Cape Lambert Port B Development Marine Turtle Management Plan

17 April 2013

Acknowledgements

The Cape Lambert Upgrade to 80mtpa Marine Turtle Management Plan (CLU80 MTMP) was developed by Dr Mick Guinea.

We thank Biota Environmental Sciences for developing and writing the approved Cape Lambert Port B Marine Turtle Management Plan. This revision of the Plan includes minor revision of their document to include some outstanding commitments carried over from the CLU80 MTMP, in order to consolidate both documents into a single management plan.

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1. Introduction

1.1 Project Background

Pilbara Iron operates the port at Cape Lambert, on behalf of Robe River Iron Associates. The Cape Lambert operation was constructed in 1972 and has undergone various upgrades to meet increasing customer demand. The operations consist of an iron ore handling, processing and ship loading facility. Pilbara Iron is proposing to construct a second ore handling, processing and ship loading facility at Cape Lambert. This Cape Lambert Port B Development (the Port B Development) will effectively be a brown field extension to the existing Cape Lambert operation.

Three species of marine turtle are known to nest on beaches in the Cape Lambert area: the Flatback Turtle (*Natator depressus*), Hawksbill Turtle (*Eretmochelys imbricata*) and Green Turtle (*Chelonia mydas*). All three species of marine turtle are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (Commonwealth), and are also afforded protection under the *Wildlife Conservation Act 1950-1979* (Western Australia). The presence of nesting turtles in the locality therefore presents a relevant environmental management issue for the development.

Flatback Turtles account for by far, the great majority of breeding records in the locality. There are two breeding sites in the project area, the more heavily used of which is Bells Beach, adjacent to the site of the Port B Development. A second smaller beach (Cooling Water Beach) is also utilised by marine turtles within the existing Cape Lambert operation. Figure 1-1 shows the proposed Port B Development in relation to Bells Beach and Cooling Water Beach.

The Port B Development was referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986*. The EPA determined that the proposal would be formally assessed at the level of Public Environmental Review (PER). The planned action of constructing the Port B Development was also referred to the Federal Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), under the terms of the *EPBC Act 1999*. The Cape Lambert Port B Development was subsequently determined by the Minister to be a Controlled Action.

The Port B Development was approved by the State Minister for the Environment on 30 September 2010 with the granting of Ministerial Statement 840. A copy of Ministerial Statement 840 is provided in Appendix 1.

The Port B Development was approved by the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities with the granting of conditions (EPBC 2008/4032) issued under the *EPBC Act 1999*. Approval to undertake ocean dredge spoil disposal was also required and was subsequently issued through Sea Dumping Permit SD2008/0822 granted under the *Environment Protection (Sea Dumping) Act 1981* (Commonwealth). These approvals were granted on and dated 26 October 2010. Pilbara Iron will comply with the conditions outlined in Ministerial Statement 840, EPBC 2008/4032 and SD2008/0822. Copies of EPBC 2008/4032 and SD2008/0822 are provided in Appendix 2 and Appendix 3. Subsequent to the grant of the above approvals, an amendment to the approved proposal was sought. This amendment involved the dredging footprint and breakwater layout associated with the proposed tug harbour extension. The approvals covering this amendment are also contained in the respective appendices to this document.

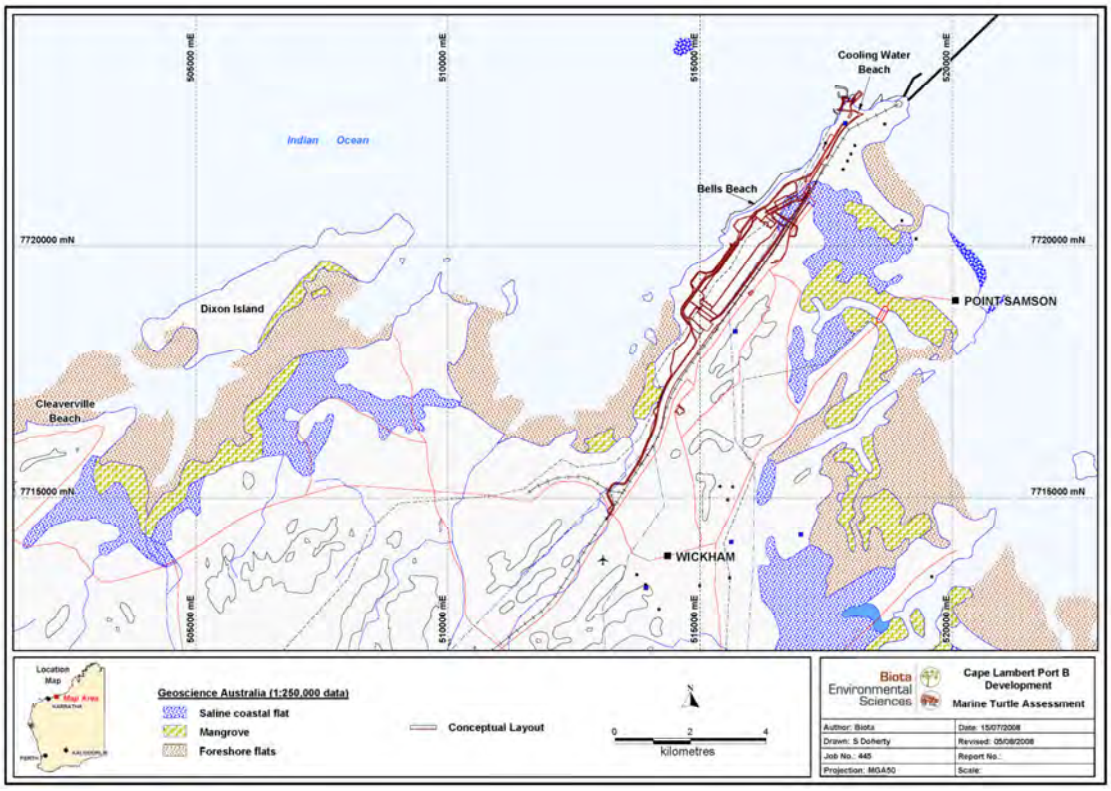


Figure 1-1: Locality plan showing Bells Beach and Cooling Water Beach relative to the conceptual layout for the Cape Lambert Port B Development.

1.2 Scope and Role of this Management Plan

The Cape Lambert Port B Development Marine Turtle Management Plan (MTMP-B) sets out project design, construction and operations management measures to reduce impacts on marine turtles. Monitoring procedures are also detailed to measure the effectiveness of these design and management measures, and to provide continuous improvement feedback to the programme. This revision of the MTMP also incorporates the outstanding elements of a separate Marine Turtle Management Plan for existing Cape Lambert Operations (Guinea 2009; Appendix 4). *The Guinea (2009) plan (denoted CLU80 MTMP) was developed in November 2007 for the now completed Cape Lambert Upgrade and was prepared in accordance with the requirements of Condition 12 of Ministerial Statement 743. The CLU80 MTMP stated that the marine turtle management plan "should be reviewed after three years from its implementation". As implementation commenced in 2008/9, the findings of the review and any outstanding actions from the CLU80 MTMP have now been incorporated into the MTMP-B. The MTMP-B for the Port B Development is considered a more comprehensive plan than the CLU80 MTMP for the Cape Lambert Upgrade. A summary of CLU80 MTMP commitments, their status, the relevant CLU80 MTMP section, and additions to the MTMP-B are provided in Section 1.3.*

This MTMP was originally prepared as a supporting document for the Port B Development PER. It has also been prepared in accordance with a condition under the *EPBC Act 1999* (EPBC 2008/4032) and *Environment Protection (Sea Dumping) Act 1981* (SD2008/0822) approvals.

It addresses environmental management and monitoring requirements for marine turtles during design, pre-construction, construction and operational phases of the Port B Development. In accordance with the

requirements of the EPBC 2008/4032 approval conditions, this MTMP was made publicly available within 30 days of approval by the Minister for Sustainability, Environment, Water, Population and Communities.

Currently, there are no marine drilling and blasting activities proposed for the Port B Development, so this aspect is not specifically addressed in the Port B MTMP. Both the Ministerial Statement 840 (Appendix 1) and the EPBC 2008/4032 (Appendix 2) contain conditions relating to marine drill and blast activities. If marine drilling and blasting activities are proposed for the Port B Development, both the DSEWPaC and the EPA will be advised and, in accordance with current approval conditions, management plans addressing the marine drill and blast activities will be prepared in consultation with those Government agencies stipulated in the relevant conditions of those approvals.

To minimise impacts to listed threatened, migratory and other marine vertebrate species (including marine turtles), a combined Blasting Management Plan (BMP) and Drilling and Blasting Management Plan (D&BMP) will be prepared, to address both the EPBC 2008/4032 and Ministerial Statement 840 condition requirements, respectively. The BMP/D&BMP will be developed to the requirement of the CEO of the EPA and will be submitted to the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities for approval at least two months prior to the commencement of marine blasting activities. Marine blasting activities will not commence until the BMP/D&BMP has been approved in writing by the Minister. The approved BMP/D&BMP will be made publicly available.

The approved BMP/D&BMP will be implemented where drilling and blasting activities are undertaken.

1.3 Alignment of Cape Lambert Upgrade to 80mtpa MTMP (CLU80 MTMP) with the MTMP-B

As a condition of approval for the expansion of port facilities and associated dredging for an upgrade of facilities to 80 million tonnes per annum (mtpa), Robe River Iron Associates was required to develop and implement a marine turtle management plan (the CLU80 MTMP) to limit the possible environmental impacts on the marine environment. This requirement is set out in the Ministerial Statement No 743 condition 12. The CLU80 MTMP identified the actions needed to monitor for and mitigate potential impacts of the existing Cape Lambert Operations on turtle populations in the immediate vicinity of the Cape Lambert lease.

The status of Operations phase commitments under the CLU80 MTMP is summarised in Table 1-1. Most commitments were met during the first three monitoring seasons of the program. Following the required review of the CLU80 MTMP three years after its implementation, several monitoring components from the CLU80 MTMP have been integrated into the current MTMP-B, in order to rationalise turtle monitoring programs at Cape Lambert into a single management plan covering both the existing operation and the Port B Development. The relevant monitoring commitments of the MTMP-B (Section 6) have been updated with some carry-over commitments from the CLU80 MTMP. It is envisaged that following the commissioning of the Port B Development, this MTMP will be reviewed and updated to cover the combined Cape Lambert port operation.

1.4 Other Relevant Management Plans

Several other management plans already exist that are relevant to the Port B Development. Relevant management plans for the project (excluding this MTMP) include:

- Construction Environmental Management Plan (SKM 2008a);
- Dredging and Spoil Disposal Management Plan (SKM 201008b);
- Cape Lambert Dust Management Plan (Pilbara Iron 2007); and

- Cetacean Management Plan (SKM 2010).

In addition, an Ecosystem Research and Monitoring Program (ERMP) for the Cape Lambert ecosystem was required to be prepared as a condition (Condition 10) of the EPBC 2008/4032. This ERMP was approved on 25 October 2011 and is currently being implemented.

Table 1-1Status of CLU80 MTMP commitments and corresponding commitments under this MTMP.

Research Activity	Commitment under Section 5.1 of CLU80 MTMP	Duration	Status				Equivalent section of this document (MTMP-B)	Addition to this document (MTMP-B)
			2008/9	2009/10	2010/11	2011/12		
Nesting Adult Track Count	Daily track counts on Cape Lambert Lease	Ongoing	✓	✓	✓	✓	**6.4.1**	No change
	Track counts – other beaches	Ongoing	-	✓	✓	✓	**6.4.1**	No change
Hatched nest track count	Daily counts on Cape Lambert Lease	Ongoing	✓	✓	✓	✓	**6.4.1**	No change
	Hatched nest counts – other beaches	Ongoing	-	✓	✓	✓	**6.4.1**	No change
Temperature dataloggers	Dataloggers deployed for beach temperature measurement	3 years	✓	✓	✓	✓	**6.3**	No change
Tagging nesting females	2 week tagging per season on Cape Lambert Lease	3 years	✓	✓	✓	✓	**6.5**	Add tagging program on Delambre Island to replace track counts on island beaches
	2 week tagging on one zone 2 beach	3 years	✓ †	✓ †	✓ †	- #	**n/a**	
	2 week tagging on Delambre & Legendre Islands	3 years	✓	✓ ‡	✓ ‡	✓ ‡	**n/a**	
Excavating hatched nests	At least 6 nests/season on Cape Lambert beaches	3 years	-	✓	✓	✓	**6.3**	No change
Recording female morphometrics	One week per year on Cape Lambert lease	3 years	✓	✓	✓	✓	**Not required**	No change
Satellite tracking – nesting females	Within nesting season on Cape Lambert lease	3 years	-	-	✓	✓	**6.5**	Increased commitment in MTMP-B
Inwater foraging study	Single annual survey	3 years	-	-	-	-	**n/a**	No change

Key: Green boxes – complete; Yellow boxes – Partially complete, but additional monitoring beyond original commitment undertaken; Red boxes – not undertaken

n/a – There was no requirement for this monitoring in the approved MTMP-B

† - Monitoring conducted at Cleaverville (2008/9, 2009/10, 2010/11) and at Boat Beach (2010/11); however, as no turtles were observed tagging could not be conducted.

