or multiple bunkering or other routine operational activities at neighbouring ports (Dampier and Port Hedland), will be exempt from the invasive marine species risk mitigation measures referred to in condition 9-1 if, prior to arriving or departing from Port Walcott, the CEO, on advice from the Department of Fisheries, has issued a written exemption for that specified vessel and immersible equipment to enter Port Walcott prior to an identified date, based on comprehensive information submitted by the proponent that includes a risk assessment supported by documentation demonstrating biofouling management measures and a vessel activity profile since the most recent dry-dock cleaning.
- 9-3 If, non-trading vessels and associated immersible equipment are to be transferred without exemption (condition 9-2) from Cape Lambert to other locations within Western Australia's territorial waters, the proponent shall, at least 14 days prior to departure from Port Walcott, undertake an inspection or submit a demobilisation risk assessment to the Department of Fisheries that is informed by the invasive marine species monitoring of Cape Lambert Port B. Invasive marine species monitoring shall:
1. be consistent with monitoring design, implementation and reporting standards set out as part of the National Monitoring Network for the Prevention and Management of Marine Pest Incursions, as approved by the Monitoring Design Assessment Panel of the National Introduced Marine Pest Coordinating Group;
  2. include a review of target priority species prior to each monitoring survey;
  3. include a range of sample sites focusing on habitats considered most capable of facilitating the establishment of priority target species throughout all areas of port activities including anchorages, wharves, jetties, slipways, harbours and natural substrates;
  4. be undertaken a minimum of every three years for the life of the project; and
  5. include opportunistic sampling and analysis of specimens removed during port and vessel maintenance activities.
- 9-4 The proponent shall, throughout the life of the project notify the CEO and the Department of Fisheries of any known invasive marine species detected in the waters within the marine leases held by the proponent at or adjacent to Cape

Lambert within 48 hours following detection or following subsequent sample analysis undertaken as part of inspection or monitoring activities.

- 9-5 In the event that any invasive marine species are detected during either the inspection of non-trading vessels and immersible equipment, or during monitoring surveys, the proponent shall, in consultation with the CEO and the Department of Fisheries develop and implement an agreed Invasive Marine Species Management Strategy to prevent wherever practicable, the establishment and proliferation of that organism, aiming to control and potentially eradicating that organism, and to minimize the risk of that the organism being transferred to other locations within Western Australia.

For the purpose of conditions 9-1 to 9-5: the term 'non-trading vessel' refers to those vessels included in the definition of non-trading vessels outlined in the *National System for the Prevention and Management of Marine Pest Incursions, National Biofouling Management Guidance for Non-Trading Vessels*; and known invasive marine species are considered to be those species listed by the Consultative Committee on Introduced Marine Pest Emergencies (CCIMPE) within the Revised CCIMPE Trigger List.

## **10 Dust**

- 10-1 Prior to commissioning, the proponent shall update the *Dust Management Plan – 2009 Cape Lambert Port Operations, December 2008* to include Cape Lambert Port B to the requirements of the CEO on advice from the Department of Environment and Conservation.
- 10-2 The Construction Environmental Management Plan and Dust Management Plan shall describe the process for defining and reviewing criteria for determining when port construction or operation is significantly contributing to ambient dust levels at Point Samson and Wickham, in consultation with the Department of Environment and Conservation.
- 10-3 The proponent shall implement the Dust Management Plan required by condition 10-1.
- 10-4 The proponent shall make the Dust Management Plan required by condition 10-1 publicly available in a manner approved by the CEO.

## **11 Marine Drilling and Blasting Activities**

- 11-1 Prior to commencing marine drilling and blasting activities, the proponent shall prepare to the requirements of the CEO, a Drilling and Blasting Management Plan (D&BMP), in consultation with:
1. Department of Environment and Conservation;

2. Department of Transport (Maritime Division);
  3. Department of Fisheries; and
  4. Commonwealth Department of the Environment, Water, Heritage and the Arts.
- 11-2 The objectives of the D&BMP are to ensure that drilling and blasting activities are managed to minimise adverse impacts on marine vertebrate species. The D&BMP shall include:
1. an assessment of the amount of drilling and blasting required and over what area;
  2. an assessment of likely blast pressures and potential environmental impacts of these pressures;
  3. management actions and procedures to minimise environmental impacts, including the disposal of drilling muds and consideration of ecological windows between seasonally sensitive periods for marine wildlife;
  4. a description of how dead and injured wildlife are to be managed;
  5. stakeholder communication; and
  6. reporting procedures and time frames.
- 11-3 In the event that marine drilling and blasting is required, the proponent shall implement the D&BMP required under conditions 11-1 and 11-2.
- 11-4 The proponent shall make the Plan required under conditions 11-1 and 11-2 publically available in a manner approved by the CEO.
- 11-5 No dredging, marine drilling or blasting activities are to be conducted outside the 320 hectare area illustrated in Figure 2 and bounded by the coordinates listed in Table 4 of this Statement.
- 11-6 The disposal of dredge material is not to take place in Western Australian State Waters outside the two square kilometre area bounded by the coordinates listed in Table 5 of this Statement.

## **Procedures**

1. Where a condition states “on advice of the Environmental Protection Authority”, the Office of the Environmental Protection Authority will provide that advice to the proponent.

2. The Office of the Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the proponent.
3. The proponent is required to apply for a Works Approval and Licence for this project under the provision of Part V of the *Environmental Protection Act 1986*.



Hon Donna Faragher JP MLC  
**MINISTER FOR ENVIRONMENT; YOUTH**

**30 SEP 2010**

## Schedule 1

### The Proposal (Assessment No.1717)

#### General Description

The proposal is for the construction and operation of a second port (Port B) at Cape Lambert to process and export up to 130 million tonnes of ore per annum (Mtpa).

The upgrade works are described in the following documents:

- *Cape Lambert Port B development – Public Environmental Review and draft Public Environmental Report, March 2009.* Prepared for Rio Tinto Pty Ltd by Sinclair Knight Merz (17 March 2009); and
- *Cape Lambert Port B Development – Environmental Assessment of the Wharf relocation, November 2009.* Prepared for Rio Tinto Pty Ltd by Sinclair Knight Merz (27 November 2009).

#### Summary Description

A summary of the key proposal characteristics is presented in Table 1.

**Table 1 Summary of Key Characteristics of the Cape Lambert Port B Proposal**

| Element                                                                                                                                                                                                                                                                                                                                                                          | Description                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Life of project                                                                                                                                                                                                                                                                                                                                                                  | At least 50 years                                                                                                                                                                                                          |
| Iron ore throughput capacity                                                                                                                                                                                                                                                                                                                                                     | Up to 130 Mtpa                                                                                                                                                                                                             |
| Stockyard capacity                                                                                                                                                                                                                                                                                                                                                               | Storage to accommodate up to 130 Mtpa.                                                                                                                                                                                     |
| Total footprint of land-based activities                                                                                                                                                                                                                                                                                                                                         | 340 ha                                                                                                                                                                                                                     |
| Total area of vegetation clearing within the footprint                                                                                                                                                                                                                                                                                                                           | 300 ha                                                                                                                                                                                                                     |
| <b>Dredging:</b><br>Volume of sea bed to be dredged for berth pockets, turning basins, departure channel, service wharf B and tug harbour extension:<br>Area of seabed to be dredged:<br>Dredging depths; <ul style="list-style-type: none"> <li>• berth pockets;</li> <li>• approach/departure channel; and</li> <li>• turning basins.</li> </ul> Duration of dredging program: | Up to 14 Mm <sup>3</sup><br>Up to 320 ha<br><br><ul style="list-style-type: none"> <li>• 20 metres Chart Datum;</li> <li>• 16 metres Chart Datum; and</li> <li>• 10 metres Chart Datum.</li> </ul> Approximately 52 weeks. |

**Table 1 Summary of Key Characteristics of the Cape Lambert Port B Proposal (cont'd)**

| <b>Element</b>                                                                                                                                                                                                                          | <b>Description</b>                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Dredge disposal:</b><br>Number of spoil grounds in State waters:<br>Dimensions of spoil ground:<br>Volume of dredge spoil to be disposed of in Western Australian State Waters:<br>Amount of dredge spoil to be disposed of onshore: | 1<br>2 km long by 1 km wide<br>6.06 Mm <sup>3</sup><br>0 Mm <sup>3</sup>                                                       |
| Duration of pile driving operation                                                                                                                                                                                                      | Approximately 52 weeks                                                                                                         |
| <b>Access jetty and wharf:</b><br>Design:<br>Length:<br>Number of ship loading berths:                                                                                                                                                  | Open trellis design allowing water flow beneath.<br>Up to 2.2 km (from conveyor junction on land to end of wharf).<br>Up to 4. |
| <b>Major plant components:</b><br>Car dumpers:<br>Screenhouses (lump rescreening plants):<br>Sample stations/systems:<br>Stackers:<br>Reclaimers:<br>Shiploaders:                                                                       | 3<br>2<br>2<br>3 or 4<br>3<br>2                                                                                                |

#### **Abbreviations**

Mtpa million tonnes per annum  
ha hectares  
Mm<sup>3</sup> million cubic metres  
km kilometre

#### **Attachments**

##### **Figures (attached)**

Figure 1 Terrestrial component of proposal footprint with *Lerista neviniae* habitat  
Figure 2 Marine component of proposal footprint.  
Figure 3 Bell's Beach light spill  
Figure 4a Predicted dredging impacts and monitoring sites  
Figure 4b Predicted dredging impacts and monitoring sites

Figure 4c Predicted dredging impacts and monitoring sites

**Tables (attached)**

|         |                                                                          |
|---------|--------------------------------------------------------------------------|
| Table 2 | Coordinates of terrestrial footprint                                     |
| Table 3 | Coordinates of potential impact areas in <i>Lerista neviniae</i> habitat |
| Table 4 | Coordinates of dredging footprint                                        |
| Table 5 | Coordinates of Western Australian State waters spoil disposal site.      |
| Table 6 | Coordinates of dredging impact monitoring sites                          |
| Table 7 | Boundary coordinates of predicted worst case dredging impacts            |
| Table 8 | Seaward boundary coordinates of shaded area on Bell's Beach              |
| Table 9 | Coordinates of area of direct light at Bell's Beach                      |

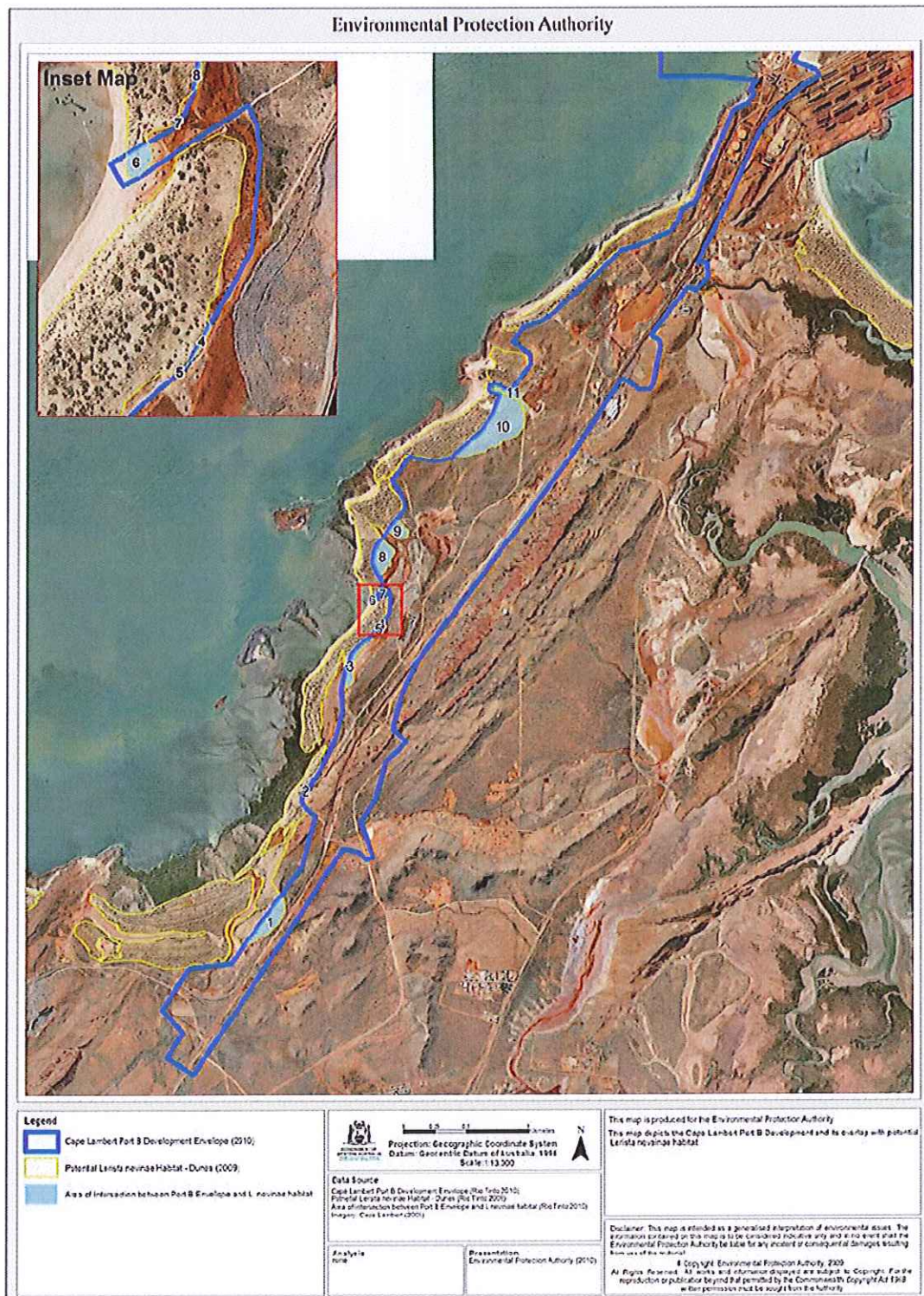


Figure 1: Terrestrial component of proposal footprint with *Lerista neviniae* habitat