- Owing to low numbers of turtles in previous seasons, no tagging at these beaches attempted in 2011/12

‡ - Monitoring program incomplete at Legendre Island due to safety issues. Additional monitoring carried out at Delambre Island in lieu of this.

2. Management Context

2.1 Management Area

The primary management areas for this MTMP comprise the Cape Lambert port facility itself, Bells Beach and Cooling Water Beach, including the waters immediately offshore of these locations. These areas were identified as the primary locations where the Port B Development may impact on marine turtles in the assessment completed by Biota (2008). This assessment also found that Bells Beach and Cooling Water Beach are relatively small rookeries in the locality, compared to the number of turtles utilising other beaches in the nearby Dampier Archipelago (particularly Delambre and Legendre Islands; Biota 2008). These latter sites, while outside of Pilbara Iron management control, will form part of the monitoring components of this MTMP (Section 6).

2.2 Background on Focal Species

While occasional Green and Hawksbill turtles nest in the Cape Lambert area, the primary management species focused on by this MTMP is the Flatback Turtle *Natator depressus*. This species accounts for the great majority of nesting records in both the management area and the wider Dampier Archipelago locality (Biota 2008). Nesting activity occurs from November through to March each year; defining the annual timeframe during which turtles may be affected by Port B Development activities (as well as Port A). A summary of the biology of Flatback Turtles, as well as the lower frequency Green Turtle *Chelonia mydas* and Hawksbill Turtle *Eretmochelys imbricata*, is provided in Appendix 5.

2.3 Relevant Potential Impacts

Threatening processes affecting marine turtles arising from coastal developments are well documented, however the actual impacts (i.e. the consequences of these processes) are less well understood and in general poorly quantified. A number of threatening processes are associated with the existing Port A and the proposed Port B Development that place pressure on turtles nesting at Bells Beach and Cooling Water Beach (Biota 2008, Guinea 2008). These include:

- light spill;
- noise;
- vibration;
- human disturbance; and
- predation of eggs and hatchlings by introduced fauna.

In respect of the Port B Development, these can be classified as associated with the construction phase of the development (and therefore relatively short-term), or due to operations (ongoing) (Table 2-1).

Table 2-1:Summary of Port B Development construction and operation phase attributes and processes in respect of marine turtles.

Construction Phase	
Project Attribute	**Threatening Processes**
Increased construction workforce	Disturbance
Heavy plant and equipment undertaking earthworks	Noise, vibration, light spill
Pile driving for jetty and associated infrastructure	Noise, vibration
Dredging	Disturbance, turbidity, foraging habitat removal

Operations Phase	
Project Attribute	**Threatening Processes**
Increased operational workforce	Disturbance
Operation of new stockyards and infrastructure	Noise, vibration
Shipping	Disturbance, light spill
Stockpile, infrastructure and jetty/tug harbour lighting	Light spill
Jetty/tug harbour lighting and waste production	Increased predation

Potential impacts have also been considered in respect of different classes of sensitive receivers, comprising: nesting adult females, eggs, hatchlings, and juvenile and adult turtles (following Biota 2008).

2.4 General Management Responsibilities

The Registered Port Manager (or delegates) shall ensure that:

1. adequate resources are provided to effectively implement and monitor the performance of this MTMP; and
2. adequate review mechanisms are implemented to monitor the effectiveness of this MTMP.

Rio Tinto's Manager Environment (or delegated Superintendent / Site Environmental Adviser (SEA)) shall ensure that:

1. all employees and contractors comply with this MTMP as relevant to their work activities;
2. adequate specialist resources are made available to complete the monitoring and management requirements identified in this MTMP;
3. periodic reviews of the effectiveness of this management plan are conducted, with resultant modifications to monitoring and management procedures as appropriate;

4. adequate records are maintained to demonstrate compliance with this MTMP;
5. management requirements applicable to marine turtles and their habitat is a topic covered in the site specific induction attended by all employees and contractors;
6. a training and awareness program is implemented which includes the management requirements applicable to marine turtles and their habitat; and
7. environmental and legal compliance audits will be held during construction and operations period, including auditing of this MTMP.

2.5 Definitions

The following definitions apply to terms used in this MTMP:

Construction: Substantial commencement of earthworks through to Operations phase.

Disorientation: Used to described turtles that repeatedly change direction in response to different light cues.

Ground clearing: Any ground disturbing activity that results in the removal of native vegetation and/or the disturbance of topsoil.

Misorientation: Used to describe a turtle that has oriented on an artificial light source and moves consistently toward this instead of the ocean.

Nesting period: The annual period between which females being nesting and final hatchling emerge: November to March each year.

New turtle: An individual turtle marked for the first time at a particular beach.

Operation: Operations will commence from the first shipping of ore through the new facilities.

Pre-construction: Project design phase and related investigations; all project activities prior to substantial commencement of project earthworks.

Project footprint: The area over which the Cape Lambert Port B Development will be constructed and operated.

Re-migrant: A turtle that had been recorded during a previous year's nesting season (at beaches monitored over the longer term).

Re-sighting: A turtle that had previously been recorded during a given monitoring period/season.

3. Project Design Measures

3.1 Habitat Protection

Project design measures will represent the first level of management in regards to reducing impacts on marine turtles. The overall siting and configuration of the Port B Development is largely dictated by the location of the existing port facilities. The detailed design of the Port B Development will still, however, incorporate measures to minimise impacts on turtles.

The final project design treats the retention and protection of terrestrial habitats relevant to marine turtles as a design constraint. Measures to be included comprise:

1. The final design of the facility seeks to maximise the setback distance of the stockyard and other infrastructure from Bells Beach. The extent of project land clearing boundaries will also be limited such that there is no direct impact on turtle nesting habitat at either Bells Beach or the nesting area of Cooling Water Beach. These works area limits will be clearly delineated on all plans.

2. The elevated primary dune separating Bells Beach from the Port B Development plays an important role in reducing direct light spill onto Bells Beach (Biota 2008). The final project design has ensured that this landform has been retained.

3. There will be no new or upgraded general vehicle access onto Bells Beach created as part of the Port B Development design. Access onto Bells Beach will be by foot. Locked gates will be installed at the Boat Beach end (near the Yacht Club) of the existing track leading toward Bells Beach to control access for only members of the West Pilbara Community Turtle Programme (WPCTP). This will allow safe access to the area for volunteer monitoring purposes.

A number of management measures to reduce light impacts have already been included in the project design. A lighting review and analysis is currently in preparation and is scheduled to be completed. Measures to reduce light spill are listed in Section 3.3.

3.2 Dune Vegetation Enhancement Specification

In addition to ensuring the foredune is retained, Pilbara Iron will also include revegetation and enhancement of the dune field as part of site rehabilitation and revegetation specifications. This will serve to further improve the dune's existing screening and may also assist in extending light screening beyond Bells Beach and into shallow offshore water. Dune vegetation enhancement should also serve to stabilise the landform, minimising the risk that long-term aeolian or erosive processes could reduce the height or extent of the primary dune.

Revegetation and enhancement of dunes as part of the site rehabilitation will only be undertaken during daylight hours.

This dune vegetation enhancement will form a specific item in the construction specifications and will be carried out using provenance-sourced, locally occurring native flora species only. A recommended species list, based on primary dune flora data from the Cape Lambert area in Biota (2008b), is provided in Table 3-1.

Table 3-1:Recommended flora species for primary dune enhancement plantings adjacent to Bells Beach.

Shrubs	**Grasses and Herbs**
Acacia ampliceps	*Eriachne gardneri*
Acacia coriacea subsp. *coriacea*	*Eulalia aurea*
Commicarpus australis	*Euphorbia coghlanii*
Crotalaria cunninghamii	*Ptilotus villosiflorus*
Rhagodia preissii subsp. *obovata*	*Spinifex longifolius*
Santalum lanceolatum	*Triodia epactia*
Scaevola cunninghamii	*Whiteochloa airoides*

3.3 Light Spill Reduction

The potential for light spill onto nesting habitat and an increase in overall sky glow are key marine turtle impact processes presented by the development (Biota 2008). This can result in disorientation or misorientation of both adult and hatchling turtles, affecting nesting success and hatchling survivorship. The majority of the management measures that can be implemented to reduce overall light levels at the new facilities are in effect, project design measures. To ensure these are suitably addressed, Pilbara Iron will undertake a staged lighting review and analysis with the objective of identifying aspects of the project design where light impacts on marine turtles can be reduced.

The steps in this review process will comprise:

1. Detailed identification of all light sources associated with the Port B Development, categorising these into:
   - static terrestrial sources (infrastructure, buildings, stockpiles, car dumper, rail facilities, road lighting);
   - static marine sources (jetty structures, off-loading facilities);
   - mobile terrestrial sources (vehicles, shiploaders, stacker/reclaimer systems); and
   - mobile marine sources (shipping).

2. Tabulation of all identified light sources, and cross-referencing these with:
   - default lighting specifications for each identified area (specifically the type and intensity of luminaires);
   - nature of operational activities undertake at each identified area (and associated safety and personnel use issues);
   - whether the lighting is associated with automated or remotely managed machinery; and
   - frequency of personnel access after daylight hours.

The objective of this process is to audit and critically review all lighting requirements for the project, with consideration to the lighting design recommendations of similar work completed in other turtle-sensitive environments (e.g. Witherington and Martin 1996, Washburn et al. 2003, Florida Conservation Commission 2008). The final stage of the lighting review will, subject to plant integrity and occupational health and safety considerations, consider:

- reassessment of intensity and luminaire construction specifications for lighting for particular functions where lower levels may be acceptable;
- the use of asymmetrical louvered bollard lighting rather than pole mounted luminaries;
- increased use of shrouded and directional lighting;
- the use of high pressure sodium vapour or other long wavelength lighting; and
- incorporating motion-sensor or timer lighting in areas with intermittent activity.

A number of management measures to reduce light impacts have already been included in the project design. Further, the lighting review and analysis is currently in preparation and is scheduled to be completed prior to end 2010. Measures to reduce light spill have included:

1. locating stockpiles nearer to the railway, further away from Bells Beach;
2. reducing the length of the jetty, effectively reducing the area requiring to be lit by the Port B Development and its potential light spill;
3. reviewing the lighting design to:
    - ensure no direct light spill where turtles nest on Bells Beach;
    - provide automatic control systems to ensure lights are turned off when not needed;
    - mount lights low;
    - select the lowest intensity for the purpose;
    - shield lights near Bells Beach and Cooling water Beach to minimise light escaping upwards and outwards; and
    - include long wave length lighting on jetties, wharves, tug harbour and areas near the ocean.

The outcome of this first phase lighting review and analysis was provided to the DSEWPaC in January 2011. Additional information in relation to the lighting review and analysis for the Cape Lambert Port B development, including the amendments to the tug harbour will be submitted to DSEWPaC by 31 January 2012. Advice will be provided to DSEWPaC on what measures are to be implemented, how these measures will address the relevant management actions and the timings for implementation.

Appendix 6 contains design guidelines sourced from Witherington and Martin (1996) as a guide to this reassessment. Once all light sources have been identified and requirements critically analysed, a finalised lighting specification will be produced for the Port B Development.

3.4 Summary of Design Phase Management Actions

Table 3-2 below provides a summary of marine turtle management measures to be implemented during the project design phase, including identification of management responsibilities.

Table 3-2:Summary of design phase management actions, responsibilities and frequency.

Management Action	**Responsibility**	**Frequency**
3.1 – Final design will aim to maximise the setback of stockpiles and other infrastructure from Bells Beach.	RTIO Expansion Projects (RTIO EP)	Once
3.2 – Ensure the final design does not result in any direct clearing of turtle nesting habitat on Bells Beach or Cooling Water Beach.	RTIO EP	Once
3.3 – Ensure the final design does not result in any direct clearing of the elevated foredune separating Bells Beach from the port facilities.	RTIO EP	Once
3.4 – Ensure that final project design does not result in increased vehicle access onto Bells Beach or Cooling Water Beach.	RTIO EP	Once
3.5 – Stabilise primary dune vegetation (and enhance where opportunities are present), using locally occurring dune species.	Pilbara Iron Site Environmental Adviser (SEA)	Ongoing
3.6 – Conduct a project lighting review to identify all static and mobile operational light sources – expected by end 2010.	RTIO EP	Once
3.7 – Provide a copy of the completed project lighting review to DSEWPaC by 31st January 2011.	RTIO EP	Once
3.8 – Critically reassess all identified project lighting, giving consideration to functional and safety issues, with the objective of reducing light levels and light spill at Bells Beach and Cooling Water Beach and along the jetty/wharf – expected by end 2010.	RTIO EP; Pilbara Iron SEA	Once
3.9 – Produce a finalised project lighting specification based on the outcomes of the review process required by 3.6 and 3.7 above. The outcome of the first phase lighting review and analysis was provided to the DSEWPaC in January 2011. Additional information in relation to the lighting review and analysis for the Cape Lambert Port B development, including the amendments to the tug harbour will be submitted to DSEWPaC by 31 January 2012. Advice will be provided to DSEWPaC on what measures will be implemented, how these measures will address the relevant management actions and the timing for implementation.	RTIO EP	Once

4. Construction Management Procedures

4.1 Habitat Protection

Inadvertent ground clearing outside of the specified works area could potentially affect primary dune habitat adjacent to Bells Beach (Section 3.1). In order to manage this risk, Pilbara Iron will implement standard ground clearing management procedures for all works adjacent to Bells Beach. The existing RTIO Approval Request and permitting system will be applied to ensure no clearing is undertaken without necessary approvals. Existing ground clearing procedures will be applied to avoid inadvertent ground clearing. During construction, the ground clearing procedure as outlined in the Port B Development CEMP (SKM 2008) will be applied.