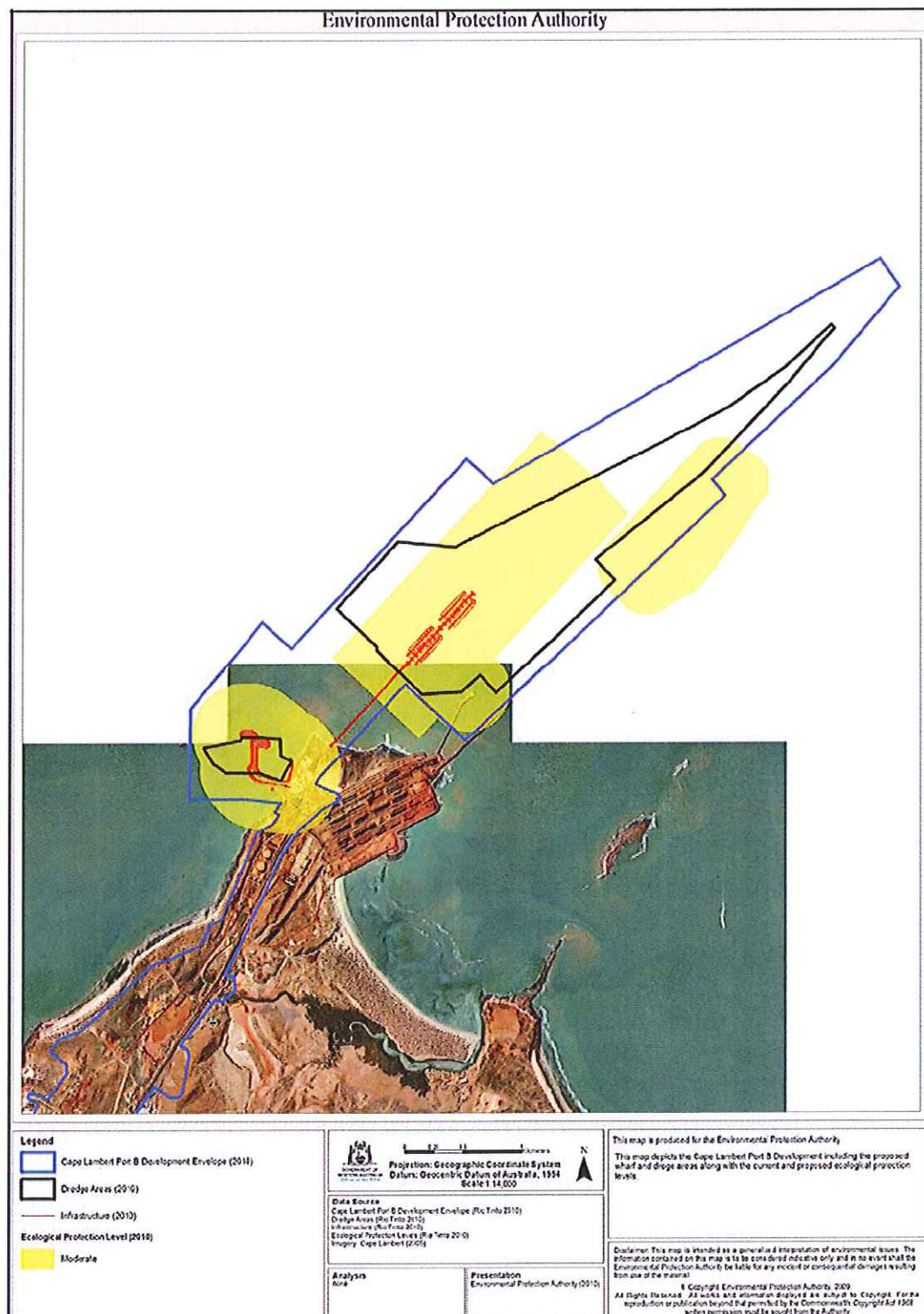


**Figure 2: Marine Component of Proposal Footprint**

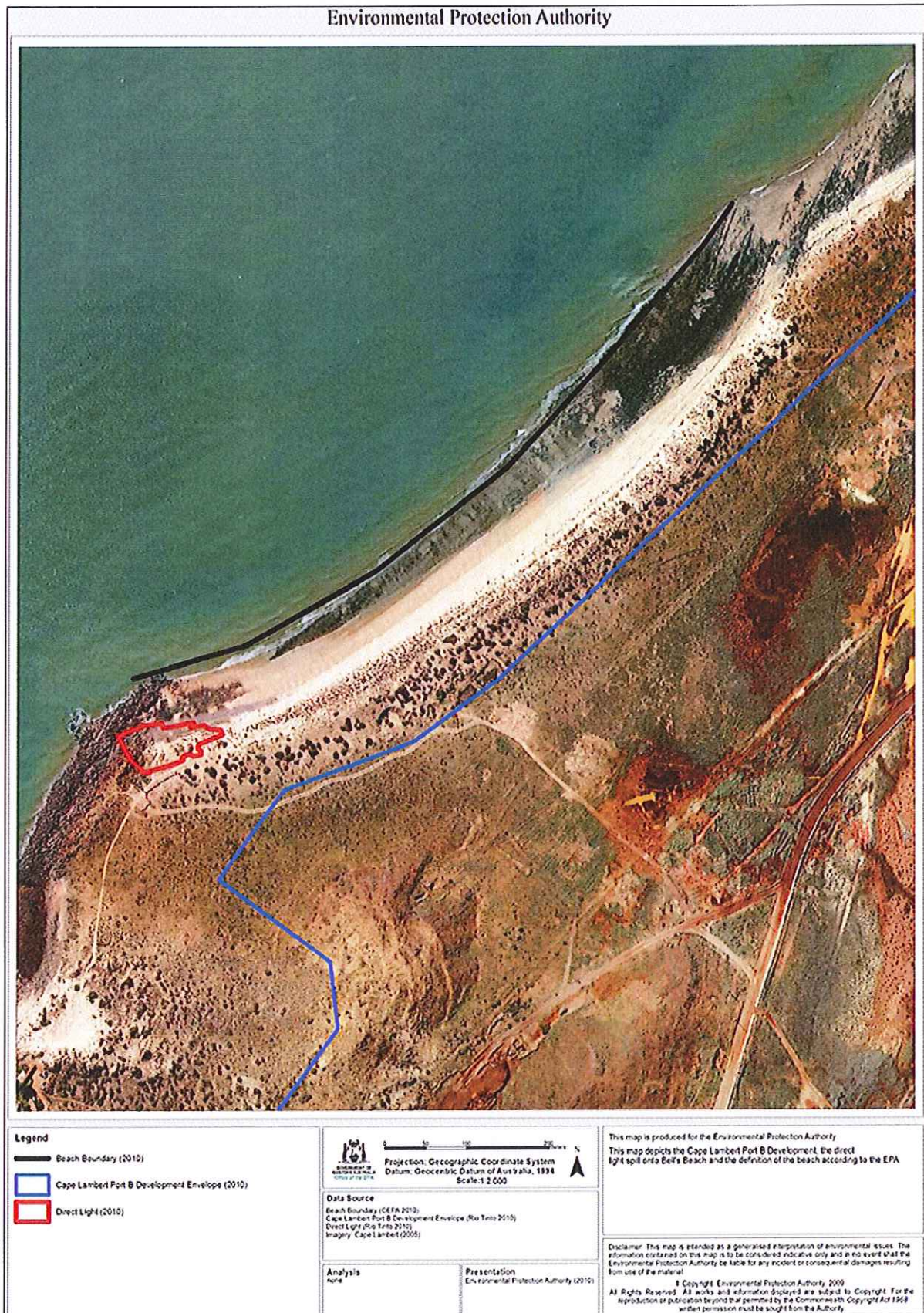


**Figure 3: Bell's Beach Light Spill**

### Figure 4a: Predicted Dredging Impacts and Monitoring Sites

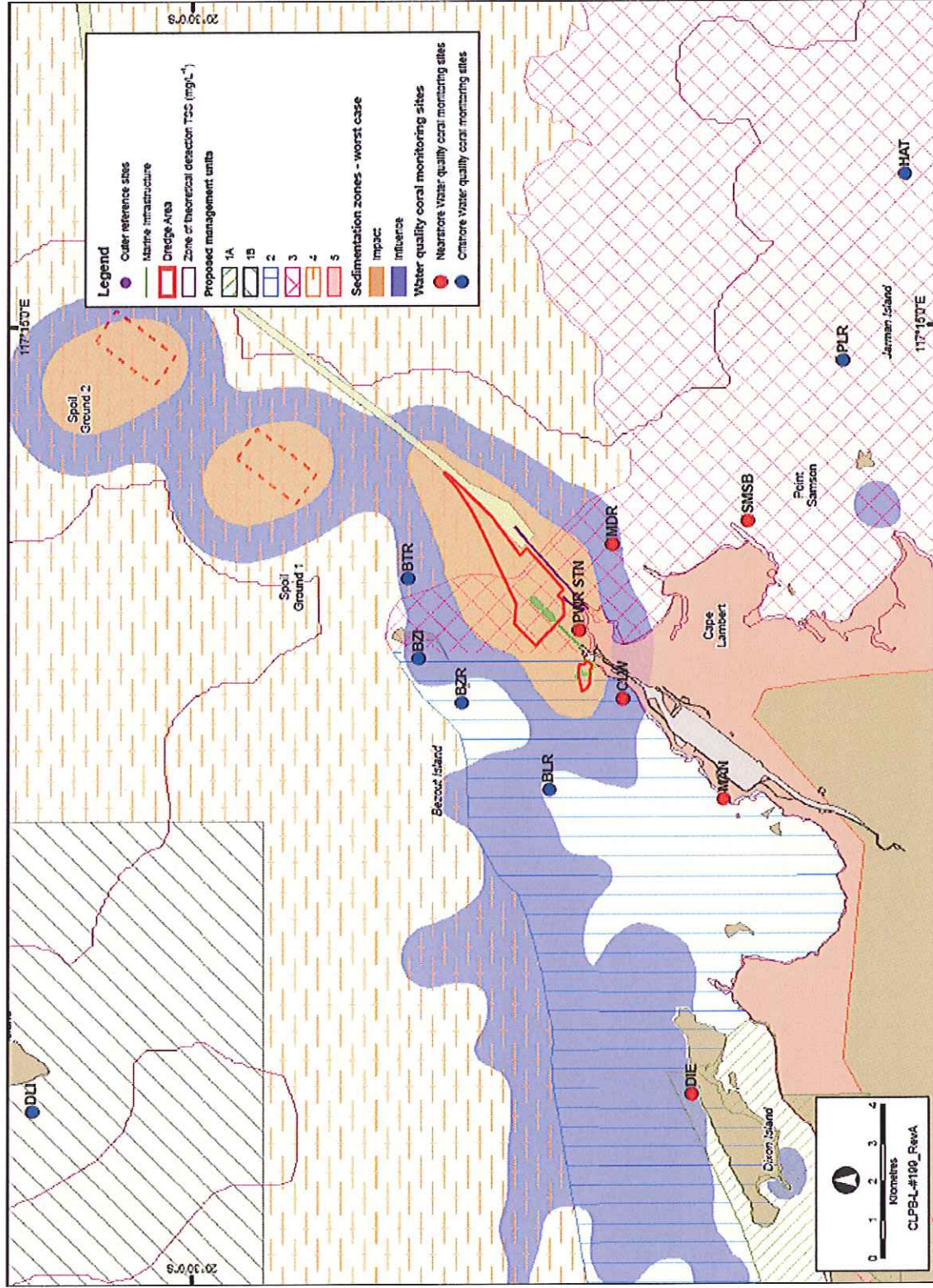


Figure 4b: Predicted Dredging Impacts and Monitoring Sites

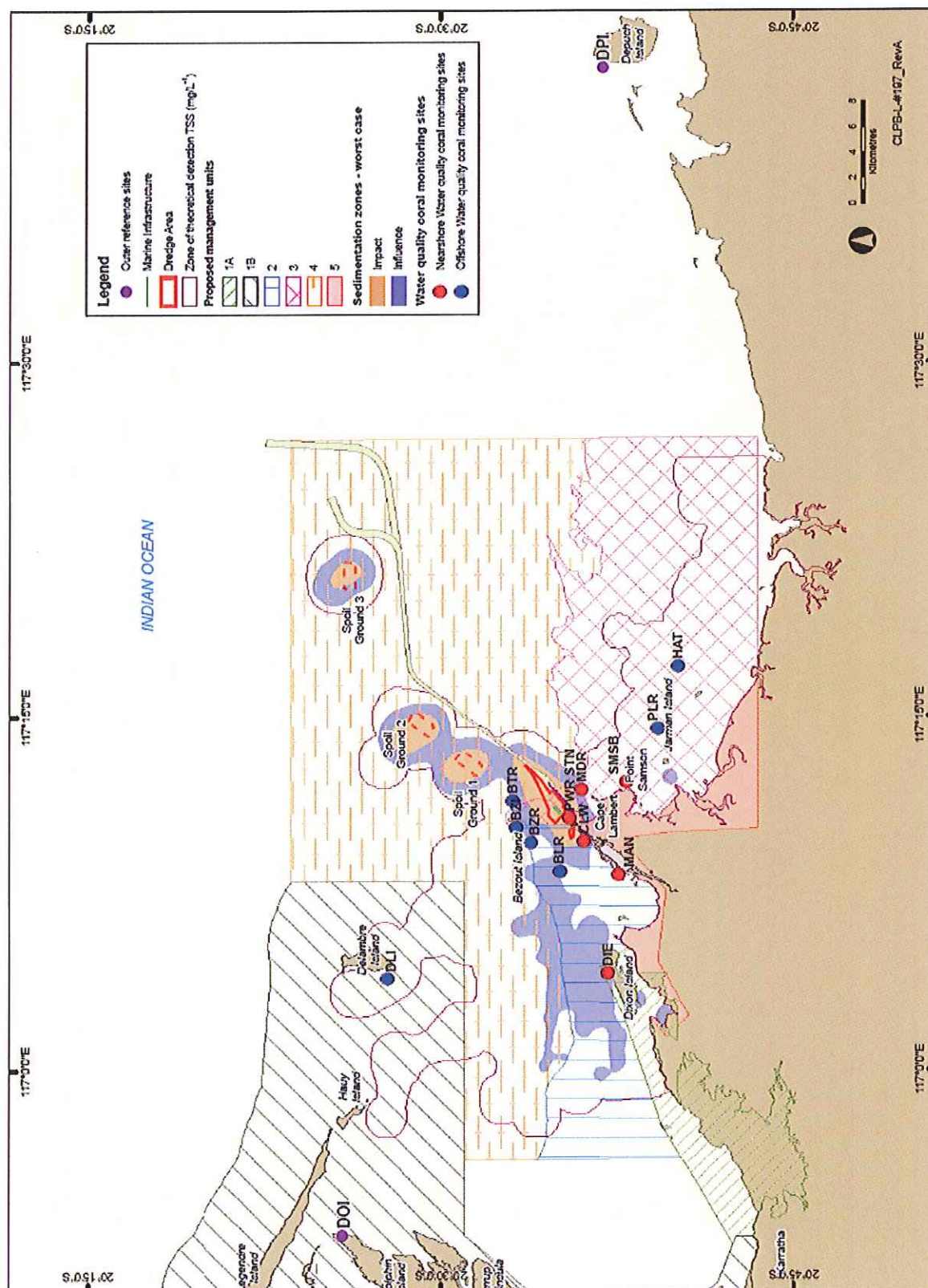


**Table 2** Coordinates of terrestrial footprint

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 518063         | 7722744         |
| 518056         | 7722736         |
| 518037         | 7722691         |
| 518223         | 7722610         |
| 518248         | 7722565         |
| 518195         | 7722537         |
| 518090         | 7722468         |
| 517904         | 7722309         |
| 517858         | 7722254         |
| 517771         | 7722125         |
| 517650         | 7721875         |
| 517610         | 7721767         |
| 517283         | 7721100         |
| 517261         | 7721054         |
| 517340         | 7721054         |
| 517350         | 7720945         |
| 517254         | 7720835         |
| 517181         | 7720855         |
| 516888         | 7720466         |
| 516952         | 7720428         |
| 516962         | 7720378         |
| 516906         | 7720059         |
| 516870         | 7720025         |
| 516797         | 7720025         |
| 516657         | 7720117         |
| 516304         | 7719578         |
| 516231         | 7719462         |
| 514996         | 7717800         |
| 514884         | 7717554         |
| 514817         | 7717274         |
| 514920         | 7717170         |
| 514752         | 7717002         |
| 514681         | 7716707         |
| 514557         | 7716519         |
| 514659         | 7716232         |
| 514601         | 7716212         |
| 514549         | 7716270         |
| 514536         | 7716279         |
| 514416         | 7716305         |

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 513211         | 7714469         |
| 512996         | 7714608         |
| 513125         | 7714807         |
| 512962         | 7714997         |
| 513175         | 7715333         |
| 513505         | 7715369         |
| 514082         | 7716157         |
| 514188         | 7716567         |
| 514140         | 7716607         |
| 514122         | 7716622         |
| 514107         | 7716637         |
| 514078         | 7716671         |
| 514074         | 7716691         |
| 514076         | 7716711         |
| 514087         | 7716741         |
| 514156         | 7716818         |
| 514172         | 7716853         |
| 514191         | 7716887         |
| 514219         | 7716927         |
| 514352         | 7717197         |
| 514409         | 7717414         |
| 514407         | 7717457         |
| 514406         | 7717497         |
| 514399         | 7717562         |
| 514400         | 7717601         |
| 514406         | 7717641         |
| 514425         | 7717705         |
| 514457         | 7717807         |
| 514480         | 7717887         |
| 514715         | 7718096         |
| 514786         | 7718227         |
| 514794         | 7718308         |
| 514797         | 7718339         |
| 514793         | 7718371         |
| 514782         | 7718393         |
| 514731         | 7718360         |
| 514666         | 7718316         |
| 514641         | 7718301         |
| 514626         | 7718326         |

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 514655         | 7718343         |
| 514694         | 7718365         |
| 514711         | 7718384         |
| 514722         | 7718410         |
| 514729         | 7718466         |
| 514705         | 7718511         |
| 514671         | 7718580         |
| 514655         | 7718619         |
| 514662         | 7718690         |
| 514671         | 7718729         |
| 514689         | 7718767         |
| 514909         | 7719067         |
| 514891         | 7719156         |
| 514807         | 7719287         |
| 514951         | 7719484         |
| 515153         | 7719446         |
| 515279         | 7719469         |
| 515523         | 7719690         |
| 515619         | 7719834         |
| 515672         | 7719983         |
| 515646         | 7719997         |
| 515602         | 7720010         |
| 515582         | 7720030         |
| 515590         | 7720056         |
| 515613         | 7720052         |
| 515622         | 7720065         |
| 515668         | 7720054         |
| 515753         | 7720008         |
| 515919         | 7720234         |
| 515909         | 7720317         |
| 515773         | 7720417         |
| 515853         | 7720526         |
| 516013         | 7720585         |
| 516114         | 7720660         |
| 516647         | 7721154         |
| 516785         | 7721195         |
| 517044         | 7721309         |
| 517101         | 7721385         |
| 517134         | 7721488         |

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 517237         | 7721544         |
| 517334         | 7721785         |
| 517438         | 7722032         |
| 517543         | 7722282         |
| 517666         | 7722348         |
| 517676         | 7722359         |
| 517693         | 7722377         |
| 517724         | 7722431         |
| 517691         | 7722451         |
| 517741         | 7722532         |
| 517711         | 7722535         |
| 517714         | 7722541         |
| 517773         | 7722614         |
| 517767         | 7722632         |
| 517757         | 7722658         |
| 517758         | 7722684         |
| 517766         | 7722690         |
| 517774         | 7722686         |
| 517784         | 7722668         |
| 517790         | 7722660         |
| 517808         | 7722657         |
| 517810         | 7722666         |
| 517829         | 7722692         |
| 517828         | 7722709         |
| 517818         | 7722709         |
| 517791         | 7722710         |
| 517790         | 7722719         |
| 517799         | 7722758         |
| 517795         | 7722776         |
| 517797         | 7722786         |
| 517827         | 7722805         |
| 517844         | 7722836         |
| 517868         | 7722866         |
| 517946         | 7722965         |
| 517967         | 7722998         |
| 517984         | 7723003         |
| 517993         | 7723002         |
| 518008         | 7722985         |
| 518010         | 7722976         |
| 517999         | 7722947         |

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 518003         | 7722939         |
| 518012         | 7722946         |
| 518025         | 7722965         |
| 518033         | 7722969         |
| 518067         | 7722970         |
| 518075         | 7722966         |
| 518082         | 7722958         |
| 518087         | 7722924         |
| 518085         | 7722905         |
| 518059         | 7722863         |
| 518043         | 7722835         |
| 518018         | 7722805         |
| 518015         | 7722785         |
| 518028         | 7722768         |
| 518046         | 7722759         |
| 518063         | 7722744         |

**Table 3** Coordinates of potential impact areas in *Lerista neviniae* habitat

| Polygon intersection number- corresponds with map | Easting | Northing |
|---------------------------------------------------|---------|----------|
| 1                                                 | 513614  | 7715517  |
| 1                                                 | 513635  | 7715521  |
| 1                                                 | 513666  | 7715537  |
| 1                                                 | 513701  | 7715552  |
| 1                                                 | 513727  | 7715571  |
| 1                                                 | 513754  | 7715596  |
| 1                                                 | 513815  | 7715625  |
| 1                                                 | 513856  | 7715664  |
| 1                                                 | 513891  | 7715699  |
| 1                                                 | 513910  | 7715922  |
| 1                                                 | 513913  | 7715736  |
| 1                                                 | 513923  | 7715906  |
| 1                                                 | 513935  | 7715880  |
| 1                                                 | 513935  | 7715854  |
| 1                                                 | 513940  | 7715804  |
| 1                                                 | 513940  | 7715804  |
| 2                                                 | 514087  | 7716741  |
| 2                                                 | 514129  | 7716788  |
| 2                                                 | 514156  | 7716818  |
| 2                                                 | 514156  | 7716818  |
| 3                                                 | 514426  | 7717660  |
| 3                                                 | 514430  | 7717625  |
| 3                                                 | 514431  | 7717703  |
| 3                                                 | 514434  | 7717732  |
| 3                                                 | 514442  | 7717622  |
| 3                                                 | 514457  | 7717807  |
| 3                                                 | 514469  | 7717634  |
| 3                                                 | 514480  | 7717887  |
| 3                                                 | 514489  | 7717659  |
| 3                                                 | 514493  | 7717734  |
| 3                                                 | 514495  | 7717791  |
| 3                                                 | 514502  | 7717689  |
| 3                                                 | 514523  | 7717862  |
| 3                                                 | 514558  | 7717919  |
| 3                                                 | 514599  | 7717973  |
| 3                                                 | 514615  | 7717986  |
| 3                                                 | 514625  | 7717999  |
| 3                                                 | 514630  | 7718020  |
| 3                                                 | 514630  | 7718020  |
| 4                                                 | 514718  | 7718102  |
| 4                                                 | 514727  | 7718112  |
| 4                                                 | 514740  | 7718142  |
| 4                                                 | 514742  | 7718137  |
| 4                                                 | 514742  | 7718137  |
| 5                                                 | 514707  | 7718089  |

| Polygon intersection number- corresponds with map | Easting | Northing |
|---------------------------------------------------|---------|----------|
| 5                                                 | 514707  | 7718089  |
| 5                                                 | 514708  | 7718090  |
| 5                                                 | 514708  | 7718090  |
| 6                                                 | 514645  | 7718337  |
| 6                                                 | 514645  | 7718324  |
| 6                                                 | 514647  | 7718312  |
| 6                                                 | 514655  | 7718343  |
| 6                                                 | 514658  | 7718312  |
| 6                                                 | 514669  | 7718322  |
| 6                                                 | 514669  | 7718351  |
| 6                                                 | 514671  | 7718348  |
| 6                                                 | 514675  | 7718334  |
| 6                                                 | 514675  | 7718334  |
| 7                                                 | 514700  | 7718372  |
| 7                                                 | 514707  | 7718379  |
| 7                                                 | 514709  | 7718374  |
| 7                                                 | 514709  | 7718374  |
| 8                                                 | 514655  | 7718619  |
| 8                                                 | 514662  | 7718690  |
| 8                                                 | 514671  | 7718580  |
| 8                                                 | 514671  | 7718729  |
| 8                                                 | 514689  | 7718767  |
| 8                                                 | 514705  | 7718511  |
| 8                                                 | 514710  | 7718502  |
| 8                                                 | 514710  | 7718506  |
| 8                                                 | 514710  | 7718508  |
| 8                                                 | 514722  | 7718411  |
| 8                                                 | 514722  | 7718529  |
| 8                                                 | 514725  | 7718413  |
| 8                                                 | 514728  | 7718817  |
| 8                                                 | 514728  | 7718821  |
| 8                                                 | 514728  | 7718498  |
| 8                                                 | 514729  | 7718466  |
| 8                                                 | 514730  | 7718434  |
| 8                                                 | 514730  | 7718811  |
| 8                                                 | 514730  | 7718462  |
| 8                                                 | 514734  | 7718490  |
| 8                                                 | 514746  | 7718555  |
| 8                                                 | 514747  | 7718792  |
| 8                                                 | 514766  | 7718594  |
| 8                                                 | 514774  | 7718598  |
| 8                                                 | 514784  | 7718764  |
| 8                                                 | 514788  | 7718594  |
| 8                                                 | 514797  | 7718598  |
| 8                                                 | 514797  | 7718622  |
| 8                                                 | 514797  | 7718634  |

| Polygon intersection number- corresponds with map | Easting | Northing |
|---------------------------------------------------|---------|----------|
| 8                                                 | 514799  | 7718605  |
| 8                                                 | 514805  | 7718747  |
| 8                                                 | 514807  | 7718668  |
| 8                                                 | 514826  | 7718698  |
| 8                                                 | 514828  | 7718728  |
| 8                                                 | 514829  | 7718715  |
| 8                                                 | 514829  | 7718715  |
| 9                                                 | 514750  | 7718851  |
| 9                                                 | 514770  | 7718846  |
| 9                                                 | 514774  | 7718851  |
| 9                                                 | 514775  | 7718866  |
| 9                                                 | 514781  | 7718872  |
| 9                                                 | 514792  | 7718872  |
| 9                                                 | 514808  | 7718868  |
| 9                                                 | 514826  | 7718844  |
| 9                                                 | 514857  | 7718991  |
| 9                                                 | 514858  | 7718998  |
| 9                                                 | 514859  | 7718970  |
| 9                                                 | 514864  | 7718823  |
| 9                                                 | 514884  | 7718943  |
| 9                                                 | 514891  | 7718823  |
| 9                                                 | 514902  | 7718924  |
| 9                                                 | 514914  | 7718904  |
| 9                                                 | 514930  | 7718840  |
| 9                                                 | 514933  | 7718897  |
| 9                                                 | 514936  | 7718875  |
| 9                                                 | 514937  | 7718890  |
| 9                                                 | 514937  | 7718890  |
| 10                                                | 515298  | 7719486  |
| 10                                                | 515312  | 7719490  |
| 10                                                | 515404  | 7719490  |
| 10                                                | 515466  | 7719510  |
| 10                                                | 515523  | 7719690  |
| 10                                                | 515549  | 7719528  |
| 10                                                | 515555  | 7719531  |
| 10                                                | 515578  | 7719553  |
| 10                                                | 515582  | 7720030  |
| 10                                                | 515585  | 7720038  |
| 10                                                | 515591  | 7720035  |
| 10                                                | 515592  | 7719560  |
| 10                                                | 515602  | 7720010  |
| 10                                                | 515613  | 7719567  |
| 10                                                | 515619  | 7719834  |
| 10                                                | 515625  | 7719563  |
| 10                                                | 515629  | 7720028  |
| 10                                                | 515646  | 7719997  |

| <b>Polygon intersection number- corresponds<br/>with map</b> | <b>Easting</b> | <b>Northing</b> |
|--------------------------------------------------------------|----------------|-----------------|
| 10                                                           | 515657         | 7719575         |
| 10                                                           | 515671         | 7719591         |
| 10                                                           | 515673         | 7719983         |
| 10                                                           | 515674         | 7720012         |
| 10                                                           | 515688         | 7719608         |
| 10                                                           | 515714         | 7719616         |
| 10                                                           | 515716         | 7719988         |
| 10                                                           | 515752         | 7719968         |
| 10                                                           | 515764         | 7719635         |
| 10                                                           | 515784         | 7719952         |
| 10                                                           | 515803         | 7719652         |
| 10                                                           | 515813         | 7719934         |
| 10                                                           | 515829         | 7719918         |
| 10                                                           | 515841         | 7719690         |
| 10                                                           | 515846         | 7719888         |
| 10                                                           | 515860         | 7719851         |
| 10                                                           | 515865         | 7719721         |
| 10                                                           | 515867         | 7719731         |
| 10                                                           | 515869         | 7719826         |
| 10                                                           | 515872         | 7719797         |
| 10                                                           | 515872         | 7719797         |
| 11                                                           | 515589         | 7720051         |
| 11                                                           | 515590         | 7720056         |
| 11                                                           | 515599         | 7720046         |
| 11                                                           | 515613         | 7720052         |
| 11                                                           | 515622         | 7720065         |
| 11                                                           | 515623         | 7720041         |
| 11                                                           | 515650         | 7720035         |
| 11                                                           | 515668         | 7720054         |
| 11                                                           | 515675         | 7720025         |
| 11                                                           | 515723         | 7719996         |
| 11                                                           | 515753         | 7720008         |
| 11                                                           | 515774         | 7719970         |
| 11                                                           | 515797         | 7720047         |
| 11                                                           | 515798         | 7720059         |
| 11                                                           | 515799         | 7720023         |
| 11                                                           | 515801         | 7720005         |
| 11                                                           | 515803         | 7720067         |
| 11                                                           | 515807         | 7720000         |
| 11                                                           | 515815         | 7719945         |
| 11                                                           | 515816         | 7720074         |
| 11                                                           | 515831         | 7719933         |
| 11                                                           | 515837         | 7719996         |
| 11                                                           | 515840         | 7720099         |
| 11                                                           | 515846         | 7719950         |
| 11                                                           | 515848         | 7719914         |

| <b>Polygon intersection number- corresponds with map</b> | <b>Easting</b> | <b>Northing</b> |
|----------------------------------------------------------|----------------|-----------------|
| 11                                                       | 515850         | 7720123         |
| 11                                                       | 515851         | 7719935         |
| 11                                                       | 515853         | 7719970         |
| 11                                                       | 515856         | 7719996         |
| 11                                                       | 515857         | 7720137         |
| 11                                                       | 515866         | 7719982         |
| 11                                                       | 515866         | 7719992         |
| 11                                                       | 515867         | 7719863         |
| 11                                                       | 515869         | 7719916         |
| 11                                                       | 515870         | 7720155         |
| 11                                                       | 515874         | 7719856         |
| 11                                                       | 515879         | 7720176         |
| 11                                                       | 515879         | 7720177         |
| 11                                                       | 515884         | 7720186         |
| 11                                                       | 515892         | 7719857         |
| 11                                                       | 515898         | 7719888         |
| 11                                                       | 515901         | 7719878         |
| 11                                                       | 515901         | 7719878         |