4.2 Light Spill Reduction

The management of light spill issues for the development are effectively project design (Section 3), and operational (Section 5) in nature. Construction activities may also result in periodic increase in light levels however, from both mobile (plant and equipment) and static (site lighting) sources.

During the turtle nesting period, management measures to address this will include:

1. planning of works activities such that construction works are completed during daylight hours wherever possible (recognising that some activities, such as concrete pours will need to be undertaken over a continuous 24-hour period); and
2. education of the workforce (Section 4.3) regarding the potential disorienting effect of mobile and fixed lighting on marine turtles during the nesting season.

Pile driving will not be undertaken over a continuous 24-hour period (unless a future approval is obtained for that), but some night work may be undertaken. This work may include: welding, cutting/trimming piles, relocation/set up of temporary work, set up of scaffolding (where safe), loading/unloading of marine plant, reposition of plant and equipment, installation of conveyor components, check/tighten fastening on installed structures, install steel work, and construction of the abutment. Where construction work is carried out on the jetty/wharf and tug harbour at night, mobile directional lighting will be used and operated in such a way to limit spill of light onto Cooling Water Beach or Boat Beach and the surrounding water as much as is practical and safe to do so.

4.3 Construction Workforce Management

All on-site personnel will be required to complete a site induction, which will include a section highlighting the presence of marine turtle nesting habitat adjacent to the project. This will also set out Pilbara Iron's requirements of all personnel in regards to marine turtles, including:

1. no project personnel are to access Bells Beach or Cooling Water Beach during the nesting season without written approval from the EPCM Environmental Officer (EPCM EO or other delegated personnel);
2. no vehicles or pedestrian traffic will be permitted in the primary dune habitat adjacent to Bells Beach, except where approval has been granted under 1. above and where existing access tracks are present; and
3. any incidents involving marine turtles are to be reported and tracked through the corporate incident reporting system.

4.4 Dredging Management

All dredging for the Port B Development will be required to operate under statutory licence conditions, ensuring that turbidity levels are monitored and that dredging equipment utilises turtle exclusion devices.

In addition, a detailed Dredging and Spoil Disposal Management Plan (DSDMP) has been prepared (a condition of EPBC 2008/4032), which also addresses turtle management during dredging and spoil disposal activities. Strategy 3 Marine Mammals and Turtle Management presented in Section 4.4 of the DSDMP outlines the exclusion zone for marine turtles during dredging and spoil disposal. The marine mammals and turtle management strategy provides for a 300 m exclusion zone to be implemented for marine turtles during dredging and spoil disposal activities and allows for a water jetting system (where dredging operations allow for it) to direct marine turtles away from the drag head. Strategy 3 in Section 4.4 of the DSDMP also covers the procedures for when dredging vessels are at the dredging area and at the spoil ground in order to minimise the risk of vessel strike with turtles and marine mammals (e.g. cetaceans). This DSDMP is required to be approved by the Minister for Sustainability, Environment, Water, Population and Communities before dredging can commence.

The SD2008/0822 conditions require Pilbara Iron to document any incidents involving dredging and spoil disposal activities that may result in injury or death to any marine turtle. The time and nature of each incident and the species involved, if known, must be recorded. The DSEWPaC will be notified in writing within 24 hours, or as requested by DSEWPaC, of any such incidents involving marine turtle during dredging. The DEC will also be notified.

4.5 Pile Driving Management

Pile driving has the potential to affect both adult turtles and hatchlings (Biota 2008). Assessments completed by SVT (2008), indicate that this will, however, only be a factor for nesting activity at Cooling Water Beach. Potential impacts include both behavioural and physiological impacts from underwater noise propagation, and transmission of terrestrial vibration affecting beach nest sites (Biota 2008).

During the turtle nesting period, management measures to address risks associated with underwater noise will include:

1. Dedicated Marine Fauna Observer or Observers (MFOs) will be engaged to spot for marine turtles and marine mammals when pile driving operations are conducted. The MFOs will have demonstrated knowledge and experience of marine wildlife species and their behaviour and will have the capacity, subject to safety considerations, to move independently between pile driving barges and within exclusion zones surrounding piling operations. The MFOs will be on duty during all daylight hours when pile driving operations are conducted. The MFOs will observe for marine turtles and other marine fauna within 500 m of the piling operations. Surveillance by the MFOs will be undertaken using binoculars from a high observation platform or from a vessel.
2. Pile driving will only be conducted during daylight hours (between hours of sunset and sunrise during the turtle nesting season defined as 20 October to 10 March in any year: Ministerial Statement 840 condition 7-7). Both nesting female emergence onto Cooling Water Beach and hatchling entry into shallow waters predominantly occur after dark. Limiting piling to daylight hours will therefore serve to significantly reduce the risk of impacts on both nesting females and hatchling turtles in respect of underwater noise. The only exception to this will be in the event of a pile being in an unsafe state at dusk. In these circumstances, work will continue until that individual pile is made safe before piling is ceased for the evening.
3. If there is any requirement for piling outside of daylight hours, then this work is to be staged such that areas closest to Cooling Water Beach are preferentially completed outside of the nesting season. Any approval to pile drive outside daylight hours will firstly be sought from the DEC. Subject to any approval granted by the DEC, advice from DSEWPaC on any additional requirements will be sought.

4. An initial 'starter' warning (e.g. before full power pile driving, soft start-up procedures ['fairy' taps] that slowly increase the intensity of noise emissions from piling over a period of no less than 15 minutes will be implemented, as per Ministerial Statement 840 condition 7-4) will be conducted prior to commencing pile driving. This should assist in dispersing any adult turtles that may be close to the piling location during daylight hours, prior to the commencement of full capacity pile driving. The soft start-up procedures will only commence if no marine turtles are observed within 500 m radius of the pile driving activity.
5. No pile driving will commence until the designated MFO's have verified that no marine turtles have been observed within an area 500 m from the planned piling operation during the 15 minute period immediately prior to commencement.
6. If the MFO's notice a turtle entering within 500 m, the piling operation within that distance from the marine turtle will be suspended.

These management measures would address the risks associated with underwater noise. Nests and hatchlings on Cooling Water Beach could still, however, be affected by terrestrial vibration during piling close to Cooling Water Beach. Monitoring is planned for this location to compare nest success with reference sites during pile driving activities (see Section 6). This will be commenced early in the nesting period to establish whether management intervention is required for the balance of the season.

To mitigate impacts to turtles outside the nesting period, an initial 'starter' warning (e.g. soft start-up, as outlined above) will be conducted prior to commencing pile driving. This should assist in dispersing any adult turtles that may be close to the piling location, prior to the commencement of full capacity pile driving.

4.6 Nest Relocation

In the event that monitoring indicates there is a significant impact on nest success due to pile-driving, Pilbara Iron will undertake a nest relocation programme at Cooling Water Beach. Given the 12-month duration of piling works, this would only be needed for a single nesting season if required. The requirement for, and specifics of, the nest relocation procedures would be developed in consultation with the DEC and DSEWPaC prior to implementing any nest relocations. Given the sensitivities with nest relocation, this strategy is considered a strategy of last resort. No nest relocation will be undertaken without prior approval from the DEC or DSEWPaC.

4.7 Summary of Construction Phase Actions and Responsibilities

Table 4.1 below provides a summary of marine turtle management measures to be implemented during the project construction phase, including identification of management responsibilities.

Table 4-1:Summary of construction phase management actions, responsibilities and frequency.

Management Action	Responsibility	Frequency
4.1 – Apply the Approvals Request and permitting system to ensure no unauthorised clearing is undertaken.	RTIO EP	Once
4.2 – Apply the Port B Development CEMP clearing procedures.	RTIO EP	Once
4.3 – Include a marine turtle education and management requirements component in site inductions.	Construction Manager	Once
4.4 – No personnel or vehicles to access Bells Beach or Cooling Water Beach without EPCM EO approval.	All personnel; Construction Manager	Ongoing
4.5 – Report any incidents involving marine turtles to DSEWPaC and DEC.	All personnel	Ongoing
4.6 – Adhere to requirements of statutory dredging permits in respect of turtle exclusion devices and turtle spotting within the dredge area and spoil grounds.	EPCM; Dredging contractor	Ongoing
4.7 – Pile driving is only to be conducted during daylight hours during the nesting period (October – March). MFOs are to be engaged to spot for marine turtles during pile driving within 500 m of pile driving.	EPCM; Contractor	Ongoing
4.8 – Any piling that must be conducted after daylight hours is to be staged such that works closest to Cooling Water Beach are outside of the nesting period.	EPCM; Contractor	Ongoing
4.9 – Any approval to pile drive outside daylight hours will firstly be sought from the DEC; advice from DSEWPaC on any additional requirements will be sought.	EPCM: RTIO EP	If required
4.10 – Pile driving to be commenced with a soft start up procedure (ramping up over 15 minutes) to disperse any turtles in the vicinity prior to normal pile driving.	EPCM; Contractor	Ongoing
4.11 – No pile driving will commence until the designated MFOs have verified that no marine turtles have been observed within an area 500 m from the planned piling operation during the 15 minute period immediately prior to commencement.	EPCM: Contractor	Ongoing
4.12 – If MFOs see a turtle entering within 500 m of a single piling operation, the piling operation within that distance from the marine turtle will be suspended.	EPCM; Contractor	Ongoing
4.13 – Develop and implement a possible nest relocation programme for Cooling Water Beach, in liaison with DEC and DSEWPaC, in the event that monitoring indicates a significant decline in nest success relative to other beaches. DEC and DSEWPaC approval will be required before this strategy is adopted.	EPCM EO	Ongoing

5. Operational Management Procedures

5.1 Primary Dune Habitat Maintenance

The Bells Beach primary dune will be monitored for stability and vegetation cover for the life of the project (Section 6.2.1). In the event that monitoring data indicate that landform stability is being reduced as a result of erosion, vegetation cover reduction or other process, dune stabilisation measures will be implemented. These will comprise:

1. Identification of the process affecting the primary dune landform (so that this can be fed back into ongoing management improvements in adaptive fashion; Section 7.2);
2. physical stabilisation of mobile dune sands using webbing fences, natural fibre matting or other suitable surface treatments; and
3. revegetation of denuded areas using locally occurring species (see Table 3-1).

5.2 Light Spill Management

Primary light spill management for the Port B Development is design-based (Section 3.3). The majority of light level reduction will be a function of the final lighting specifications. The results of incident light monitoring at Bells Beach and Cooling Water Beach will, however, be used in a continuous improvement process, by:

1. providing real-world calibration of light spill modelling completed by Bassett (2008) and assessing the success of the light-reduction design aspects of the development (Section 3.3);
2. identifying any sections of the management beaches that are subject to elevated light levels from artificial sources; and
3. identification of the source of any elevated light levels with the objective of additional design modifications to address this (including shrouding, introduction of timed lighting or other methods; Appendix 6).

Reporting on the initial outcome of this analysis will be provided to DSEWPaC within six months of the commissioning of the Port B Development.

5.3 Dust Management

Pilbara Iron will extend the best practice dust management procedures currently employed at the existing Cape Lambert Port to the new Port B facilities through the Cape Lambert Dust Management Plan (Pilbara Iron 2007and subsequent updates/revisions). This will assist in reducing the overall sky glow associated with the development (Bassett 2008).

5.4 Beach Access Management

Site environmental induction and workforce education process required for all personnel during construction (Section 4.3) will be continued during operations. Beach access restrictions and incident reporting responsibilities for all on-site personnel will also be continued.

In addition, Pilbara Iron has liaised with the DEC Regional Office and has reached agreement that volunteers involved in turtle monitoring can access Bells Beach on foot via an existing track from near the Yacht Club at Boat Beach (south of Bells Beach). Access to the existing top of Bells Beach from the Cape Lambert operation is permitted by suitably inducted Pilbara Iron staff.

In 2005, Rio Tinto and DEC formed a two year partnership to determine whether a sustainable turtle monitoring program could be conducted on beaches around Wickham. The program (then known as the WPCTP) commenced on Bells Beach in December 2005. In October 2007, a formal Memorandum of Understanding (MoU) was developed for a three year partnership between Rio Tinto and DEC. The WPCTP has been renamed the West Pilbara Turtle Program (WPTP) and the partnership with DEC extended for a further three years from October 2010.