**Table 4 Coordinates of Dredging Footprint**

**Large dredge area**

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 520600         | 7724434         |
| 519582         | 7723470         |
| 519445         | 7723619         |
| 519294         | 7723477         |
| 518953         | 7723457         |
| 518563         | 7723837         |
| 518561         | 7723871         |
| 518214         | 7724194         |
| 518747         | 7724765         |
| 519231         | 7724720         |
| 520994         | 7725604         |
| 521556         | 7725896         |
| 522061         | 7726246         |
| 522452         | 7726605         |
| 522479         | 7726580         |
| 522092         | 7726119         |
| 521360         | 7725348         |
| 520431         | 7724612         |
| 520600         | 7724434         |

### Small Dredge Area

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 517085         | 7723000         |
| 517391         | 7723061         |
| 517403         | 7723083         |
| 517601         | 7723084         |
| 517736         | 7723072         |
| 517741         | 7722935         |
| 517827         | 7722886         |
| 517741         | 7722725         |
| 517564         | 7722786         |
| 517269         | 7722789         |
| 517163         | 7722868         |
| 517085         | 7723000         |

**Table 5 Coordinates of Western Australian State Waters Spoil Disposal Site**

| <b>Coordinates</b> |                 |
|--------------------|-----------------|
| <b>Easting</b>     | <b>Northing</b> |
| 522842             | 7732018         |
| 523570             | 7731490         |
| 522453             | 7729953         |
| 521725             | 7730481         |

**Table 6 Coordinates of Dredging Impact Monitoring Sites**

| <b>Site No.</b> | <b>Site Code</b> | <b>Site name</b>  | <b>Site Category</b>  | <b>Site Location</b> |                  |
|-----------------|------------------|-------------------|-----------------------|----------------------|------------------|
|                 |                  |                   |                       | <b>Latitude</b>      | <b>Longitude</b> |
| 1               | PWR STN          | Power Station     | Impact                | 20° 35.440'S         | 117° 10.685'E    |
| 2               | BTR              | Boat Rock         | Indicator             | 20° 33.750'S         | 117° 10.621'E    |
| 3               | BZI              | Bezout Island     | Indicator             | 20° 33.213'S         | 117° 10.311'E    |
| 4               | BZR              | Bezout Rock       | Indicator             | 20° 33.823'S         | 117° 09.682'E    |
| 5               | CLW              | Cape Lambert West | Indicator             | 20° 36.090'S         | 117° 09.756'E    |
| 6               | MDR              | Middle Reef       | Indicator             | 20° 35.817'S         | 117° 11.862'E    |
| 7               | BLR              | Bells Reef        | Influence             | 20° 35.052'S         | 117° 08.456'E    |
| 8               | DIE              | Dixon Island East | Influence             | 20° 37.084'S         | 117° 04.143'E    |
| 9               | MAN              | Mangrove point    | Influence             | 20° 37.555'S         | 117° 07.988'E    |
| 10              | PLR              | Pelican Rock      | Influence             | 20° 39.249'S         | 117° 14.415'E    |
| 11              | SMSB             | Samson Beach      | Influence             | 20° 37.337'S         | 117° 11.890'E    |
| 12              | DLI              | Delambre Island   | Reference             | 20° 27.736'S         | 117° 03.916'E    |
| 13              | HAT              | Hat Rock          | Reference             | 20° 40.105'S         | 117° 17.136'E    |
| 14              | DPI              | Depuch Island     | Contingency reference | 20° 36'52.40"S       | 117° 42'29.09"E  |
| 15              | DOI              | Dolphin Island    | Contingency reference | 20° 25'811"S         | 116° 53.011"E    |

**Table 7 Boundary Coordinates of Predicted Worst Case Dredging Impacts**

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 517352         | 7724632         |
| 518593         | 7725884         |
| 518858         | 7725901         |
| 520146         | 7726812         |

**Table 8 Seaward Boundary Coordinates of Shaded Area on Bell's Beach**

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 515669         | 7720662         |
| 515806         | 7720702         |
| 515965         | 7720793         |
| 516124         | 7720918         |
| 516241         | 7721045         |
| 516363         | 7721187         |
| 516400         | 7721241         |

**Table 9 Coordinates of Area of Direct Light at Bell's Beach**

| <b>Easting</b> | <b>Northing</b> |
|----------------|-----------------|
| 515651         | 7720592         |
| 515683         | 7720605         |
| 515703         | 7720607         |
| 515705         | 7720602         |
| 515721         | 7720604         |
| 515736         | 7720608         |
| 515742         | 7720608         |
| 515742         | 7720606         |
| 515738         | 7720603         |
| 515747         | 7720604         |
| 515755         | 7720605         |
| 515762         | 7720600         |
| 515775         | 7720599         |
| 515777         | 7720593         |
| 515749         | 7720582         |
| 515747         | 7720577         |
| 515751         | 7720574         |
| 515751         | 7720570         |
| 515742         | 7720568         |
| 515737         | 7720571         |
| 515728         | 7720567         |
| 515729         | 7720563         |
| 515717         | 7720558         |
| 515682         | 7720547         |
| 515666         | 7720562         |
| 515651         | 7720592         |



# Environmental Protection Authority

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Facsimile: (08) 6467 5557.

Postal Address: Locked Bag 33,  
Cloisters Square, Perth, Western Australia 6850.  
Website: [www.epa.wa.gov.au](http://www.epa.wa.gov.au)

Mr Tim Eckersley  
General Manager, Approvals and Risk Assessment  
Rio Tinto Iron Ore  
152-158 St Georges Terrace  
**PERTH WA 6000**

Our Ref: OEPA2010/001186-A357348  
Enquiries: Jose Villamizar (6467 5438)  
Email: [Jose.Villamizar@epa.wa.gov.au](mailto:Jose.Villamizar@epa.wa.gov.au)

Dear Mr Eckersley

## CAPE LAMBERT PORT B DEVELOPMENT (MINISTERIAL STATEMENT 840) – SECTION 45C APPLICATION

Thank you for your letter of 22 December 2010 requesting approval of a change to the above proposal under section 45C of the *Environmental Protection Act 1986*.

Under section 45C of the *Environmental Protection Act 1986* I am able to approve a change or changes to a proposal without a revised proposal being submitted to the Environmental Protection Authority. I consider that the change(s) described in Attachment 1 to Ministerial Statement 840 will not result in a significant, detrimental, environmental effect in addition to, or different from, the effect of the original proposal.

Approval of the change(s) to the proposal is therefore granted under section 45C of the *Environmental Protection Act 1986*. You are reminded that this approval shall be implemented in accordance with the implementation conditions in Ministerial Statement 840, and also that this approval does not replace any responsibilities you may have for seeking approvals from other government agencies to implement the change.

Yours sincerely

**Dr Paul Vogel**  
CHAIRMAN

12 May 2011



## Attachment 1 to Ministerial Statement 840

### Change to Proposal

---

**Proposal:** Cape Lambert Port B Development, Shire of Roebourne

**Proponent:** Pilbara Iron Pty Ltd

---

**Change:** Change to the Tug Harbour Extension dredging footprint area (i.e. updated Table 4 and Figures 2, 4b and 4c).

**Table 10 – Coordinates of Dredging Footprint – Small Dredge Area (datum and projection: GDA 1994 MGA zone 50)**

| Easting | Northing |
|---------|----------|
| 517519  | 7723412  |
| 517474  | 7723426  |
| 517522  | 7723209  |
| 517528  | 7723077  |
| 517531  | 7722998  |
| 517585  | 7722954  |
| 517723  | 7722950  |
| 517734  | 7722932  |
| 517735  | 7722902  |
| 517734  | 7722819  |
| 517625  | 7722706  |
| 517476  | 7722707  |
| 517452  | 7722758  |
| 517519  | 7723179  |
| 517699  | 7722959  |
| 517732  | 7722865  |
| 517732  | 7722805  |
| 517713  | 7722783  |
| 517631  | 7722717  |
| 517593  | 7722688  |
| 517560  | 7722678  |
| 517516  | 7722681  |
| 517454  | 7722874  |
| 517470  | 7723139  |

Environmental Protection Authority  
Figure 5 : Amended Marine Component of proposal footprint

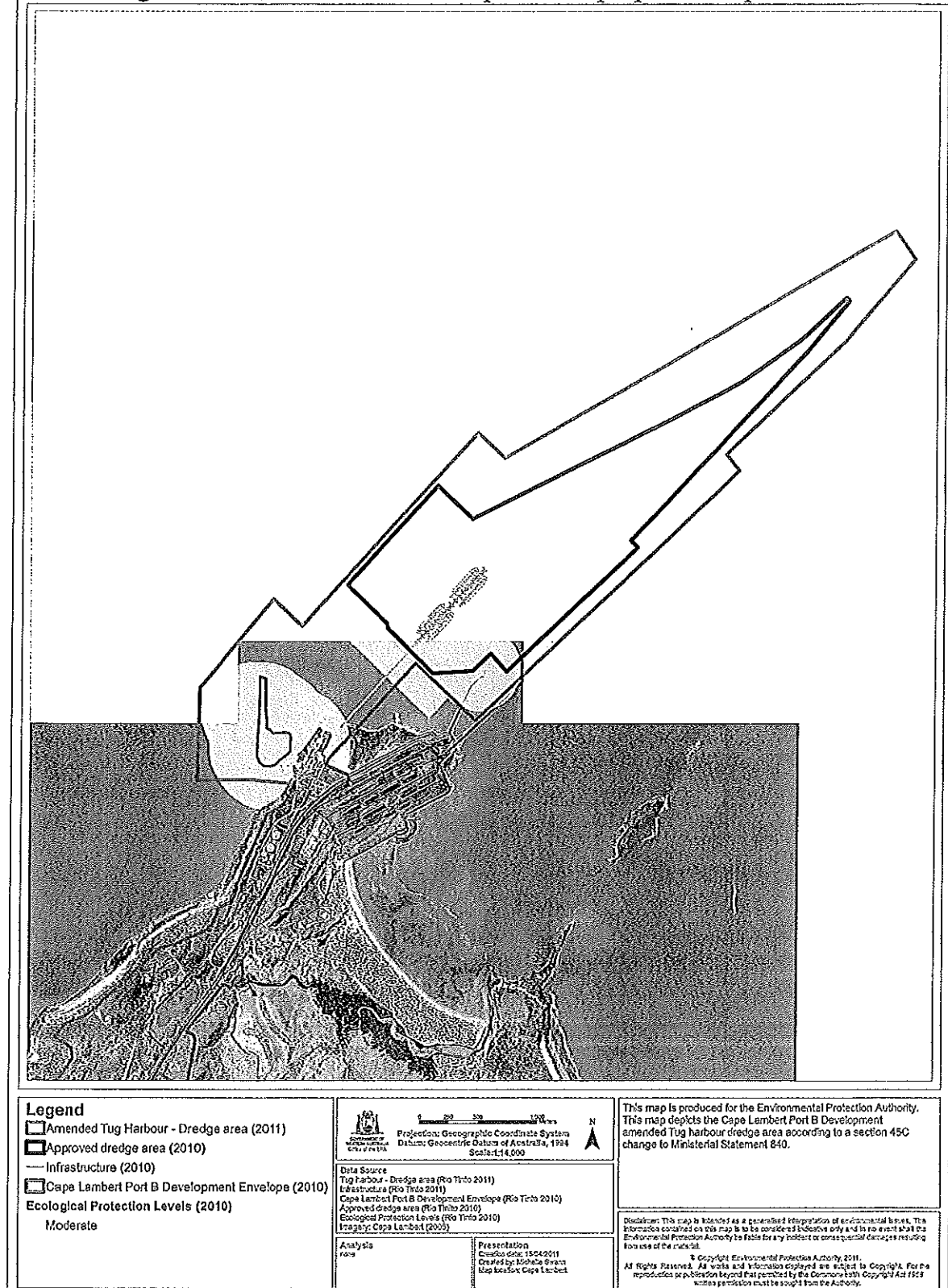
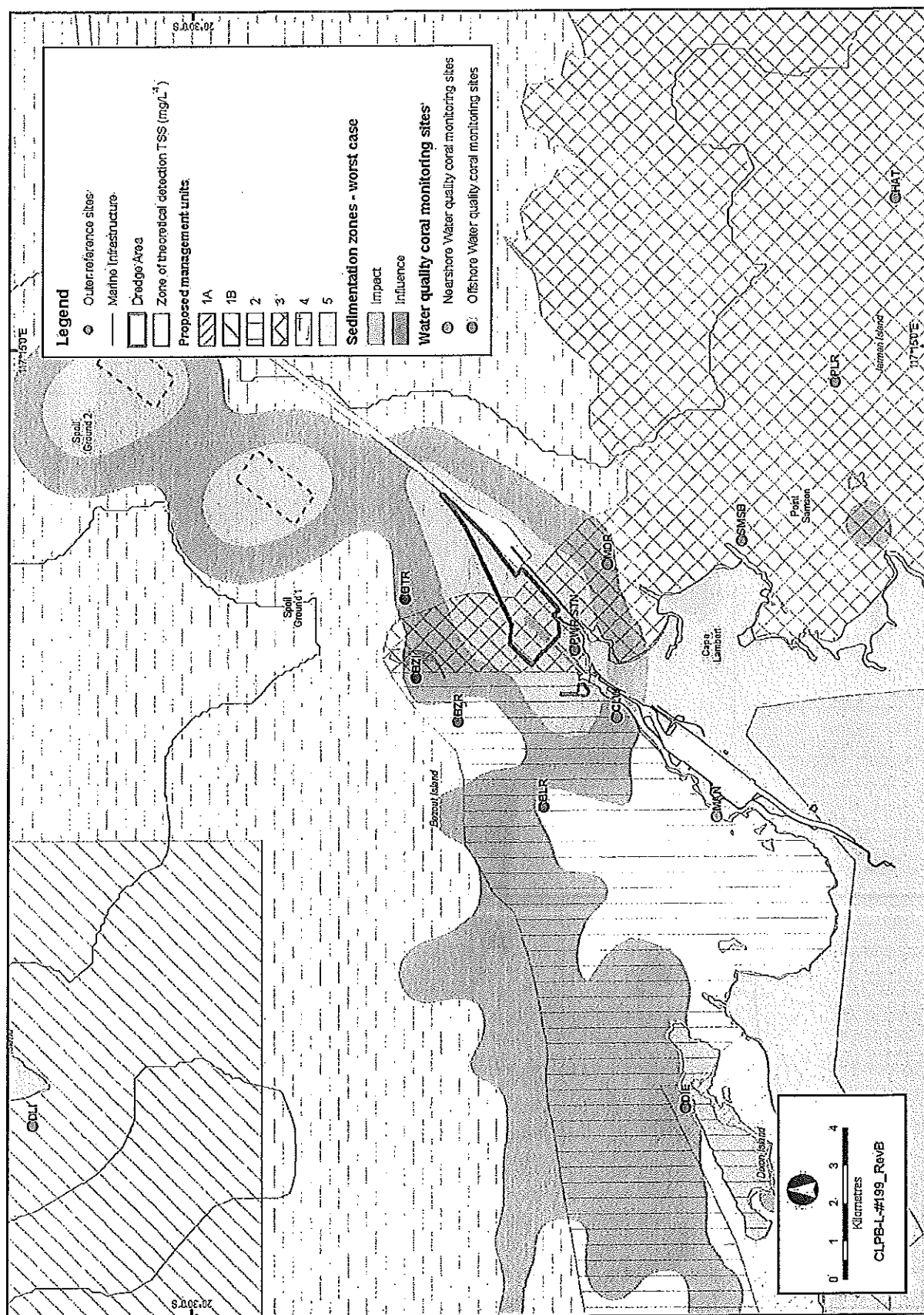