The funding is largely used to:

- support a volunteer program co-ordinator role;
- purchase equipment for track monitoring;
- community access (e.g. guided turtle information nights);
- educational opportunities (e.g. beach utilisation for recreational purposes while minimising potential risks to turtles); and
- increase general awareness of marine turtle management in the local community (through signage, newspaper coverage, predator control and keeping vehicles off the beaches).

The track monitoring program is largely carried out by volunteers and will continue to focus on beaches around Wickham. This will help educate the local community on threats to turtles and turtle nesting habitat and what can be done to mitigate these impacts.

An Ecosystems Monitoring Adviser (EMA) has recently been employed by Pilbara Iron to oversee the marine turtle monitoring program and associated work (Section 7.3).

Pilbara Iron will also establish a non-eroding pathway from the southern end of Bells Beach up from the beach to channel pedestrian traffic and avoid dune erosion.

5.5 Waste Management

Pilbara Iron will apply existing waste management procedures employed at the relocated Cape Lambert landfill or its replacement. This will assist reduce the risk of artificial enhancement of Silver Gull numbers in the Cape Lambert area, in addition to controlling the entry of non-putrescible waste into the marine environment (Biota 2008).

5.6 Feral Animal Control

Pilbara Iron will continue the programme of fox trapping it currently implements in the Cape Lambert area as part of this MTMP. This will serve to reduce pressure from foxes on turtle nest sites and hatchlings. Fox trapping is normally undertaken once per year within the Cape Lambert industrial lease area. Fox trapping is scheduled over a five night period prior to commencement of the turtle nesting season (i.e. normally implemented in September).

5.7 Relocation of Misoriented Turtles

While a low risk, Pilbara Iron has developed contingency protocols for the relocation of any misoriented turtles that are found on or behind Bells Beach or Cooling Water Beach or any construction operational area (Table 5-1). Detection of misoriented turtles will occur during dedicated monitoring periods, by WPCTP volunteers and opportunistically by the construction and operations workforce at other times. A DEC Regulation 17 Licence to handle and hold turtles will be applied for from DEC's Species and Communities Branch within seven days of this MTMP being approved.

These relocation protocols will apply during construction and operations phases and have been developed in consultation with the DEC Regional Office and the DSEWPaC, and with advice from Mick Guinea from Charles Darwin University. All records of misoriented turtles entering the Cape Lambert Port B lease will be formally reported and tracked through Pilbara Iron's incident reporting system. Awareness of these relocation protocols will be made to the construction workforce through the turtle awareness training (Section 4.3).

Table 5-1:Protocols for relocation of misoriented turtles.

1.0 Misoriented Hatchlings	
Management Actions	
1.1	Collect individual hatchlings by hand and placed into a plastic storage container (e.g. bucket with high sides) for temporary storage. The storage container must be large enough to comfortably accommodate the number of hatchlings being managed without them becoming piled on top of one another. Hatchlings should only be lifted by the carapace.
1.2	If hatchlings are found during daylight hours, they are to be temporarily held until after dark for release.
1.3	Any temporarily held hatchlings must be stored in a cool, dark, shaded location to avoid heat stress, and released on the evening of the day of collection. A wet towel may be placed over the top of the storage container, but the hatchlings should not be placed in water. Do not put anything in the container with the hatchlings.
1.4	Hatchlings are to be released off the same beach as they were collected from shore and on an outgoing tide, down current from beach (i.e. animals collected at Bells Beach should be released off this beach, with those collected from Cooling Water Beach released only at Cooling Water Beach).
1.5	Hatchlings must make their own way down the beach slope to the ocean as their journey across sand may be an integral part of the imprinting process. Hatchlings should travel at least 10 metres, or a distance supported by scientific research across sand to the ocean.
1.6	Misoriented hatchlings found at night are to be collected as per action 1.1 above, then released immediately in accordance with Action 1.4 and 1.5.
1.7	Hatchlings should not be released if large aggregations of seagulls or other predators are present at the release point. In this event, the animals should be stored as per 1.3 above until later the same evening and the preferred release point revisited to assess if the feeding aggregation has dispersed. If this has not happened, then the alternative site of either Bells Beach or Cooling Water Beach may be used to release the hatchlings.
1.8	Ensure that released hatchlings have swum away from the beach and are out of sight before leaving the area.
2.0 Misoriented Adults	
Management Actions	
2.1	Observe the animal and make a cautious and planned approach, avoiding bright lights or casting shadows over the turtle.

2.2	If the individual is still on or relatively near to the beach, it should be slowly and carefully shepherded back toward the water.
2.3	Visually assess the animal's condition: if it appears to be injured then contact the DEC Regional Office for guidance prior to taking any further action (9182 2000). If the animal is in good condition, proceed with the case-specific approach to freeing and lifting the animal toward the seaward portion of the beach. If the misoriented turtle has become stuck in rocks or in an upland dune swale, it will need to be freed to enable it to return to the water. This will require a specific assessment of each case, including freeing anything entangling the animal, and the likely requirement to physically lift the individual free. Take care to not trap the animal's head, flippers and tail if it needs to be freed from any obstruction.
2.4	If lifting is required, adult animals should only be lifted using an appropriate sling.
2.5	Place the re-located adult animal back on the seaward portion of the beach, oriented toward the ocean. Slowly and carefully shepherd the individual back toward the water.
Safety Considerations	
2.6	If adult animals need to be lifted and physically moved, then no less than four people will be required due to the weight of adult turtles. An appropriate lifting sling will be used for this purpose.
2.7	Wear appropriate PPE (safety footwear, leather gloves and safety glasses) if adult animals need to be handled or lifted.
3.0 Reporting and Investigation (Hatchlings and Adults)	
3.1	The Cape Lambert EMA, or nominated alternate/delegate, is to be notified immediately there is an apparent need to implement this protocol to ensure appropriate procedures are followed.
3.2	GPS location where misoriented individuals were encountered is to be recorded.
3.3	RTIO incident reporting procedures to be followed for each occasion where misoriented animals required management intervention.
3.4	Assess the location where the misoriented animal was found and attempted to determine possible causes for misorientation.
3.5	Rectify the source of misorientation if this can be adequately identified.
3.6	Summarise incidents involving misoriented turtles, management and corrective actions on an annual basis and liaise with DEC and DSEWPaC. Monthly reports will be provided during the construction period, but only in the event that any misorientation events are recorded.

5.8 Vessel Movement and Turtle Strike

During ongoing operations, routine vessels that use the Cape Lambert port terminals are displacement type vessels (bulk ore carriers and tugs). Ore carriers travel at about 7 knots whilst in the shipping channel. The potential risk of vessel strike with a marine turtle by loaded ore carriers is reduced because

of the relatively low speed of travel of these vessels, their large bulk, their high visibility and the underwater noise they generate, which is expected to lead to avoidance behaviour by any turtle in their path. Ore carriers have no capacity to safely manoeuvre within the shipping channel to avoid striking a marine turtle if one is on a collision course. Furthermore, the distance required to significantly reduce the travelling speed of a fully-loaded ore carrier to avoid a potential collision with a marine turtle within the shipping channel makes this option of limited effectiveness.

Tugs travel up to about 12 knots when making their way to and from the berths and ore carriers. Speed reduction and course amendment by travelling tugs to avoid potential collision with marine turtles is undertaken and is effective.

The greater risk of vessel strike is from the higher speed vessels, such as recreational vessels. Pilbara Iron excludes recreational vessels from approaching the wharf/jetty structure; this reduces the risk of high-speed vessel strike of marine turtles by recreational vessels in that area. The capacity of Pilbara Iron to adequately control recreational vessels and prevent vessel strikes with marine turtles in the Cape Lambert and surrounding areas is limited.

5.9 Summary of Operations Phase Management Timing and Responsibilities

Table 5-2 below provides a summary of marine turtle management measures to be implemented during the project operations phase, detailing responsibility and timing.

Table 5-2:Summary of operations phase management actions, responsibilities and frequency.

Management Action	**Responsibility**	**Frequency**
5.1 – Identify and address any processes affecting the long-term stability of the primary dune at Bells Beach.	Ecosystems Specialist	Biennial
5.2 – Implement dune surface stabilisation and revegetation programme at the Bells Beach primary dune if monitoring indicates landform stability is being compromised.	Ecosystems Specialist	As required
5.3 – Identify any sections of beaches that are subject to elevated light levels from artificial sources.	Ecosystems Specialist; Specialist consultant	Ongoing
5.4 – Develop and implement additional lighting design modifications to address source of elevated light levels.	Port Manager; Ecosystems Specialist	As required
5.5 – Provide initial report on light spill analysis.	RTIO EP	Within 6 months of commissioning
5.6 – Continue dust management improvement programme.	Port Manager; SEO	Ongoing
5.7 – Include a marine turtle education and management requirements component in site inductions.	Site superintendent; SEO	Once
5.8 – No personnel or vehicles to access Bells Beach or Cooling Water Beach without SEO approval.	All personnel; Ecosystems Specialist	Ongoing
5.9 – Implement misoriented turtle protocol and liaise with DEC and	Ecosystems Specialist	Operations

Management Action	Responsibility	Frequency
DSEWPaC as required.		
5.10 – Report any incidents involving marine turtles.	All personnel	Ongoing
5.11 – Develop and implement effective waste management practices for the Cape Lambert landfill or its replacement.	Port Manager; SEO	Operations
5.12 – Continue fox baiting programme in the Cape Lambert area.	Ecosystems Specialist	Operations
5.13 – Develop a relocation protocol for misoriented turtles in liaison with the DEC and the DSEWPaC.	Ecosystems Specialist	Operations
5.14 – Continue to exclude (high speed) recreational vessels from around the Cape Lambert wharves and jetties.	Port Manager	Ongoing

6. Monitoring

This section includes the monitoring components of the approved Cape Lambert MTMP-B (Biota 2008), as well as outstanding commitments of the CLU80 MTMP (Guinea 2009). Additions to the MTMP-B as a result of the three year review of the CLU80 MTMP are italicised.

6.1 Monitoring Sites

The focus for the monitoring procedures set out in the balance of this section will be the two management beaches: Bells Beach and Cooling Water Beach. Contextual monitoring data on selected aspects of turtle nesting activity will also be collected at a reference site in the immediate locality, as detailed in Sections 6.2.2, 6.4.1 and 6.5. This latter work will be undertaken at Delambre Island, shown in Figure 6-1.

6.2 Biophysical Monitoring

6.2.1 Bells Beach Dune Stability

The primary dune landform at Bells Beach will be monitored on an annual basis for overall stability, vegetation cover and any evidence of erosive processes. Fixed monitoring points will be established along the length of Bells Beach, with parameters to be recorded including:

- monitoring point location (coordinates, plus permanent marking in the field);
- estimate of vegetation cover within each stratum (shrub layer and grass / herb layer);
- evidence of any disturbance processes (fire, erosion, etc);
- elevation of the dune at the monitoring point utilising a differential GPS; and
- reference photograph.

Aerial photography will also be acquired periodically, to enable the point data from each monitoring location to be captured into a Geographical Information System (GIS), and spatially related to overall position and extent of the foredune over time. Periodic cyclones that pass Cape Lambert can significantly alter the foredunes and beach configuration of Bells Beach; this is a natural process that will not be managed (e.g. sand replenishment). Any significant reduction in landform stability to the back dunes (as measured by development of blow-outs or rapid expansion to existing blow-outs on the back dunes) would trigger the requirement for active dune stabilisation management (Section 5.1).

6.2.2 Incident Light Monitoring

Field measurement of incident light levels will be conducted at a selection of representative locations at both Bells Beach and Cooling Water Beach, prior to the construction commencing. Illuminance data will be collected at different times of the lunar cycle, and under different cloud-cover conditions, to provide a range of existing illuminance values to supplement the data set of Bassett (2008). Equivalent data on existing lighting levels will also be collected at a regional monitoring site for comparative purposes (Delambre Island).

In the first nesting period following commencement of construction, the same data will be collected at the same selection of illuminance monitoring locations at each of the management and regional monitoring beaches. In addition, incident light levels will be measured at successful nest locations at both Bells Beach and Cooling Water Beach during turtle nesting activity monitoring (Section 6.4.1). These data will then be captured in a database and linked to a GIS so that a spatial 'map' of light levels will be produced. This will then be spatially related to data on systematically collected turtle activity patterns and the distribution of successful nest sites (Section 6.4.1). The results of this incident light monitoring will be used to validate light modelling.

6.2.3 Sky Glow Monitoring

Pilbara Iron will trial monitoring of sky glow at Cape Lambert beaches and at an off-lease beach over a two week period during a turtle nesting season. Sky glow will be recorded hourly for three hours either side of high tide, using a sky quality meter (Unihedron®). A set of reference values will be generated throughout the survey with sky glow being recorded hourly throughout the night on the new moon and full moon and correlated with numbers of turtles ashore throughput the night and their nesting success. Sky glow will also be recorded opportunistically for periods of hatchling emergence with the hatched nest location recorded with the GPS receiver and the arc of tracks through which the hatchling tracks span to the waters edge will be recorded with a GPS receiver.