Figure 5 – Marine Component of Proposal Footprint



### Figure 6a – Predicted Dredging Impacts and Monitoring Sites

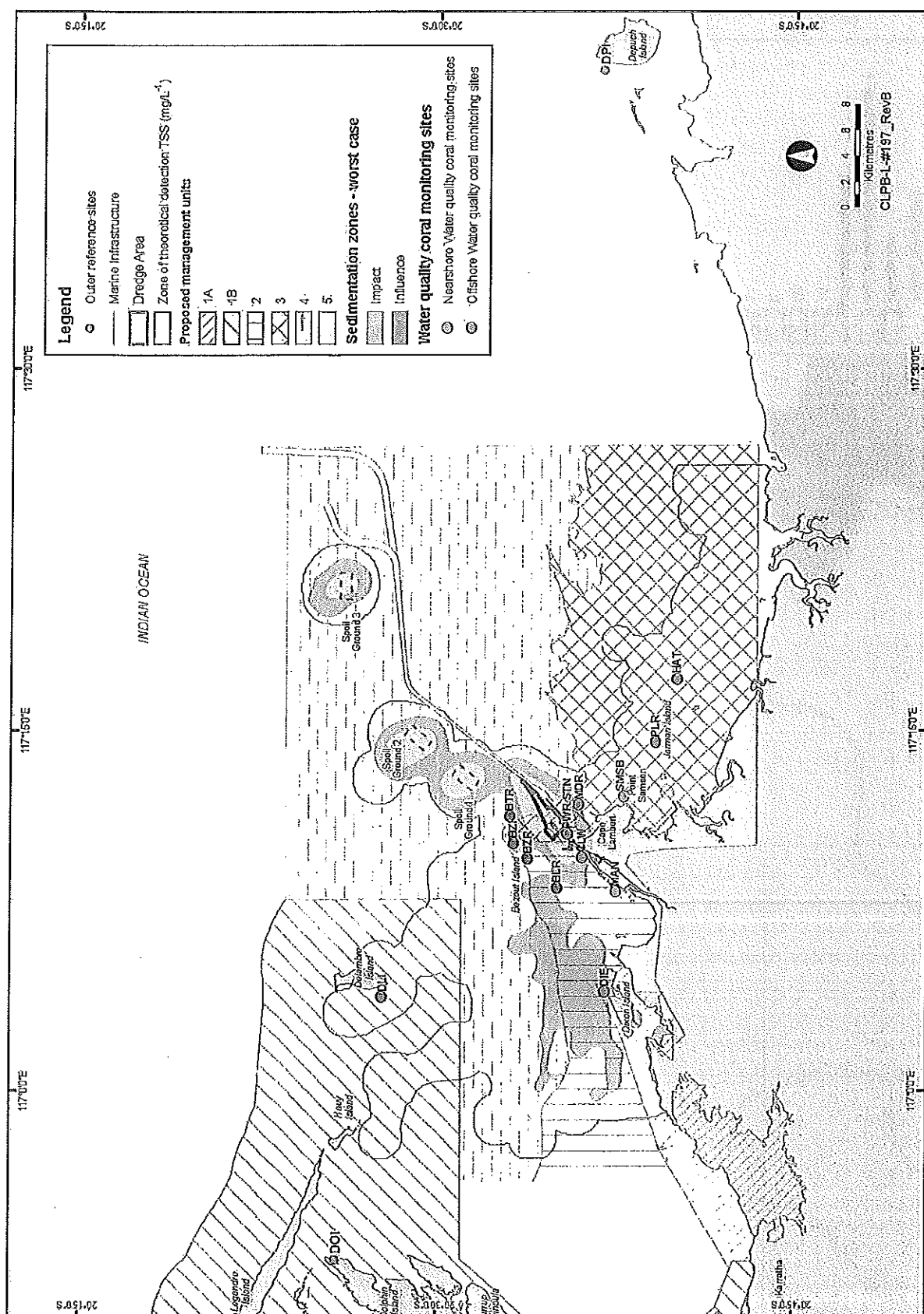


**Figure 6b -- Predicted Dredging Impacts and Monitoring Sites**

Note: No changes to the Key Proposal Characteristic table of the Cape Lambert Port  
B Development are required.

A handwritten signature in black ink, appearing to read 'P. Vogel', is written over a horizontal line.

---

**Dr Paul Vogel**  
CHAIRMAN  
Environmental Protection Authority  
under delegated authority

Approval date: 12 May 2011





## MINISTER FOR ENVIRONMENT; WATER

Statement No. **000876**

**STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL  
(PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE  
ENVIRONMENTAL PROTECTION ACT 1986)**

**CAPE LAMBERT PORT B DEVELOPMENT –  
SHIRE OF ROEBOURNE**

**Proposal:** Refer to Ministerial Statement 840

**Proponent:** Pilbara Iron Pty Ltd

**Proponent Address:** Level 22, Central Park, 152-158 St George's Terrace, Perth  
WA 6000

**Previous Statement Number:** Statement No. 840

**Report of the Environmental Protection Authority:** Report 1412

The implementation of the proposal to which the above reports of the Environmental Protection Authority relate is subject to the conditions and procedures contained in Ministerial Statement No. 840, as amended by the following:

**1. Condition 8-1 replaced**

Condition 8-1 of Ministerial Statement 840 is deleted and replaced with:

"8-1 The proponent shall ensure that the implementation of the proposal does not cause a direct loss of Benthic Primary Producer Habitat in excess of 1.4 hectares. Benthic Primary Producer Habitat is shown on Figure 4a."

**HON BILL MARMION MLA  
MINISTER FOR ENVIRONMENT; WATER**

**31 OCT 2011**

Published on

Mr Tim Eckersley  
General Manager  
Approvals and Risk Management  
Rio Tinto Iron Ore  
152-158 St Georges Terrace  
PERTH WA 6000

Our Ref: OEPA2011/000731; A425500  
Enquiries: Mary Buttfield (6467 5546)  
Email: [mary.buttfield@epa.wa.gov.au](mailto:mary.buttfield@epa.wa.gov.au)

Attention: Peter Royce



Dear Mr Eckersley

**CAPE LAMBERT PORT B DEVELOPMENT, SHIRE OF ROEBOURNE  
(MINISTERIAL STATEMENT 840) – SECTION 45C APPLICATION**

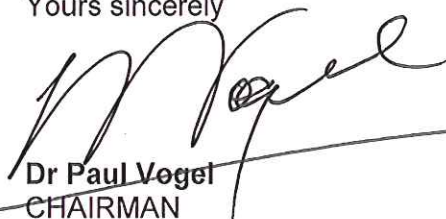
Thank you for your letter of 25 August 2011 requesting approval of a change to the above proposal under section 45C of the *Environmental Protection Act 1986*.

Under section 45C of the *Environmental Protection Act 1986*, I am able to approve a change or changes to a proposal without a revised proposal being submitted to the Environmental Protection Authority.

I consider that the changes described in Attachment 3 to Ministerial Statement 840 will not result in a significant, detrimental, environmental effect in addition to, or different from, the effect of the original proposal.

Approval of the changes to the proposal is therefore granted under section 45C of the *Environmental Protection Act 1986*. You are reminded that this approval shall be implemented in accordance with the implementation conditions in Ministerial Statement 840, and, also, that this approval does not replace any responsibilities you may have for seeking approvals from other government agencies to implement the change.

Yours sincerely



Dr Paul Vogel  
CHAIRMAN

22 December 2011

## Attachment 3 to Ministerial Statement 840

### Change to Proposal

**Proposal:** Cape Lambert Port B Development, Shire of Roebourne

**Proponent:** Pilbara Iron Pty Ltd

**Change:** Additional dredging – increase in “large dredge area” and “tug harbour dredge area” (replaced Figure 5, Table 4 and Key Characteristics Table).

#### Key Characteristics Table:

| Element                                                                                                                                                                                                                                                                                                                                             | Description of proposal                                                                                                                                                                                      | Description of approved change to proposal                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Life of Project                                                                                                                                                                                                                                                                                                                                     | At least 50 years                                                                                                                                                                                            | At least 50 years                                                                                                                                                                                                            |
| Iron ore throughput capacity                                                                                                                                                                                                                                                                                                                        | up to 130 Mtpa                                                                                                                                                                                               | up to 130 Mtpa                                                                                                                                                                                                               |
| Stockyard capacity                                                                                                                                                                                                                                                                                                                                  | Storage to accommodate up to 130 Mtpa                                                                                                                                                                        | Storage to accommodate up to 130 Mtpa                                                                                                                                                                                        |
| Total footprint of land-based activities                                                                                                                                                                                                                                                                                                            | 340 ha                                                                                                                                                                                                       | 340 ha                                                                                                                                                                                                                       |
| Total area of vegetation clearing within the footprint                                                                                                                                                                                                                                                                                              | 300 ha                                                                                                                                                                                                       | 300 ha                                                                                                                                                                                                                       |
| <b>Dredging:</b><br>Volume of sea bed to be dredged for berth pockets, turning basins, departure channel, service wharf B and tug harbour extension:<br>Area of sea bed to be dredged:<br>Dredging depths; <ul style="list-style-type: none"> <li>• berth pockets;</li> <li>• approach/departure channel; and</li> <li>• turning basins.</li> </ul> | Up to 14 Mm <sup>3</sup><br><br>Up to 320 hectares<br><br><ul style="list-style-type: none"> <li>• 20 metres Chart Datum;</li> <li>• 16 metres Chart Datum; and</li> <li>• 10 metres Chart Datum.</li> </ul> | <b>Up to 14.545 Mm<sup>3</sup></b><br><br><b>Up to 346 hectares</b><br><br><ul style="list-style-type: none"> <li>• 20 metres Chart Datum;</li> <li>• 16 metres Chart Datum; and</li> <li>• 10 metres Chart Datum</li> </ul> |
| Duration of dredging program:                                                                                                                                                                                                                                                                                                                       | Approximately 52 weeks                                                                                                                                                                                       | <b>Approximately 64 weeks</b>                                                                                                                                                                                                |

|                                                                              |                                                                |                                                                |
|------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
| <b>Dredge disposal:</b><br>number of spoil grounds in State waters:          | 1                                                              | 1                                                              |
| Dimensions of spoil ground:                                                  | 2 km long by 1 km wide                                         | 2 km long by 1 km wide                                         |
| Volume of dredge spoil to be disposed of in Western Australian State Waters: | 6.06 Mm <sup>3</sup>                                           | <b>6.605 Mm<sup>3</sup></b>                                    |
| Amount of dredge spoil to be disposed of onshore                             | 0 Mm <sup>3</sup>                                              | 0 Mm <sup>3</sup>                                              |
| Duration of pile driving operation                                           | Approximately 52 weeks                                         | Approximately 52 weeks                                         |
| <b>Access jetty and wharf:</b><br>Design:                                    | Open trellis design allowing water flow beneath                | Open trellis design allowing water flow beneath                |
| Length:                                                                      | Up to 2.2 km (from conveyor junction on land to end of wharf). | Up to 2.2 km (from conveyor junction on land to end of wharf). |
| Number of ship loading berths:                                               | Up to 4                                                        | Up to 4                                                        |
| <b>Major plant components:</b>                                               |                                                                |                                                                |
| Car dumpers:                                                                 | 3                                                              | 3                                                              |
| Screenhouses (lump rescreening plants):                                      | 2                                                              | 2                                                              |
| Sample stations/systems:                                                     | 2                                                              | 2                                                              |
| Stackers:                                                                    | 3 or 4                                                         | 3 or 4                                                         |
| Reclaimers:                                                                  | 3                                                              | 3                                                              |
| Shiploaders:                                                                 | 2                                                              | 2                                                              |

### Abbreviations

|                 |                          |
|-----------------|--------------------------|
| Mtpa            | million tonnes per annum |
| ha              | hectares                 |
| Mm <sup>3</sup> | million cubic metres     |
| km              | kilometre                |

Note: Text in **bold** in the Key Characteristics Table, indicates change/s to the proposal.