6.2.4 Noise and Vibration Monitoring

Given the lack of conclusive data on terrestrial vibration effects on turtle nesting (Biota 2008), Pilbara Iron will undertake monitoring to measure the magnitude of piling effects on nest sites at Cooling Water Beach. Vibration loggers will also be installed immediately adjacent to successful nest locations (see Section 6.3). This will enable any measurable increase in vibration levels on Cooling Water Beach to be quantified. In order to determine if this has resulted in any impact on breeding activity at Cooling Water Beach, these physical data will need to be related to data on nest success during the season affected by pile driving (Section 6.3).

Noise associated with pile driving will also be monitored during initial piling operations in order to collect data to assist with any future noise modelling that may need to be undertaken. Conditions of Ministerial Statement 840 require an underwater noise monitoring program to undertaken during the Port B Development pile driving work. This monitoring will measure underwater noise from pile driving operations to establish a library of sound signals at varying distances from the noise source, when driving piles of different sizes and types, during the concurrent piling of different numbers of piles and in conditions of different water depths. It will also be used to review the predictive capacity of the noise propagation model used for Port B Development, and enable recommendations for improving the accuracy of underwater noise modelling in the future. In accordance with State approval Conditions (Ministerial Statement 840:M7-9), the results of the noise monitoring and modelling review will be published within three years after the completion of pile driving operation for the Port B Development. This work will be undertaken by a suitably qualified consultant.

6.3 Nest Success Monitoring

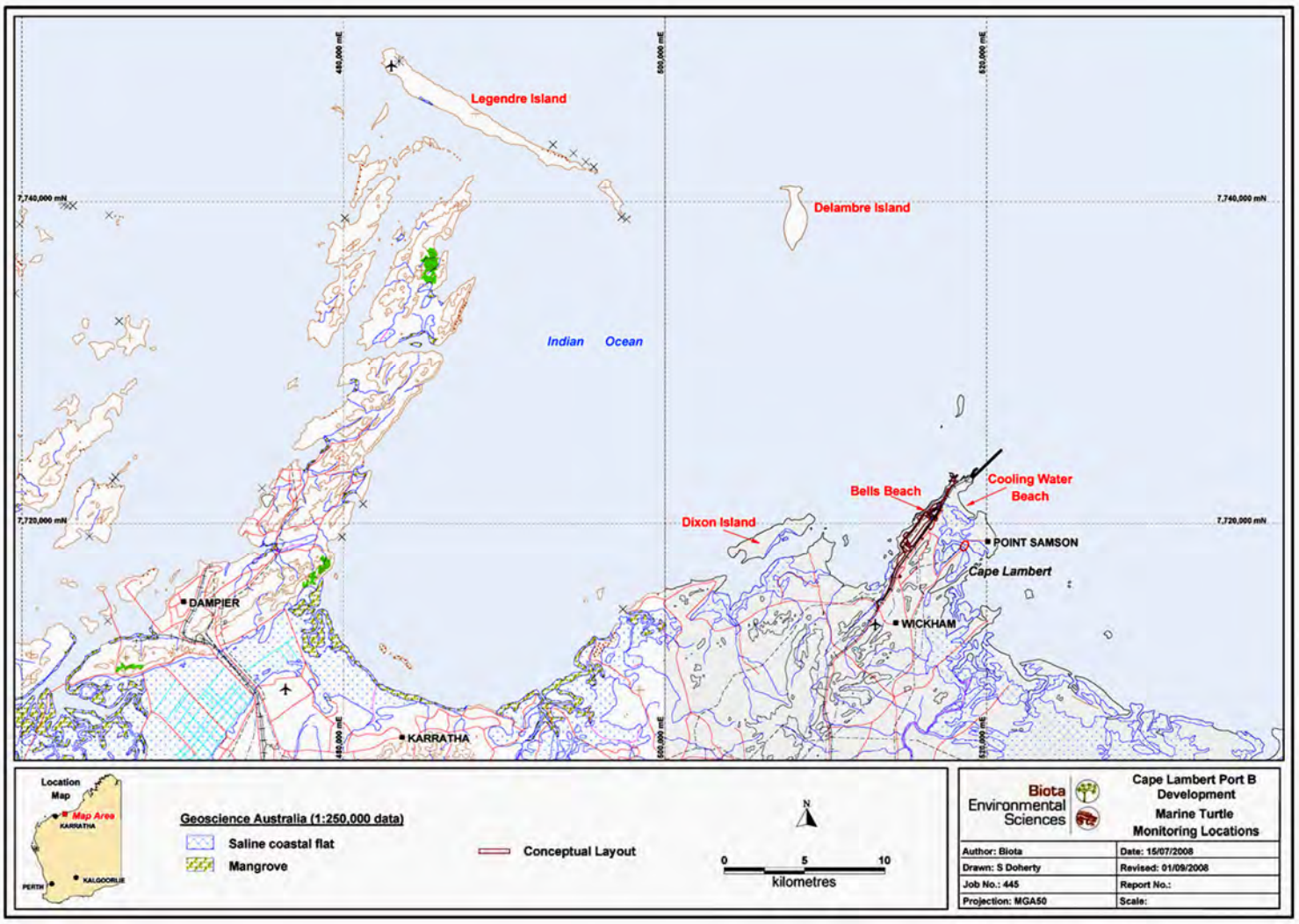
Individual nests will be monitored at Cooling Water Beach during pile driving to determine whether the vibration levels recorded during physical monitoring (Section 6.2.4) are impacting on hatchling survivorship. Success of each individual nest would then be measured by excavation of hatched nests to complete counts of:

- the number of emergent hatchlings based on shell counts; and
- the number of non-viable eggs and any dead hatchlings.

These values could then be expressed proportionally as a measure of nest success.

A similar programme will be completed at Bells Beach, which will be outside of the influence of pile driving vibration (SVT 2008). These data, along with other published information on clutch success from other locations, will be used as a reference set against which to measure nest success at Cooling Water Beach. As adjunct to this, temperature loggers would be installed in the beach adjacent to monitored nests at a depth of 50 cm (similar to nest depth). This will provide data on nest temperature on mainland beaches, which is relevant to sex ratio determination from clutches (Biota 2008).

Figure 6-1: Location of the marine turtle monitoring sites associated with the Cape Lambert Port B Development MTMP.



This monitoring will be commenced early in the nesting period during the year in which pile driving will occur. The results of this work would then allow an informed decision to be made as to whether management intervention in the form of nest relocation is warranted for Cooling Water Beach for the balance of that nesting period in that year (see Section 4.6). This decision, and associated monitoring thresholds, would be determined in consultation with the DEC and DSEWPaC as part of finalising the MTMP.

The nest success monitoring will initially be undertaken by Pilbara Iron staff that report to, or are assisting, the EMA. Initial training in nest success monitoring will be provided by Mick Guinea from the Charles Darwin University.

6.4 Turtle Behaviour Monitoring

6.4.1 Adult Nesting Activity

One of the key parameters for the monitoring programme will be the long-term quantification of turtle nesting activity at Bells Beach and Cooling Water Beach, relative to other sites in the region. This would build on historical data collected by the WPCTP/WPTP and Biota (2008). Basic parameters to be recorded at Bells Beach and Cooling Water Beach, would include:

- number of successful nests;
- location of successful nest sites (recorded using a GPS);
- number of emergences (past high tide mark); and
- number of false crawls.

The programme would be run for a three week period in November / December, geared around appropriate tidal regimes to maximise data collection. A simultaneous program will also be run at one off-lease beach (Delambre Island) over the same period. These exercises would involve a nightly presence of data collection teams on the management beaches, rather than basing monitoring on next-day track counts alone. This would also serve to maximise the value of the monitoring exercise, by allowing for data to be collected on:

- clutch sizes (as part of vibrational impact monitoring; Section 6.3);
- incident light measurement at successful nest sites (Section 6.2.2);
- monitoring data to be derived from confirmed nest site locations (rather than being inferred from track counts and body hole inspections);
- nesting females to be tagged to begin building a data set that would allow for proportion of first-time nesting females and re-nesters to be identified (Section 6.5);
- field observations regarding weather conditions and lunar cycle; and
- acquisition of sky glow images at the same time as nesting data are collected (Section 6.2.3);

The opportunity would also be taken to collect data on the frequency of any female turtle misorientation on returning to water after nesting. This would then provide input into management protocols for relocating any misoriented turtles (Section 5.7). *An additional two to three nights monitoring will be conducted at Bells Beach and Delambre Island in January, in order to obtain hatched nest data, including percentage survival of hatchlings, nest temperature, and hatchling activity (Section 6.4.2).*

In order to place the data from the management beaches into context, data on number of nests, emergences and false nesting events will also be collected during the same monitoring periods at Delambre Island for the first three years of the monitoring programme. Data will also be sought from other monitoring programmes being undertaken in the region (e.g. at Barrow Island, Mundabullangana Beach and Port Hedland). This will be further supplemented by the continued WPTP track count monitoring of other beaches in the locality (Section 7.3).

Rio Tinto will also continue to monitor seasonal numbers of nesting females and the percentage of successful hatchling emergence at Cape Lambert beaches. A decline in either of these parameters over three successive seasons will trigger the following actions, as originally specified in the CLU80 MTMP (Guinea 2009):

Trigger: Reduction in the number of nesting females over three successive seasons

Mitigation actions:

- *Review Marine Turtle Management Plan.*
- *Assess nesting activity on other beaches in the Cape Lambert area through the MoU with West Pilbara Community Turtle Program.*
- *Assess any change in nesting numbers on previously unutilized beaches.*
- *Identify all likely causes for the change in nesting marine turtle numbers.*
- *Address the likely cause for the decline in nesting turtles if associated with RTIO activities.*

Trigger: Decrease in nesting and/or hatching success over three consecutive years

Mitigation actions:

- *Identify the causative factors.*
- *Review historical records and annual reports.*
- *Assess the situation in the region to identify the scale of any decline.*
- *Annual Environmental Report (AER) to DEC by RTIO Marine Turtle Environment Personnel. Using appropriate data base model the marine turtle population of the Dampier/Cape Lambert Region*

6.4.2 Hatchling Activity

In addition to measuring female nesting activity, the programme will also monitor the aspects of potential hatchling misorientation due to increased light levels at the management beaches (as identified in Biota 2008), namely misorientation on emergence from nest while on the beach (e.g. heading inland toward the port lease rather than seaward).

Hatchling dispersal from nests will be monitored by mapping the "fan" (outward radiation of hatchling tracks from a nest) of 15 nests at Bells Beach, and plotting the arc of hatchling tracks relative to Operations-based light sources. Fifteen nests at Delambre Island will also be mapped for comparative purposes. If there is any influence of Operations-based light sources on hatchling orientation it should therefore be detected at Bells Beach, and appropriate measures developed to minimise the effect of onshore lights on hatchling orientation.

6.5 Long Term Population Monitoring

Given the long life span and generational time of marine turtles (and the long-term presence of the port at Cape Lambert), there is value in collecting data on population trends at the management beaches. The simplest method of achieving this is via tagging of nesting females. Tagging individuals enables data to be collected on:

- number of re-nesting females within a nesting period;
- frequency of first-time nesting females;
- long-term use and nest site fidelity of females from previous seasons; and
- any use of other local or regional nesting sites by females previously tagged at Bells Beach or Cooling Water Beach.

Given the presence of data collection teams at the monitored beaches (Bells and Cooling Water beaches, and Delambre Island) during the programme, this data can be obtained for relatively little additional effort. Pilbara Iron will also investigate the utility of attaching GPS tracking units to selected females to obtain data on longer-term movement patterns and use of other local or regional beaches by Bells Beach and Cooling Water Beach turtles.

Under the CLU80 MTMP, a commitment to satellite tracking of nesting females was made for a period of three years, however, there was no specification as to the number of transmitters to be deployed. A trial of Kiwisat 101 transmitters was successful in 2010/11. As a replacement for the above commitment to investigate the utility of attaching GPS tracking units to female turtles, Rio Tinto will deploy a total of 15 Kiwisat 101 transmitters on female Flatbacks over a three year period.

6.6 Incident Reporting

Pilbara Iron has a well-developed incident reporting system that covers all forms of incidents, including environmental incidents. All environmental incidents are categorised and reported through an internal system (called Prospect) during the same work shift in which the incident occurs. Significant incidents (those with serious, major or catastrophic consequences) require detailed investigation and may trigger external reporting. As a

result of the reporting of environmental incidents, further actions may be assigned to mitigate environmental impact, or to reduce the likelihood of the incident occurring again.

Pilbara Iron will ensure its incident report system will capture any events relating to marine turtles throughout the life of the port operations. This will include any interactions between turtles and shipping, frequency of misoriented animals entering the lease or other incidents. These data will form an adjunct to the turtle biology monitoring programme and also provide input to continuous improvement management reviews.

In the event of recording of any mortalities to marine turtles within the Port B Development work area, a notification to DSEWPaC will be made within 48 hours of the sighting. Details of the incident will include time and date of incident, likely or suspected cause of injury/mortality (if known), location and the species (if known).