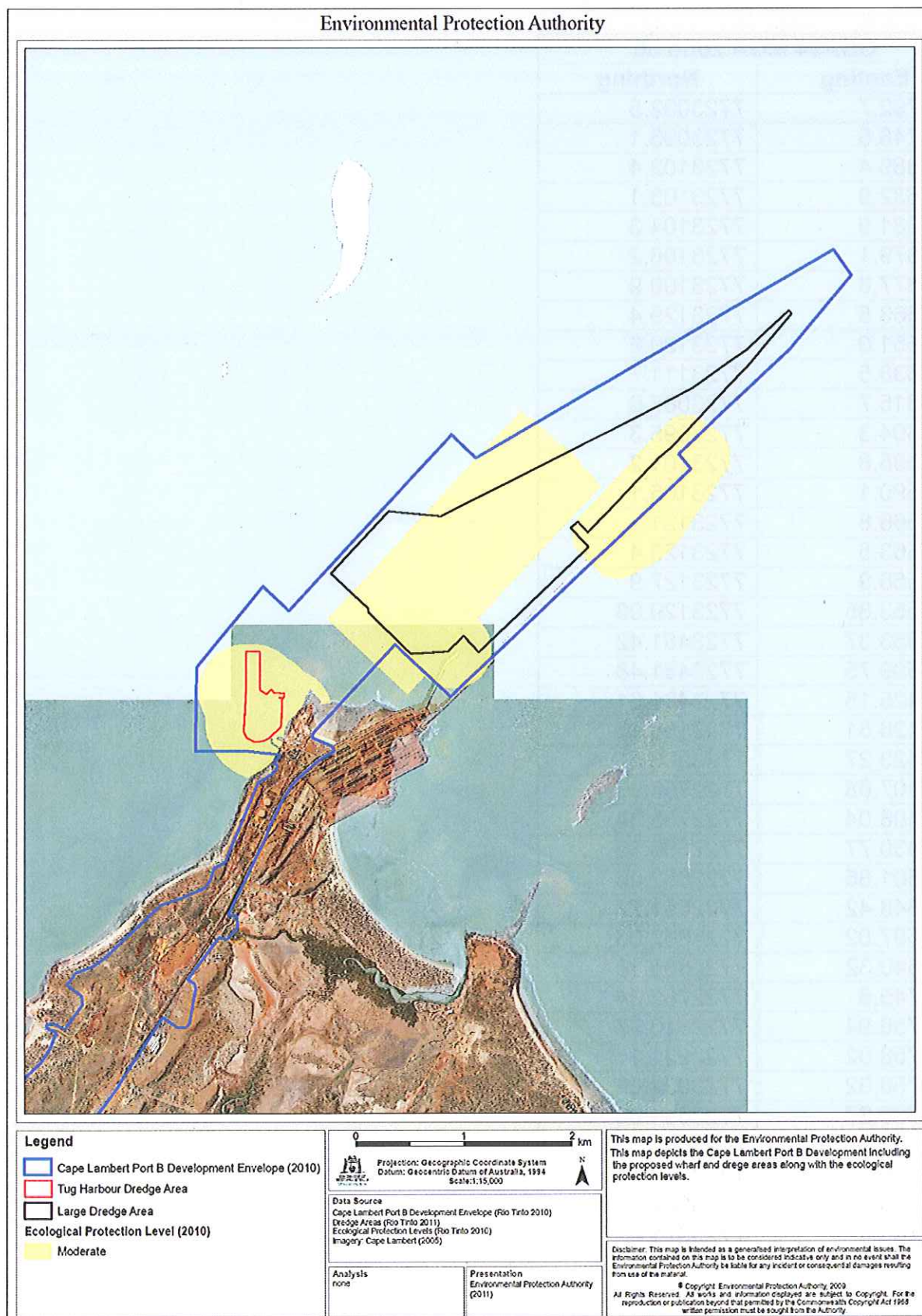


**Figure 6: Marine Component of Proposal Footprint**

**Table 11a. Coordinates of Dredging Footprint – Tug Harbour (Small Area)**

| <b>GDA94 MGA zone 50</b> |                 |
|--------------------------|-----------------|
| <b>Easting</b>           | <b>Northing</b> |
| 517782.7                 | 7723092.5       |
| 517748.5                 | 7723096.1       |
| 517689.4                 | 7723102.4       |
| 517682.9                 | 7723103.1       |
| 517681.9                 | 7723104.3       |
| 517679.1                 | 7723108.2       |
| 517677.8                 | 7723109.9       |
| 517663.5                 | 7723129.4       |
| 517651.0                 | 7723120.6       |
| 517638.5                 | 7723111.7       |
| 517615.7                 | 7723087.6       |
| 517604.3                 | 7723095.3       |
| 517595.8                 | 7723101.2       |
| 517590.1                 | 7723105.1       |
| 517566.8                 | 7723121.1       |
| 517563.5                 | 7723123.4       |
| 517556.9                 | 7723127.9       |
| 517553.85                | 7723129.99      |
| 517553.37                | 7723481.42      |
| 517509.75                | 7723481.48      |
| 517425.15                | 7723481.61      |
| 517426.51                | 7723158.12      |
| 517423.27                | 7723068.5       |
| 517407.08                | 7722756.97      |
| 517408.04                | 7722736.34      |
| 517430.77                | 7722686.32      |
| 517501.85                | 7722652.46      |
| 517548.42                | 7722651.77      |
| 517597.02                | 7722662.66      |
| 517640.32                | 7722685.16      |
| 517745.6                 | 7722782.34      |
| 517756.94                | 7722810.97      |
| 517758.02                | 7722921.1       |
| 517758.62                | 7723054.68      |
| 517736.27                | 7723054.68      |
| 517742.3                 | 7723058.3       |
| 517778                   | 7723053.5       |
| 517779.9                 | 7723067.7       |
| 517780.4                 | 7723071.4       |

**Table 11b. Coordinates of Dredging Footprint – Large Area**

| <b>GDA94 MGA zone 50</b> |                 |
|--------------------------|-----------------|
| <b>Easting</b>           | <b>Northing</b> |
| 522478.59                | 7726579.50      |
| 522451.57                | 7726605.30      |
| 522061.36                | 7726245.82      |
| 521556.30                | 7725895.80      |
| 520994.19                | 7725603.64      |
| 519230.92                | 7724720.37      |
| 518746.58                | 7724765.10      |
| 518214.33                | 7724194.32      |
| 518560.79                | 7723871.24      |
| 518563.05                | 7723836.54      |
| 518952.74                | 7723456.85      |
| 519293.94                | 7723476.57      |
| 519445.02                | 7723618.78      |
| 519582.47                | 7723470.36      |
| 520599.83                | 7724434.00      |
| 520431.26                | 7724611.98      |
| 520499.88                | 7724666.36      |
| 520592.20                | 7724568.29      |
| 521247.80                | 7725259.07      |
| 521359.69                | 7725347.73      |
| 522091.70                | 7726118.85      |



**Dr Paul Vogel**  
**CHAIRMAN**  
 Environmental Protection Authority  
 under delegated authority

Approval date: 22.12.11

## **Appendix B Environmental Protection and Biodiversity Conservation approval 2008/4032**



## Australian Government

### Department of Sustainability, Environment, Water, Population and Communities

#### Approval

##### Cape Lambert Port B Development, Pilbara Region, WA (EPBC 2008/4032)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

#### Proposed action

**person to whom the approval is granted** Pilbara Iron Pty Ltd

**proposed action** To undertake development of a new port facility and associated infrastructure at Cape Lambert in the Pilbara region of Western Australia.

#### Approval decision

| Controlling Provision                                         | Decision |
|---------------------------------------------------------------|----------|
| Listed threatened species and communities (sections 18 & 18A) | Approved |
| Listed migratory species (sections 20 & 20A)                  | Approved |
| Commonwealth marine areas (sections 23 & 24A)                 | Approved |

#### conditions of approval

This approval is subject to the conditions specified below.

#### expiry date of approval

This approval has effect until fifty years from the date of this decision

#### Decision-maker

**name and position** Vicki Middleton  
Assistant Secretary  
Environment Assessment Branch

#### Signature

*Vicki Middleton*

#### date of decision

*26 October 2010*

## **DECISION ON CONTROLLED ACTION – approved subject to conditions**

### **Cape Lambert Port B Development, Pilbara Region, WA (EPBC 2008/4032)**

#### **Sea Dumping Permit**

- 1) The person taking the action must comply with the requirements of any permit obtained under the Commonwealth *Environment Protection (Sea Dumping) Act 1981*, including any conditions attached.

#### **Dredging and Spoil Disposal Management Plan**

- 2) To mitigate the impacts from the dredging activities on EPBC Act listed threatened and migratory species and the Commonwealth marine area, the person taking the action must prepare and submit to the Minister for approval a Dredging and Spoil Disposal Management Plan (DSDMP). The Plan must include the following:
  - a) Measures (for example mitigation measures, performance indicators/trigger levels and corrective actions/management actions) that will ensure there are no unacceptable impacts on EPBC Act listed threatened species, migratory species and/or the Commonwealth marine area. These must include:
    - i. operating procedures to minimise injury to, or mortality of, EPBC Act listed threatened or migratory species from dredging activities;
    - ii. reporting mechanisms that ensure reporting to the Minister within one business day of injury to, or mortality of, any EPBC Act listed threatened or migratory species caused by dredging activities;
    - iii. management triggers and contingency measures when dredging must be varied or suspended, including requirements to report to the Minister;
    - iv. measures that minimise the risk of introduced marine pest species, including ballast-water management and vessel inspections for any non-domestic vessels;
    - v. measures to prevent and respond to accidental fuel, oil or chemical spills;
    - vi. measures that ensure that dredging activities do not impact corals during coral spawning periods, including suspension of dredging activities;
    - vii. measures to monitor water quality, turbidity plume and coral health, including dredging exclusion periods and management triggers;
    - viii. responsive actions that must be undertaken in the event contingency measures are employed, including requirement to report to the Minister; and
    - ix. reactive and post dredge monitoring, including reporting timeframes.
  - b) Details of responsible parties for each activity described in the DSDMP, noting that the person to whom this approval is granted is responsible for the proposed action; and
  - c) Measures that ensure periodic reviews of the DSDMP and that ensure continual improvement measures are applied accordingly. This condition does not remove the requirement under Condition 20.
- 3) Dredging activities must not commence until the DSDMP has been approved by the Minister in writing. The approved DSDMP must be implemented.

#### **Cetacean Management Plan**

- 4) To mitigate the impacts on cetaceans from the dredging activities, construction activities and the ongoing operation of the Cape Lambert Port, the person taking the action must prepare and submit to the Minister for approval a Cetacean Management Plan (CMP). The Plan must include the following:
  - a) measures to prevent vessel strike during dredging activities, construction activities and ongoing operation of the Cape Lambert Port;
  - b) measures to prevent any potential impact from underwater noise during construction;

- c) monitoring and exclusion zones during dredging and noise emitting construction activities, including pile driving;
  - d) details of the responsible parties for each activity described in the CMP, noting that the person to whom this approval is granted is responsible for the proposed action and the reporting requirements of the responsible parties; and
  - e) measures that ensure periodic reviews of the CMP and that ensure continual improvement measures applied accordingly. This condition does not remove the requirement under Condition 20.
- 5) Dredging activities must not commence until the CMP has been approved by the Minister in writing. The approved CMP must be implemented.

#### **Marine Turtle Management Plan**

- 6) To mitigate the impacts from dredging activities on marine turtles, during construction and ongoing operation of the Cape Lambert Port facilities, the person taking the action must prepare and submit to the Minister for approval a Marine Turtle Management Plan (MTMP). The Plan must include the following:
- a) measures for the protection of marine turtles during pile driving activities, including soft start up procedures, monitoring for the presence of marine turtles and exclusion zones;
  - b) mitigation measures for light spill management and reduction, including, but not limited to, the lighting sources, lighting intensity, directionality and shrouding.
  - c) turtle behaviour monitoring programs including adult nesting activity at Bells Beach and Cooling Water Beach, relative to other sites in the region, including hatchling dispersal (onshore and offshore);
  - d) long term population monitoring programs at Bells Beach and Cooling Water Beach;
  - e) a monitoring program to measure the magnitude of pile driving impacts effects on nest sites at Cooling Water Beach;
  - f) a nest relocation programme for Cooling Water Beach in the event that monitoring indicates a significant decline in nest success relative to other beaches;
  - g) monitoring programs for the stability and vegetation cover of the Bells Beach primary dune, including responsive actions in the event that monitoring data indicates that landform stability is being reduced as a result of erosion, vegetation cover reduction or other processes;
  - h) measures for reporting incidents involving marine turtles to the Department throughout the life of port operations;
  - i) details of responsible parties for each activity described in the MTMP, noting that the person to whom this approval is granted is responsible for the proposed action, and the reporting requirements of the responsible parties; and
  - j) measures that ensure periodic reviews of the MTMP and that ensure continual improvement measures applied accordingly. This condition does not remove the requirement under Condition 20.
- 7) Dredging activities must not commence until the MTMP has been approved by the Minister in writing. The approved MTMP must be implemented.

#### **Blasting Management Plan**

- 8) To minimise impacts to listed threatened and migratory species, if underwater blasting is required, the person taking the action must prepare and submit to the Minister for approval a Blasting Management Plan (BMP), at least 2 months prior to commencement of blasting activities. The Plan must include the following:
- a) a description of the blast methodology;
  - b) the amount of blasting required and over what area;

- c) nomination of target blast pressures and potential environmental impacts of these pressures;
  - d) monitoring for the presence of listed threatened and migratory species, including exclusion zones, prior to and during blasting;
  - e) commitments that any blasting activities will not be undertaken at night or during turtle nesting or hatchling seasons;
  - f) post blast inspection for injured fauna including management and reporting to the Department of injured fauna; and
  - g) details of responsible parties for each action described in the BMP, including reporting requirements.
- 9) Blasting activities must not commence until the BMP has been approved in writing by the Minister. The approved BMP must be implemented.

#### **Ecosystem Research and Monitoring Program**

- 10) The person taking the action must develop and implement an Ecosystem Research and Monitoring Program (ERMP) to acquire a detailed ecological understanding of the marine environment of the Cape Lambert region, that can be used to monitor, manage and/or improve the regional marine environment. The Plan must include monitoring programs for the following:
- a) Coastal processes including beach degradation;
  - b) Condition of listed and threatened migratory species populations, associated habitat and the Commonwealth Marine Areas;
  - c) Behaviour of listed threatened and migratory species, including but not limited to, cetaceans and marine turtles. This should include monitoring of potential important habitats, including resting areas;
  - d) Water quality;
  - e) Benthic habitat, including but not limited to, coral, seagrass, mangrove; and
  - f) Implementation and reporting timeframes for each of the actions described above.
- 11) The ERMP must be submitted to the Minister for approval no later than six months from the date of this approval.
- 12) After 12 months from the date of this approval, dredging activities must not thereafter be undertaken unless the Minister has approved the ERMP in writing. The approved ERMP must be implemented.
- 13) The results of the ERMP must be used to inform an adaptive management response to observed impacts and/or any potential impacts identified, and to inform the continuous improvement of the management measures within the MTMP, CMP and BMP (if required).

#### **Conditions – Other**

- 14) The person taking the action must ensure that all relevant staff and contractors and any other persons working on the action receive comprehensive training in relation to the requirements of this decision and comply with all requirements of this decision relevant to their duties prior to commencing action on the project.
- 15) Upon the direction of the Department, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Department. The independent auditor must be approved by the Department prior to the commencement of the audit. Audit criteria must be agreed by the Department and the audit report must address the criteria to the satisfaction of the Department.
- 16) If, at any time after two years from the date of this approval, the Minister notifies the person taking the action that the Minister is not satisfied that there has been substantial commencement of the action, the action must not thereafter be commenced without the written agreement of the Minister.