If the injured or dead turtle is attributed to 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 Dredging Environmental Advisory Group (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.

In the event that any turtles/hatchlings need to be relocated (refer Section 5.7), a report (outlining matters such as the reason for the relocation, the site where the turtles/hatchling was relocated from and where it was relocated to, and timing) will be provided to the DSEWPaC within 48 hours.

6.7 Summary of Monitoring Timing and Responsibilities

Table 6-1 below provides a summary of marine turtle monitoring measures to be implemented thought construction and operation of the project, detailing responsibilities and timing.

Table 6-1:Summary of monitoring actions, responsibilities, frequency and timing.

Management Action	Responsibility	Frequency	Timing
6.1 – Design and implement a monitoring plan for the Bells Beach primary dune.	Ecosystems Specialist	Annual	Commence pre-construction; Continue during Operations
6.2 – Undertake field monitoring of incident light levels at Bells Beach and Cooling Water Beach and regional sites.	Ecosystems Specialist; Specialist consultant	Annual	Commence pre-construction; Continue during Operations
6.3 – Capture light level data into a database and GIS.	Ecosystems Specialist; Specialist consultant	Annual	Commence pre-construction; Continue during Operations
6.4 – Investigate the use of sky glow image monitoring from fixed viewsheds at Bells Beach and Cooling Water Beach and regional sites.	Ecosystems Specialist; Specialist consultant	Annual	Commence pre-construction; Continue during Operations
6.5 – Undertake vibration monitoring at Cooling Water Beach during pile driving activities in the nesting season.	Ecosystems Specialist; Specialist consultant	One season	Construction
6.6 – Monitor noise associated with pile driving during initial operations to collect data to assist future noise modelling.	EPCM; Contractor	One-off program	During pile driving
6.7 – Measure underwater noise from pile driving to establish a library of sound signals from various piling scenarios suitable for reviewing the predictive capacity of the noise propagation model used for Port B Development, and enable recommendations for improving the accuracy of future underwater noise modelling.	EPCM; Contractor	One-off program	During pile driving
6.8 – Undertake nesting success monitoring at Cooling Water Beach and Bells Beach during pile driving activities in the nesting season.	Ecosystems Specialist; Specialist consultant	One season	Construction
6.9 – Undertake nesting activity monitoring at Bells Beach and Cooling Water Beach, and collect contextual data at reference sites.	Ecosystems Specialist; Specialist consultant	Annual	Commence pre-construction; Continue during Operations
6.10 – Monitor hatchling dispersal patterns in onshore habitats.	Ecosystems Specialist; Specialist consultant	Annual	Commence pre-construction; Continue during Operations

Management Action	Responsibility	Frequency	Timing
6.11– Conduct tagging programme for turtles utilising Bells Beach and Cooling Water beach *and Delambre Island* to examine long term population changes	Ecosystems Specialist; Specialist consultant	Annual	Commence pre-construction; Continue during Operations
6.11b – Conduct satellite tracking of nesting female Flatback turtles at Bells Beach	*Ecosystems Specialist*	*Within 3 years*	*Deploy 15 transmitters within 3 years*
6.12 – Continue incident reporting programme and analyse turtle related incidents.	All personnel; SEA; Specialist consultant	Annual	Commence pre-construction; Continue during Operations
6.13 – Report mortalities of marine turtles found within the Port B Development work area through notification to DSEWPaC within 48 hours of the sighting.	EPCM; All personnel, SEA; Ecosystems Specialist	When dead turtle sighted	Within 48 hours of sighting
6.14 – Undertake an investigation if the injured or dead turtle is attributed to the Port B Development and refer to one of three trigger levels to guide any management response.	EPCM; All personnel, SEA; Ecosystems Specialist	When dead turtle sighted	When dead turtle attributed to Port B Development activities
6.15 – Report to the DSEWPaC if any turtles/hatchlings need to be relocated outlining matters such as the reason for the relocation, the site where the turtles/hatchling was relocated from and where it was relocated to, and timing) within 48 hours.	EPCM; All personnel, SEA; Ecosystems Specialist	If any turtles or hatchlings need to be relocated	Within 48 hours of needing to relocate turtles/hatchlings

7. Reporting and Review Process

7.1 Annual Reporting

Pilbara Iron will ensure that regular reviews of the data collected in the implementation of this MTMP are undertaken. This will include both internal processes and formal reporting requirements with the relevant government agencies, comprising:

7.1.1 Internal reporting and data reviews

The results of the monitoring programme outlined in this MTMP will be collated and analysed on an annual basis during operational life of the Port B Development. This will include incorporation and consolidation of complementary data collected by the WPTP. An annual report will be prepared and formally reviewed by the Environment Manager in liaison with the Port Manager (or relevant delegates).

7.1.2 External reporting

Formal reporting will be included on an annual basis as part of Annual Environmental Reports (AERs). AERs are submitted to State Government agencies by 31 March each year, reporting on the previous calendar year period (i.e. January to December); these reports will provide a brief outline of the marine turtle monitoring undertaken during that period. Relevant sections from the AER will be provided to DSEWPaC. Pilbara Iron will also undertake information consultation with the DEC and DSEWPaC as required in regards to marine turtle management (Section 7.3).

In accordance with Condition 18 of the EPBC 2008/4032, an annual report will be provided to the Minister for Sustainability, Environment, Water, Population and Communities addressing compliance with the conditions of that approval, including the MTMP.

7.2 Continuous Improvement Review

Reviews of the outcomes of this MTMP based on the annual reports will be undertaken internally and externally in liaison with the DEC and DSEWPaC. Aspects of the plan that will be reviewed include changes to monitoring methods / frequency, reporting frequency, and refinements to management procedures based on feedback from their implementation. Other matters that will be addressed by the review include overall design and effectiveness of the MTMP, progress in environmental performance, changes in environmental risks, changes in business conditions and any relevant emerging environmental issues. Any revisions to the MTMP will require approval prior to implementation from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities under the *EPBC Act 1999* and *Sea Dumping Act 1981*.

7.3 Stakeholder Consultation and Collaboration

As part of implementing the Port B Development, Pilbara Iron has employed a dedicated EMA. Functions that this position include:

- involvement in ongoing marine turtle monitoring and management as outlined in this MTMP;
- support for the WPTP and related liaison;
- management of Cape Lambert area coastal fox trapping programme;

- education of the workforce in regards to marine turtles;
- collaboration and consultation with other parties undertaking turtle monitoring in the region;
- preparation of annual reports on marine turtle issues; and
- periodic consultation to ensure ongoing improvements or refinements to the MTMP.

Pilbara Iron will also undertake consultative meetings with DEC to discuss the findings of monitoring programmes, the adequacy of current management procedures and any intended modifications to the MTMP. Pilbara Iron's existing marine turtle Memorandum of Understanding and ongoing support of the WPTP will also be continued as an adjunct to this MTMP (refer Section 5.4).

7.4 Summary of Reporting Actions and Responsibilities

Table *7-1* below provides a summary of reporting, review and consultation processes relevant to marine turtles that will be implemented during construction and operation of the Port B Development.

Table 7-1*:Summary of reporting and review management actions, responsibilities and frequency.*

Management Action	**Responsibility**	**Frequency**
7.1 – Prepare internal and external reports on marine turtle monitoring and management.	Port Manager; SEA; Ecosystems Specialist; Specialist zoologists	Annual
7.2 – Undertake annual continuous improvement review based on outcomes of 7.1 above, in consultation with DEC and DSEWPaC.	SEA; Ecosystems Specialist	Annual
7.3 – Employ an EMA as part of implementation of the Cape Lambert Port B Development.	Port Manager	Once
7.4 – Consult with DEC, DSEWPaC and other stakeholders in regards to turtle monitoring and management.	SEA; Ecosystems Specialist	Annual (or as required)
7.5 – Provide annual report to the Minister for SEWPaC addressing compliance with the conditions of EPBC 2008/4032, including this MTMP (Condition 18)	RTIOEP; SEA; Ecosystems Specialist	Annual
7.6 – Provided Compliance Assessment Report to the OEPA addressing compliance with the conditions of Ministerial Statement 840 (Condition 4),	RTIOEP; SEA; Ecosystems Specialist	Annual

8. References

Bassett Consulting Engineers (2008). Cape Lambert Port B Development: Assessment of Lighting Effects on Turtles. Unpublished report prepared for Pilbara Iron, Perth.

Biota Environmental Sciences (2008). Cape Lambert Port B Development Marine Turtle Assessment. Unpublished report prepared for Pilbara Iron, Perth.

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Guinea, M.L. (2008). Draft Marine Turtle Management Plan for CLU-80 Expansion for Rio Tinto Iron Ore. Unpublished report, prepared for Rio Tinto Iron Ore, Perth.

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Pilbara Iron (2007). Cape Lambert Dust Management Plan. Unpublished report prepared by Pilbara Iron, Perth.

Sinclair Knight Merz (2008). Cape Lambert Port B Development Construction Environmental Management Plan (CEMP). Unpublished report prepared for Pilbara Iron, Perth.

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SVT Consulting Engineers (2008). Vibration Measurements Taken During Pile Driving Operations At Cape Lambert. Correspondence to Pilbara Iron, 3/7/08, Perth.

Washburn, S.S. and Ellis, R.E. (2003). Evaluation of an Alternative Roadway Lighting System to Improve Sea Turtle Nesting Safety along Coastal Roadways. *Proceedings of the 82nd Annual Meeting of the Washington Transportation Research Board. Dept* of Civil and Coastal Engineering, University of Florida.

Witherington, B.E. and R. Martin (1996). Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches. *Florida Marine Research Institute Technical Report*. FMRI Technical Report RT-2. 1996.

Appendix 1 - 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

10th Floor, Dumas House, 2 Havelock Street, West Perth Western Australia 6005
Telephone: +61 8 9213 7250 Facsimile: +61 8 9213 7255 Email: Minister.Faragher@dpc.wa.gov.au

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 nevinae* habitat as outlined in Figure 1 and defined in Table 3 of this Statement.

5-2 The proponent shall not clear *Lerista nevinae* 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 nevinae* 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 nevinae* 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 nevinae* 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 (μmol.m^2/day), gross sedimentation rates (mg.cm^2/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
Dredging: Volume of sea bed to be dredged for berth pockets, turning basins, departure channel, service wharf B and tug harbour extension: Area of seabed to be dredged: Dredging depths; • berth pockets; • approach/departure channel; and • turning basins. Duration of dredging program:	 Up to 14 Mm^3 Up to 320 ha • 20 metres Chart Datum; • 16 metres Chart Datum; and • 10 metres Chart Datum. Approximately 52 weeks.

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

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

Abbreviations

Mtpa million tonnes per annum
ha hectares
Mm^3 million cubic metres
km kilometre

Attachments

Figures (attached)

Figure 1 Terrestrial component of proposal footprint with *Lerista nevinae* 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 *Lerista nevinae* 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

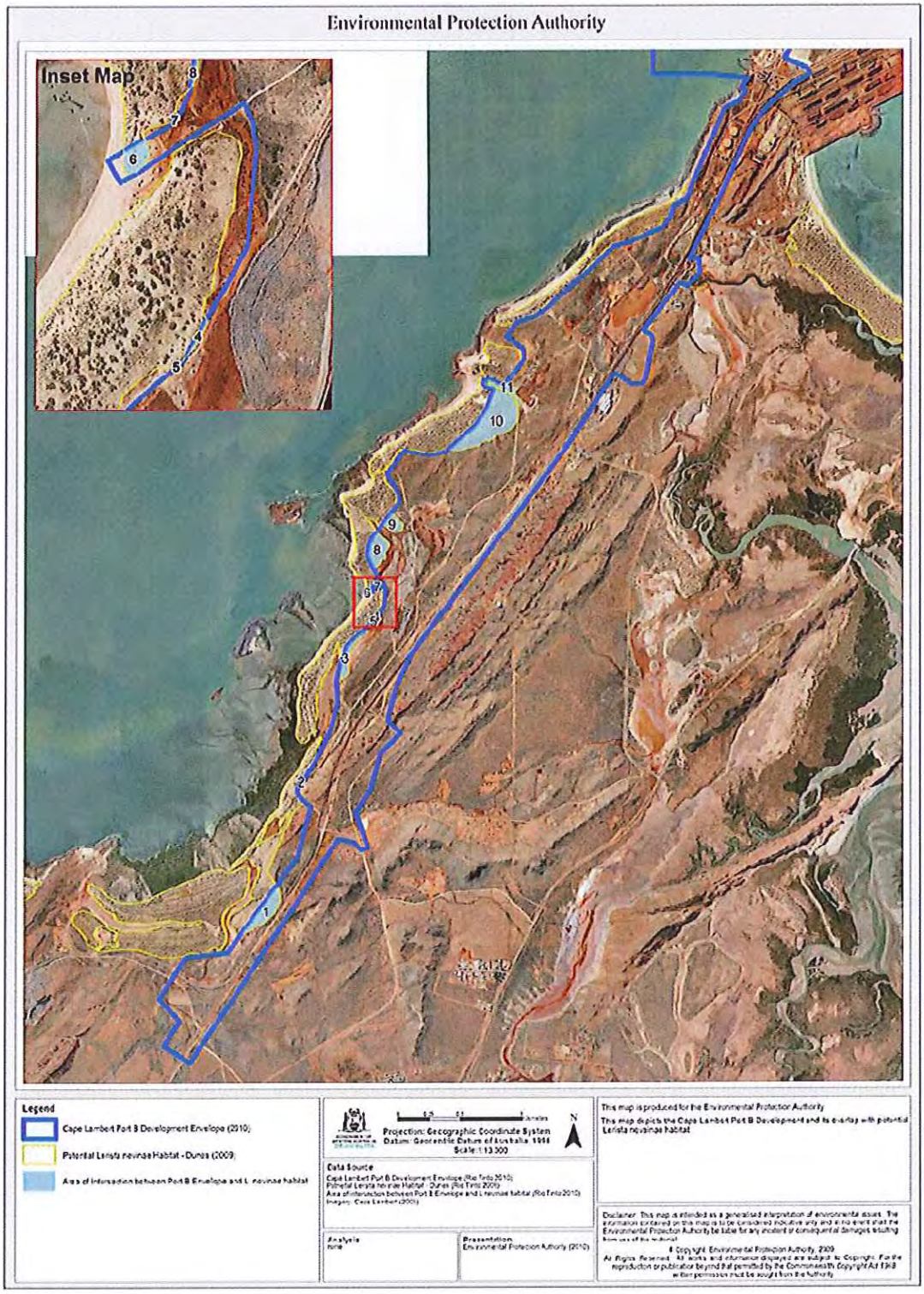

Figure 1: Terrestrial component of proposal footprint with *Lerista nevinae* habitat