- 17) Within 10 days of commencement of the action, the person taking the action must advise the Minister in writing of the actual date of commencement.
- 18) Each year the person taking the action must provide a report to the Minister addressing compliance with each of the conditions of this approval. The date of the first compliance report must be within twelve months from the date of this approval with each subsequent report 12 months from the date of the previous report. The Compliance report must:
  - (a) be endorsed by Pilbara Iron Pty Ltd or a person approved in writing by the Department, who is delegated to sign on behalf of Pilbara Iron Pty Ltd;
  - (b) include a statement as to whether the person taking the action has complied with the conditions;
  - (c) identify any non-compliances and describe corrective and preventative actions taken; and
  - (d) make the compliance report publicly available on the Internet within 30 days of it being submitted to the Minister.
- 19) The Reports described at Condition 18 must be provided until the expiry of this approval.
- 20) If the person taking the action wishes to carry out any activity otherwise than in accordance with the DSDMP, CMP, MTMP, BMP and ERMP, referred to in conditions 2, 4, 6, 8, and 10, respectively, the person taking the action must submit for the Minister's approval a revised version of the relevant plan or program (however described). The varied activity shall not commence until the Minister has approved the varied plan or program in writing. If the Minister approves such a revised plan or program, that plan or program must be implemented in place of the plan or program originally approved.
- 21) Management plans, reports, systems and programs (however described) referred to in these conditions of approval must be made publicly available within 30 days of approval by the Minister.
- 22) All plans, reports or programs (however described) required under this approval must include the following elements:
  - (a) a description of the EPBC Act listed species and habitat likely to be impacted by the components of the action which are the subject of that plan, report or program (however described);
  - (b) an assessment of the risk to these values, species or habitats, from the components of the action that are the subject of or relevant to that plan, report or program (however described);
  - (c) details of the management measures proposed in relation to these values, species or habitats, if it is a requirement of the condition requiring that plan, report or program (however described);
  - (d) details of monitoring proposed for that species if it is a requirement of the condition requiring that plan, report or program (however described);
  - (e) performance standards in relation to that species if it is a requirement of the condition requiring that plan, report or program (however described); and
  - (f) management triggers in relation to that species if it is a requirement of the condition requiring that plan, report or program (however described).
- 23) The person taking the action must maintain accurate records of activities associated with or relevant to the above conditions of approval, and make them available on request by the Department. Such documents may be subject to audit by the Department and used to verify compliance with the conditions of approval.
- 24) If the Minister believes that it is necessary or desirable for the better protection of any relevant controlling provision to do so, the Minister may request that the person taking the action make specified revisions to any plans, reports or programs (however described) approved pursuant to these conditions. The person taking the action must comply with any such request. The revised plans, reports or programs (however described) must be implemented.

## **Definitions**

In this document, unless a contrary intention appears, the terms below have the meanings given to them:

**Blasting activities:** means any blasting of consolidated seabed material.

**Dredging activities:** means all activities associated with the dredging and disposal including:

- i the excavation or dredging of the material;
- ii the loading and carriage of dredged material for the purpose of dumping;
- iii the dumping of the material at the prescribed disposal sites.

**Construction activities:** means the commencement of any works that may impact on threatened and/or migratory species due to disturbance of habitat including disturbance resulting from dredging, increased noise and/or increased lighting.

**The Department:** is the Australian Government Department responsible for the *Environment Protection and Biodiversity Conservation Act 1999*.

**The Minister:** is the Australian Government Minister who administers the *Environment Protection and Biodiversity Conservation Act 1999*.

**EPBC Act:** is the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

## **Appendix C Sea Dumping Permit SD2008/0822**



*ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981*

SEA DUMPING PERMIT No. SD2008/822

for

**PILBARA IRON PTY LTD**

I, VICKI JANE MIDDLETON, a delegate of the Minister for Sustainability, Environment, Water, Population and Communities, acting under Section 19 of the *Environment Protection (Sea Dumping) Act 1981*, hereby grant a sea dumping permit to Pilbara Iron Pty Ltd, GPO Box A42, PERTH WA 6837, to load for the purposes of dumping, and to dump up to 14 million cubic metres of capital seabed material derived from berth pockets, turning basins, approach/departure channel and tug harbour, as part of the Cape Lambert Port B Development, Cape Lambert, WA commencing on the date of signature of this permit and extending for a period of three years, subject to conditions which are specified in Appendices 1 and 2.

DATE.....<sup>26<sup>th</sup></sup>.....day of.....<sup>October</sup>.....2010

*Vicki Middleton*

Vicki Middleton  
Delegate of the Minister

*This permit comprises six (6) pages, including Appendices 1 and 2.*

# **CONDITIONS FOR DUMPING AT SEA OF SEABED MATERIAL DERIVED FROM CAPITAL DREDGING AT CAPE LAMBERT, WA**

## **Definitions**

In this permit:

|                          |                                                                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “the Act”                | means the <i>Environment Protection (Sea Dumping) Act 1981</i> ;                                                                                                                                                                                                                                                             |
| “the Application”        | means the Application for a permit under the <i>Environment Protection (Sea Dumping) Act 1981</i> submitted by Pilbara Iron Pty Ltd on 19 March 2008, subsequent information provided in the draft PER and letter dated 30 November 2010, received on 4 December 2010 - Notification of revised proposal - wharf relocation; |
| “the Department”         | means the Department of Sustainability, Environment, Water, Population and Communities<br>Ports and Marine Section,<br>GPO Box 787, Canberra ACT 2601.<br>Telephone – 02 6274 1111<br>Facsimile – 02 6274 1620<br>Email – portsandmarine@environment.gov.au<br>or successor entities;                                        |
| “Cetacean”               | means the migratory whales identified as of significance under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> ;                                                                                                                                                                                    |
| “DSDMP”                  | means the Dredging and Spoil Disposal Management Plan;                                                                                                                                                                                                                                                                       |
| “draft PER”              | means Public Environment Review submitted by Pilbara Iron Pty Ltd dated March 2009 and subsequent PER Supplementary Information Package dated 21 August 2009;                                                                                                                                                                |
| “dumping activities”     | means all activities associated with the dumping permitted under this permit, including:<br>(i) the excavation or dredging of the material;<br>(ii) the loading and carriage of dredged material for the purpose of dumping;<br>(iii) the dumping of the material at the prescribed disposal site;                           |
| “Environmental incident” | means any event which has the potential to, or does impact, on the environment;                                                                                                                                                                                                                                              |
| “Environmental risk”     | any risk, additional to those risks previously identified in the Application, which has the potential to, or does impact, on the environment;                                                                                                                                                                                |
| “GPS”                    | means Global Positioning System;                                                                                                                                                                                                                                                                                             |
| “Monitoring zone”        | means the area within 300 metres of any point on the dredging/dumping run about to be commenced; and                                                                                                                                                                                                                         |

“vessel”

means any vessel or vessels used for or in connection with the loading and/or dumping activities.

1. Except so far as the contrary intention appears, terms used in these conditions to this permit have the same meaning as such terms in the Act.
2. Pilbara Iron Pty Ltd must ensure that all activities are undertaken in accordance with the conditions of the EPBC Act approval (EPBC2008/4032).

#### **Dredging and Spoil Disposal Management Plan (DSDMP)**

3. Pilbara Iron Pty Ltd must develop and submit for the Minister’s approval a DSDMP for managing the impacts on the environment, from the dredging and dumping activities, relating to the Cape Lambert Port B Development as specified in the Application. Dredging and dumping must not commence until the DSDMP is approved by the Minister.
4. Pilbara Iron Pty Ltd may submit for the Minister’s approval a revised version of the DSDMP specified under Condition 3. If the Minister approves such a revised DSDMP, that DSDMP must be implemented in place of the original DSDMP specified at Condition 3.
5. If the Minister believes that it is necessary or desirable for the better protection of the environment to do so, the Minister may request Pilbara Iron Pty Ltd to make specified revisions to the DSDMP as specified in Condition 3 and submit the revised DSDMP for the Minister’s approval. If the Minister approves a revised DSDMP pursuant to this condition, Pilbara Iron Pty Ltd must implement that DSDMP instead of the original DSDMP specified at Condition 3.
6. The DSDMP must be made available (electronically) on Pilbara Iron Pty Ltd website within 30 days of the DSDMP being approved by the Minister as specified in Condition 3.

#### **Material to be dumped**

7. Pilbara Iron Pty Ltd must ensure that the dredged material which is loaded and dumped comprises only up to 14 million cubic metres of capital seabed material as detailed in the application.
8. Pilbara Iron Pty Ltd must ensure that each load of dredged material is dumped so that the overall dredge material is distributed evenly over the disposal site(s) specified in Condition 9.

#### **Disposal Sites**

9. Pilbara Iron Pty Ltd must only dump within the disposal site(s) prescribed by the following MGA94 (Zone 50) coordinates:

##### Spoil Ground One

| Easting | Northing |
|---------|----------|
| 522842  | 7732018  |
| 523570  | 7731490  |
| 522453  | 7729953  |
| 521725  | 7730481  |

### Spoil Ground Two

| Easting | Northing |
|---------|----------|
| 525748  | 7735714  |
| 526476  | 7735186  |
| 525359  | 7733649  |
| 524631  | 7734177  |

### Spoil Ground Three

| Easting | Northing |
|---------|----------|
| 537470  | 7740726  |
| 537470  | 7739826  |
| 535570  | 7739826  |
| 535570  | 7740726  |

10. Pilbara Iron Pty Ltd must establish by GPS that, prior to dumping, the vessel is within the disposal site(s) defined in Condition 9.

### **Access for Observers**

11. At least two nominees of the Department 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.

### **Mitigation Measures for Protection of Marine Species**

12. Before beginning dumping activities, Pilbara Iron Pty Ltd must check, using binoculars from a high observation platform on the vessel, for cetaceans or dugongs within the monitoring zone.
13. If any cetaceans or dugongs as specified in Condition 12 are sighted in the monitoring zone, dredging/dumping activities must not commence in the monitoring zone until twenty minutes after the last cetacean or dugong is observed to leave the monitoring zone or the dredge is to move to another area of the dredge/disposal site to maintain a minimum distance of 300 metres between the vessel and any cetacean or dugong identified in Condition 12.

### **Environmental Risk and Incidents**

14. If, at any time during the course of the dumping activities, an environmental incident occurs or environmental risk is identified, measures must be taken immediately by Pilbara Iron Pty Ltd to mitigate the risk or the impact. The situation is to be reported in writing within 24 hours, to the Department, 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.
15. Pilbara Iron Pty Ltd must document any incidents involving the dumping activities that result in injury or death to any cetacean, turtle or dugong. The time and nature of each incident and the species involved, if known, must be recorded.

16. Pilbara Iron Pty Ltd must notify the Department, in writing, of any incidents documented in accordance with Condition 15. Reports must be submitted to the Department within 24 hours, or as requested by the Department.

**Compliance of all Parties engaged in dumping activities**

17. Pilbara Iron Pty Ltd must ensure that all persons engaged in the dumping activities under this permit, including the owner(s) and person(s) in charge of the vessel, comply with this permit and the requirements of the Act.

**Monitoring and reporting**

18. Pilbara Iron Pty Ltd must keep records comprising either weekly plotting sheets or a certified extract of the ship's 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 dumping run, with the inclusion of the path of each dumping run; and
  - c. the volume of dredge material (in-situ cubic metres) dumped and quantity in dry tonnes and compare these quantities with the total amount permitted under the permit on a daily basis.

These records are to be retained by Pilbara Iron Pty Ltd for verification and audit purposes.

19. A bathymetric survey of the disposal sites must be undertaken by Pilbara Iron Pty Ltd:

- a. prior to the commencement of dredging under this permit; and
- b. within one month of the completion of all dumping activities authorised under this permit.

20. Within two (2) months of the final bathymetric survey being undertaken, Pilbara Iron Pty Ltd must provide a digital copy of each of the bathymetric surveys to the RAN Hydrographer, Locked Bag 8801, South Coast Mail Centre, NSW 2521.

21. Pilbara Iron Pty Ltd must provide a report on the bathymetry to the Department within two (2) months of the final bathymetric survey being undertaken. The report must include a chart showing the change in sea floor bathymetry as a result of dumping and include written commentary on the volumes of dumped material that have been retained within the disposal site.

22. To facilitate annual reporting to the International Maritime Organization, Pilbara Iron Pty Ltd must report to the Department by 31 January each year, including on the day of the expiry of the permit or completion of all dumping activities under this permit, information at Appendix 2 to this permit, or in a format as approved by the Department from time to time.

## Appendix 2: Sea Dumping Permit International Reporting Requirements

Please fill in this form and return it by **email only** to the Department of Sustainability, Environment, Water, Population and Communities by 31 January each year. This information is required for Australia's International reporting obligations under the London Protocol. Email: [portsandmarine@environment.gov.au](mailto:portsandmarine@environment.gov.au)

Permit Holder:

Address:

Submitted by:

Phone:

Email:

Date: (dd/mm/yyyy)

**Sea Dumping Permit number:**

**Permit start date:** (dd/mm/yyyy) **Permit end date:** (dd/mm/yyyy)

**Approved dumping site/s:**

### Geographical position

| Latitude | Longitude |
|----------|-----------|
|          |           |
|          |           |
|          |           |
|          |           |
|          |           |
|          |           |
|          |           |

**Permit quantity:**

**Quantity dumped (cubic metres/number) in the preceding calendar year:**

**Description of material** Please tick relevant box or boxes

Capital Dredged Material ☐, Maintenance Dredged Material ☐, Fish Waste ☐,

Vessels ☐, Platforms ☐, Sewage Sludge ☐, Organic Material of Natural Origin ☐,

Bulky Waste ☐, CO<sub>2</sub> ☐, Inert-Inorganic Geological Material ☐,

**Comments:**



Mr Peter Royce  
Principal Advisor – Environmental  
Approvals  
Rio Tinto Iron Ore  
GPO Box A42  
PERTH WA 6837

Date: 21 March 2011  
EPBC Ref: 2008/4032  
SD Ref: 2008/822  
Contact: Dionne Cassanell  
(02) 6274 2487  
dionne.cassanell@environment.gov.au

Dear Mr Royce

**Variation to Management Plans (EPBC2008/4032) and Variation to Sea Dumping Permit (SD2008/822) for the Cape Lambert Port B Development**

I refer to your email of 22 December 2010 advising the Department of the change to the configuration of the tug harbour as part of the Cape Lambert Port B Development and the subsequent telephone conversations with Ms Dionne Cassanell of this Department in relation to the variation of management plan(s) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval and variations to the Sea Dumping Permit.