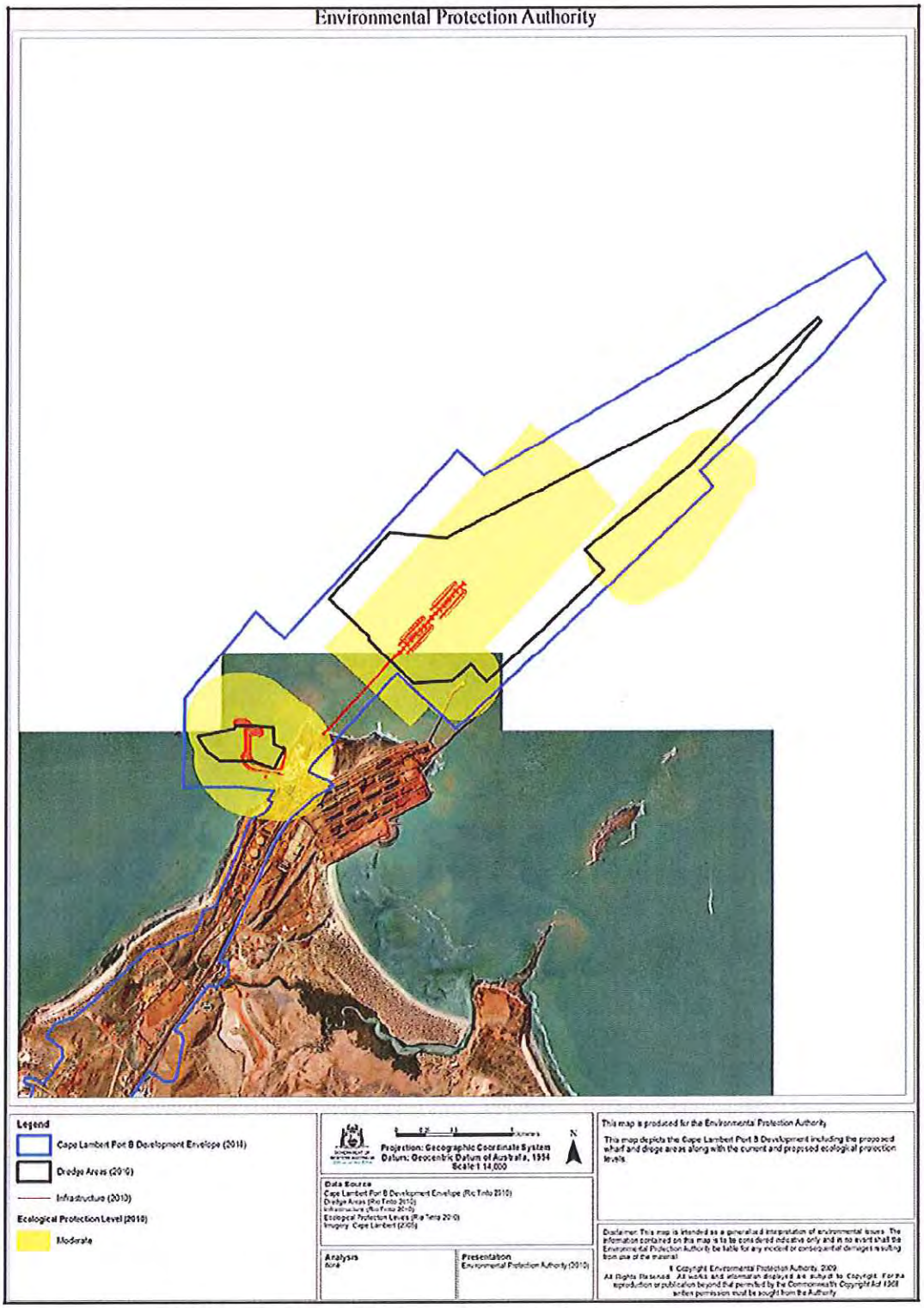

Figure 2: Marine Component of Proposal Footprint

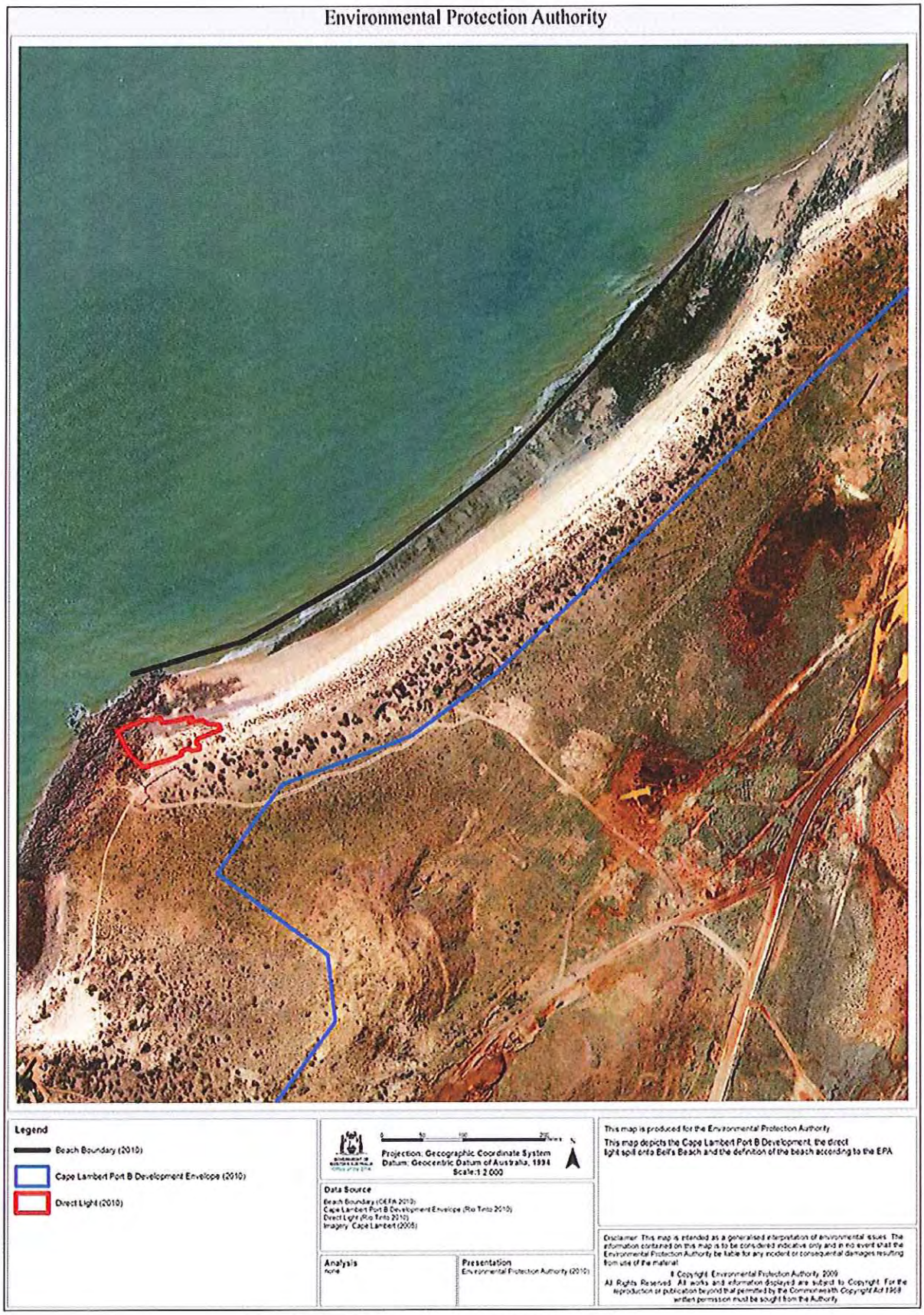

Figure 3: Bell's Beach Light Spill

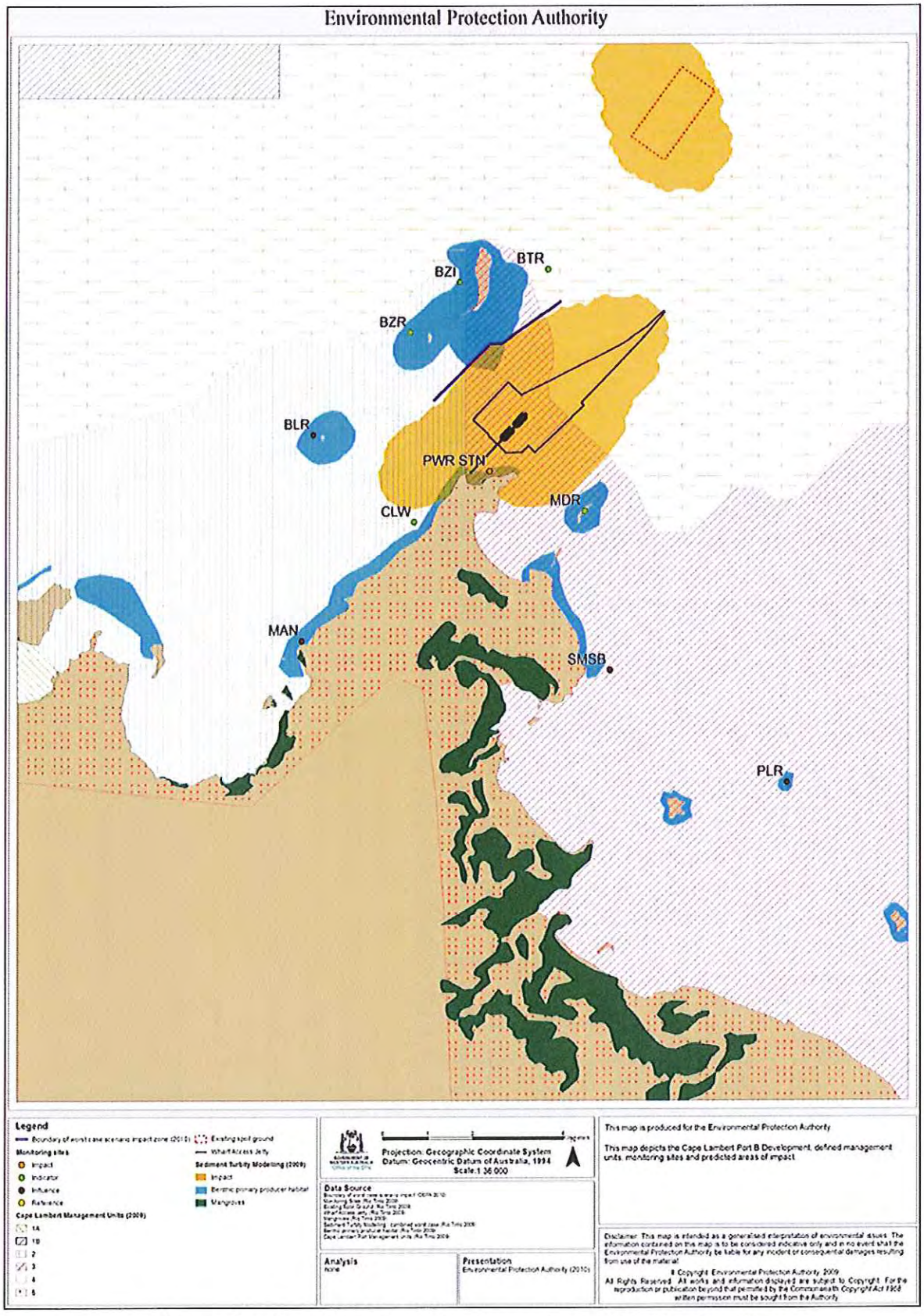

Figure 4a: Predicted Dredging Impacts and Monitoring Sites

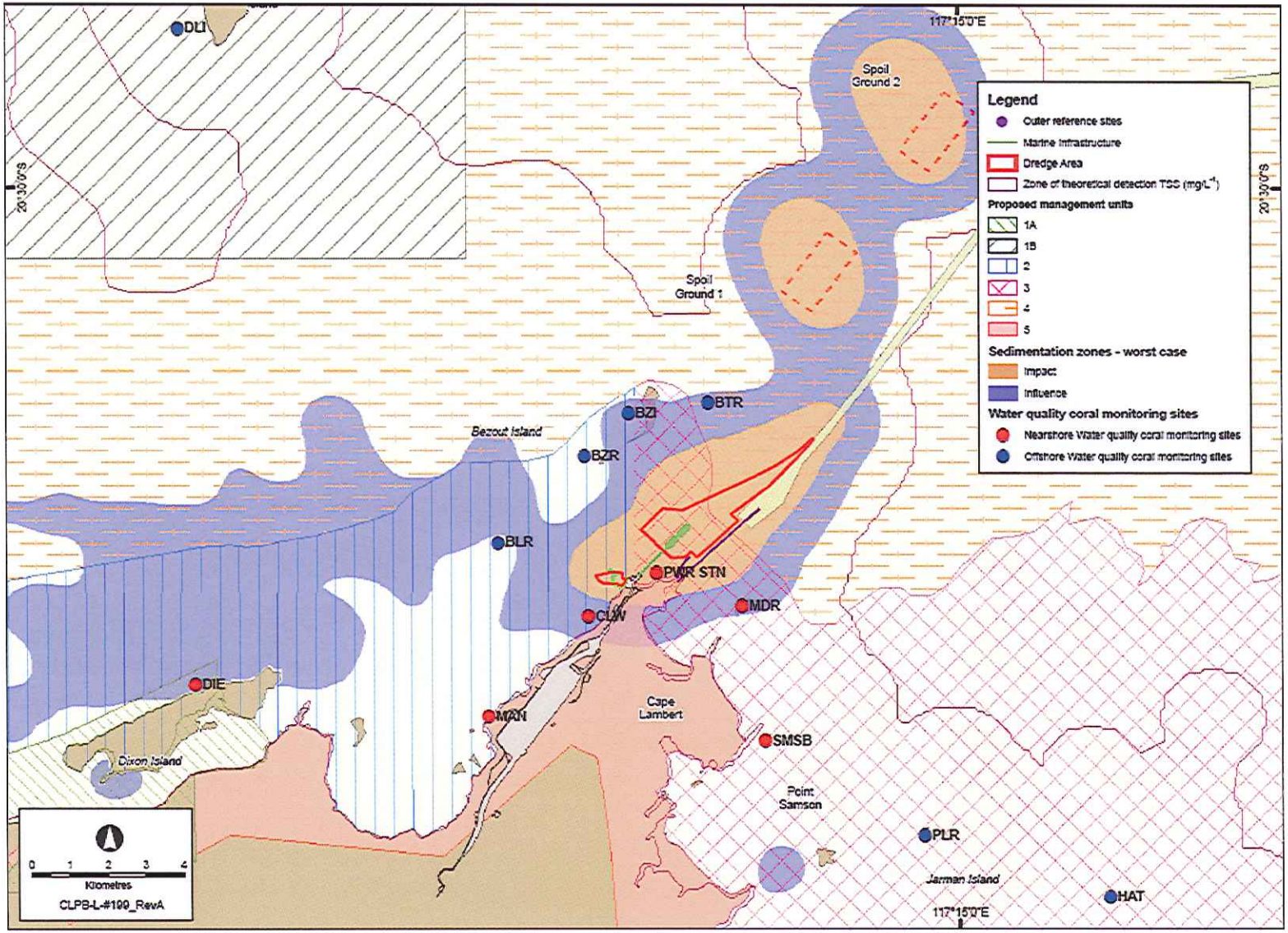

Figure 4b: Predicted Dredging Impacts and Monitoring Sites

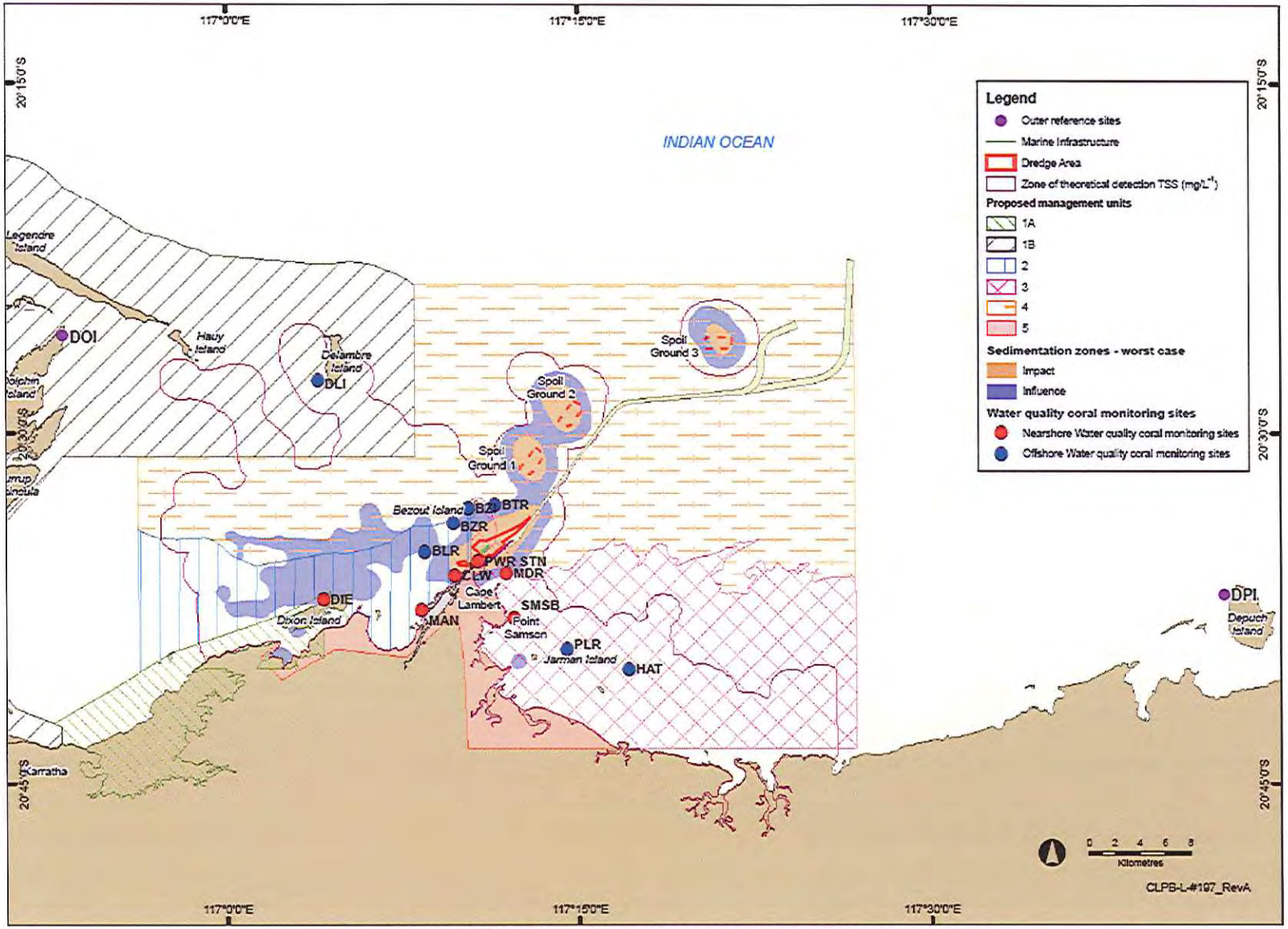

Figure 4c: Predicted Dredging Impacts and Monitoring Sites

Table 2 Coordinates of terrestrial footprint

Easting	Northing
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

Easting	Northing
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

Easting	Northing
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

Easting	Northing
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

Easting	Northing
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 nevinae* 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

Polygon intersection number- corresponds with map	Easting	Northing
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

Polygon intersection number- corresponds with map	Easting	Northing
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