The Department has reviewed the revised Cetacean Management Plan (CMP) (Rev 5 dated 18 February 2011), Dredging and Spoil Disposal Management Plan (DSDMP) (Rev 8 dated 1 March 2011) and the Marine Turtle Management Plan (MTMP) (dated February 2011) and considers that they adequately reflect the reconfiguration of the tug harbour.

Therefore, acting as a delegate of the Minister for Sustainability, Environment, Water, Population and Communities, under the EPBC Act, and in accordance with Condition 20 of EPBC2008/4032 I have decided to approve the revised CMP, MTMP and DSDMP. In addition, as a delegate of the Minister for Sustainability, Environment, Water, Population and Communities, under the *Environment Protection (Sea Dumping) Act 1981* (Sea Dumping Act) I have decided to approve the revised DSDMP, in accordance with Condition 4 of the Sea Dumping Permit (SD2008/822) issued on 26 October 2010.

Acting as the delegate of the Minister under Section 23 of the Sea Dumping Act, I also wish to advise the sea dumping permit has been varied to allow for the reconfiguration of the tug harbour. I have included a copy of the variation to the permit with this letter.

If you require any further information please contact the EPBC project manager for this proposal.

Yours sincerely

Barbara Jones  
Assistant Secretary  
Environment Assessment Branch



*ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981*

VARIATION TO SEA DUMPING PERMIT No. *SD2008/822*

for

**PILBARA IRON PTY LTD**

I, BARBARA ANN JONES, a delegate of the Minister for Sustainability, Environment, Water, Population and Communities, acting under Section 23 of the *Environment Protection (Sea Dumping) Act 1981*, hereby vary the permit granted on 26 October 2010 to Pilbara Iron Pty Ltd, GPO Box A42, PERTH WA 6837, to load for the purposes of dumping, and to dump up to 14 million cubic metres of capital seabed material derived from berth pockets, turning basins, approach/departure channel and tug harbour, as part of the Cape Lambert Port B Development, Cape Lambert, WA, by:

Amending Appendix one to include the additional definition as follows:

“Tug Harbour” means the area labelled/identified as Revised Tug Harbour Infrastructure and Dredge Footprint in Appendix 3.

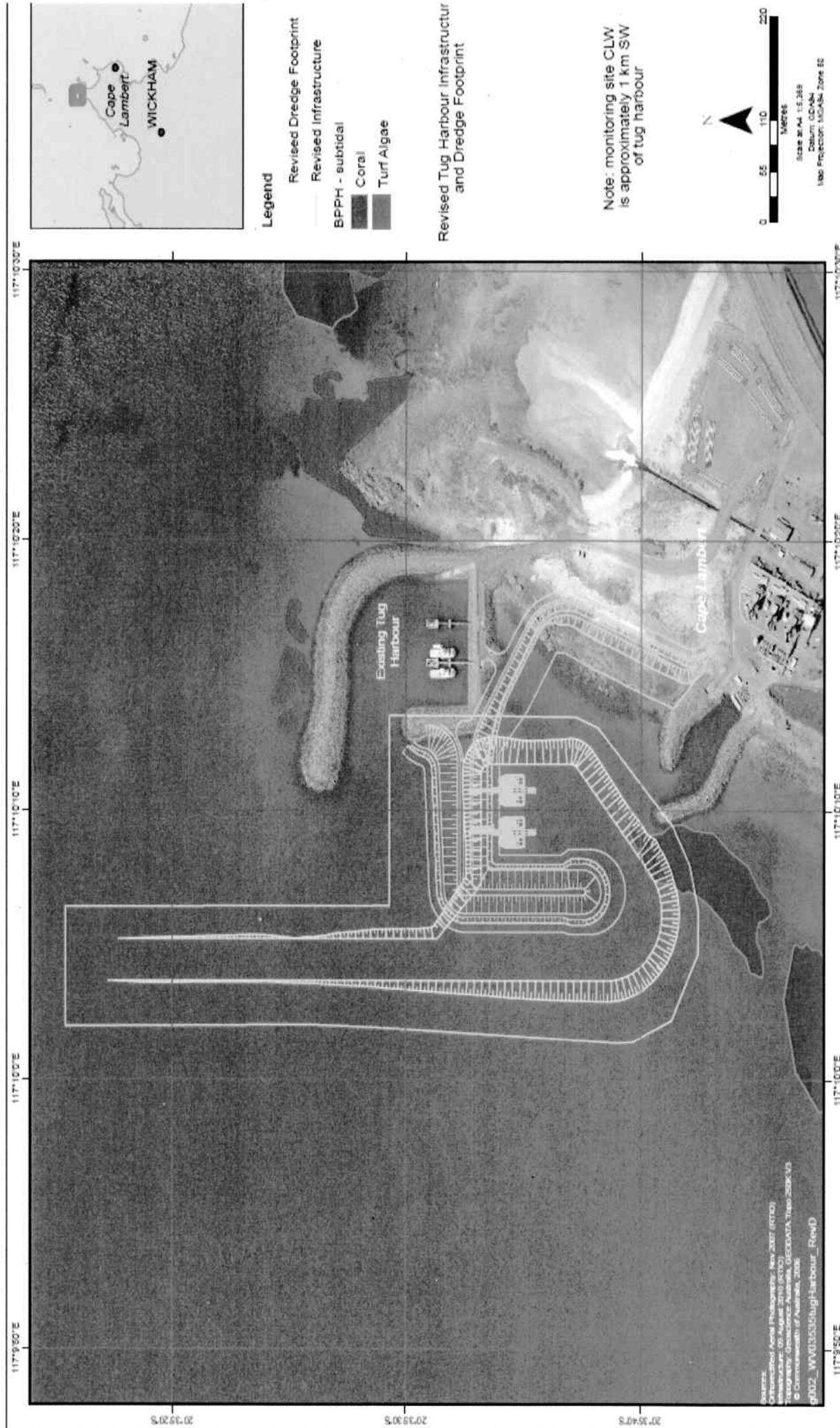
Amending the permit to include Appendix 3 as attached to this variation.

All other conditions of the permit remain unaltered.

Dated.....*21st*.....day of.....*March*.....2011

Barbara Ann Jones  
Delegate of the Minister

## Appendix 3





Mr Peter Royce  
Principal Advisor – Environmental  
Approvals  
Rio Tinto Iron Ore  
GPO Box A42  
PERTH WA 6837

Date: 23 December 2011  
EPBC Ref: 2008/4032  
SD Ref: 2008/822  
Contact: Matthew Kuntsi  
(02) 6274 1536  
matthew.kuntsi@environment.gov.au

Dear Mr Royce

**Variation to Management Plans (EPBC2008/4032) and Variation to Sea Dumping Permit (SD2008/822) for the Cape Lambert Port B Development**

I refer to your letter dated 27 October 2011 requesting the Department to vary sea dumping permit SD2008/822 to include additional capital/maintenance dredging at the Western CLA departure channel, existing departure channel and tug harbour and the subsequent emails with Matthew Kuntsi of this Department in relation to the variation of management plan(s) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval and variations to the Sea Dumping Permit.

As the delegate of the Minister for Sustainability, Environment, Water, Population and Communities under Section 23 of the *Environment Protection (Sea Dumping) Act 1981*, I wish to advise the sea dumping permit SD2008/822 has been varied to allow for additional capital/maintenance dredging of up to 610,000m<sup>3</sup> at the Western CLA departure channel, existing departure channel and tug harbour. I have included a copy of the variation to the permit with this letter.

I have reviewed the revised Dredging and Spoil Disposal Management Plan (DSDMP) (Rev 9, dated 12 December 2011), Cetacean Management Plan (CMP) (Rev 6, dated 12 December 2011) and the Marine Turtle Management Plan (MTMP) (dated December 2011) and consider that they adequately reflect the variation in dredge footprint and volume.

Therefore, as delegate of the Minister for Sustainability, Environment, Water, Population and Communities, under the EPBC Act, and in accordance with Condition 20 of EPBC2008/4032 I have approved the revised CMP, MTMP and DSDMP.

If you require any further information please contact the EPBC project manager for this proposal.

Yours sincerely

Matthew Johnston  
A/g Assistant Secretary  
Environment Assessment Branch





*ENVIRONMENT PROTECTION (SEA DUMPING) ACT 1981*

VARIATION TO SEA DUMPING PERMIT No. SD2008/822

for

**PILBARA IRON PTY LTD**

I, MATTHEW JOHNSTON, a delegate of the Minister for Sustainability, Environment, Water, Population and Communities, acting under Section 23 of the *Environment Protection (Sea Dumping) Act 1981*, hereby vary the sea dumping permit granted on 26 October 2010 to Pilbara Iron Pty Ltd, GPO Box A42, PERTH, WA, 6837, and varied on 21 March 2011, to load, for the purposes of dumping, and to dump up to 14 million cubic metres of capital seabed material derived from berth pockets, turning basins, approach/departure channel and tug harbour, as part of the Cape Lambert Port B Development, Cape Lambert, WA commencing on the date of signature of this permit and extending for a period of three years, subject to conditions which are specified in Appendices 1 and 2. The permit is varied as follows:

**The deletion of the words on page one of the permit**

*to load, for the purposes of dumping, and to dump up to 14 million cubic metres of capital seabed material derived from berth pockets, turning basins, approach/departure channel and tug harbour, as part of the Cape Lambert Port B Development, Cape Lambert, WA commencing on the date of signature of this permit and extending for a period of three years, subject to conditions which are specified in Appendices 1 and 2.*

**The insertion of the words on page one of the permit in their place**

*to load, for the purposes of dumping, and to dump up to 14.61 million cubic metres of capital and maintenance seabed material derived from berth pockets, turning basins, approach/departure channel and tug harbour, as shown in Appendix 4, as part of the Cape Lambert Port B Development, Cape Lambert, WA commencing on the date of signature of this permit and extending until 26 October 2013, subject to conditions which are specified in Appendices 1, 2, 3 and 4.*

**The permit definitions and conditions prescribed in Appendix 1 of the permit are varied as follows**

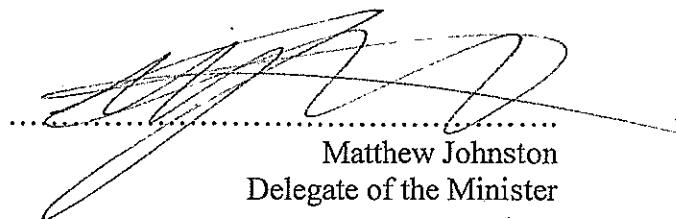
**Definitions - "the Application":** insert "*and the variation requests dated 22 December 2010 and 27 October 2011*" prior to the semi colon at the end of the definition.

**Condition 7:** delete "*14 million cubic metres*" and insert "*14.61 million cubic metres*" in its place.

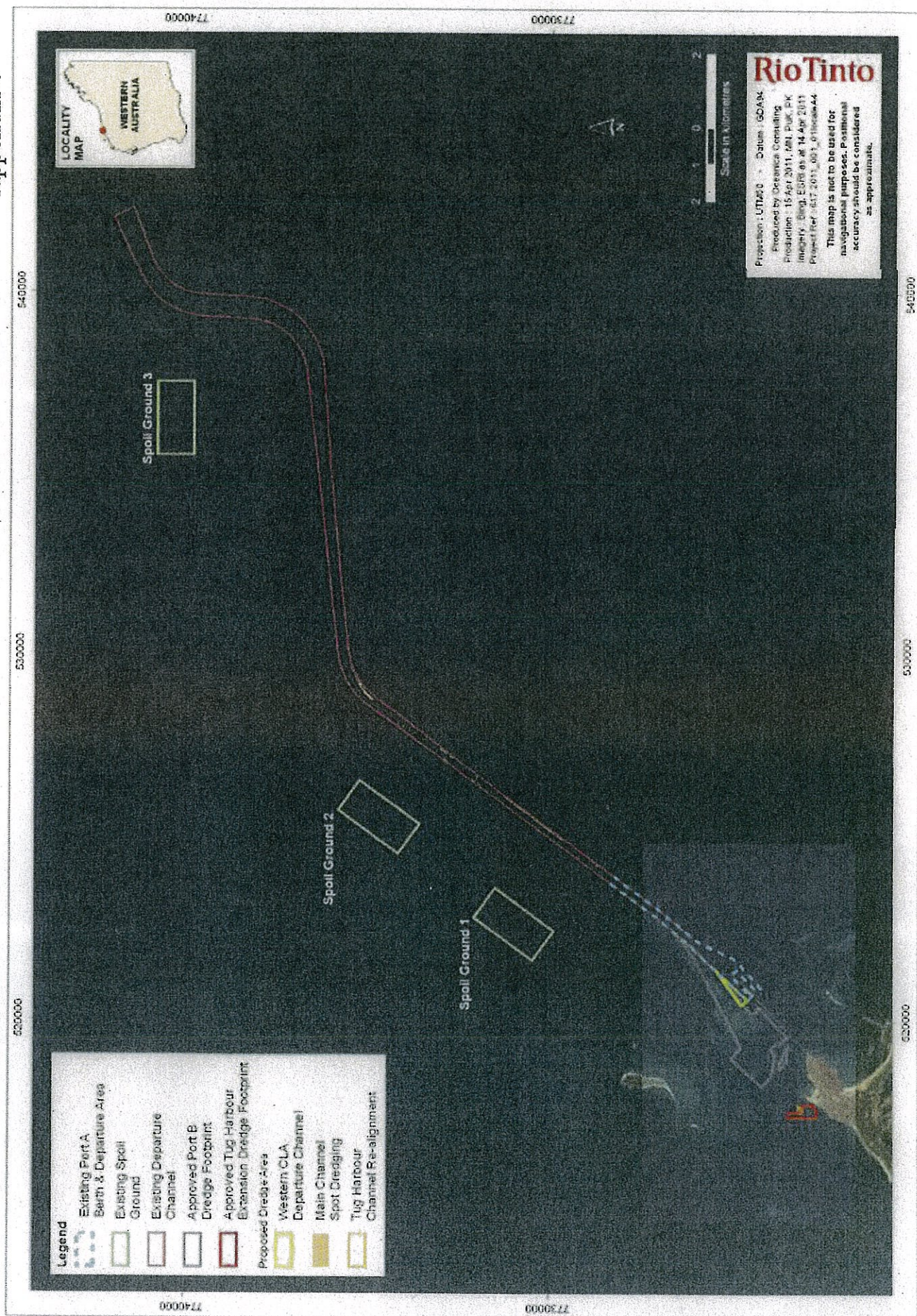
Amending the permit to include Appendix 4 as attached to this variation.

All other conditions of the permit remain unaltered.

DATED.....*23rd*.....day of.....*December*.....2011

  
.....  
Matthew Johnston  
Delegate of the Minister

# Appendix 4



## Appendix D Example Compliance Audit Table





| Ref Number | Description | Requirement Ref | Assessment Criteria | Assessment Findings | Recommendation/Action | Accountability (Role) |
|------------|-------------|-----------------|---------------------|---------------------|-----------------------|-----------------------|
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