Easting	Northing
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

Easting	Northing
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

Coordinates	
Easting	Northing
522842	7732018
523570	7731490
522453	7729953
521725	7730481

Table 6 Coordinates of Dredging Impact Monitoring Sites

Site No.	Site Code	Site name	Site Category	Site Location	
				Latitude	Longitude
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

Easting	Northing
517352	7724632
518593	7725884
518858	7725901
520146	7726812

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

Easting	Northing
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

Easting	Northing
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

A396135

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

The Atrium,
Level 8, 168 St Georges Terrace,
Perth, Western Australia 6000.
Telephone: (08) 6467 5000.
Facsimile: (08) 6467 5557.

Postal Address: Locked Bag 33,
Cloisters Square, Perth, Western Australia 6850.
Website: 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

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

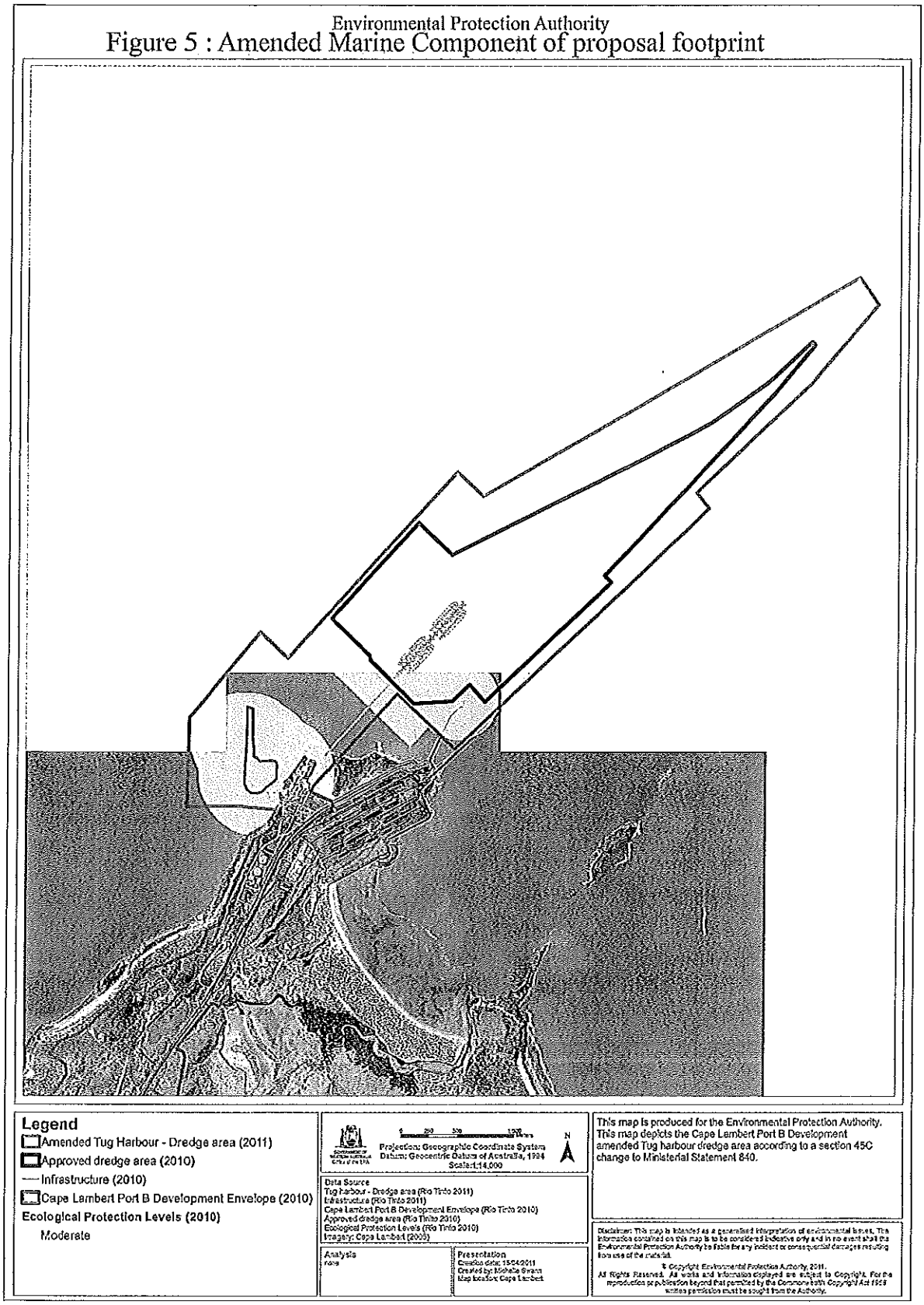

Figure 5 – Marine Component of Proposal Footprint

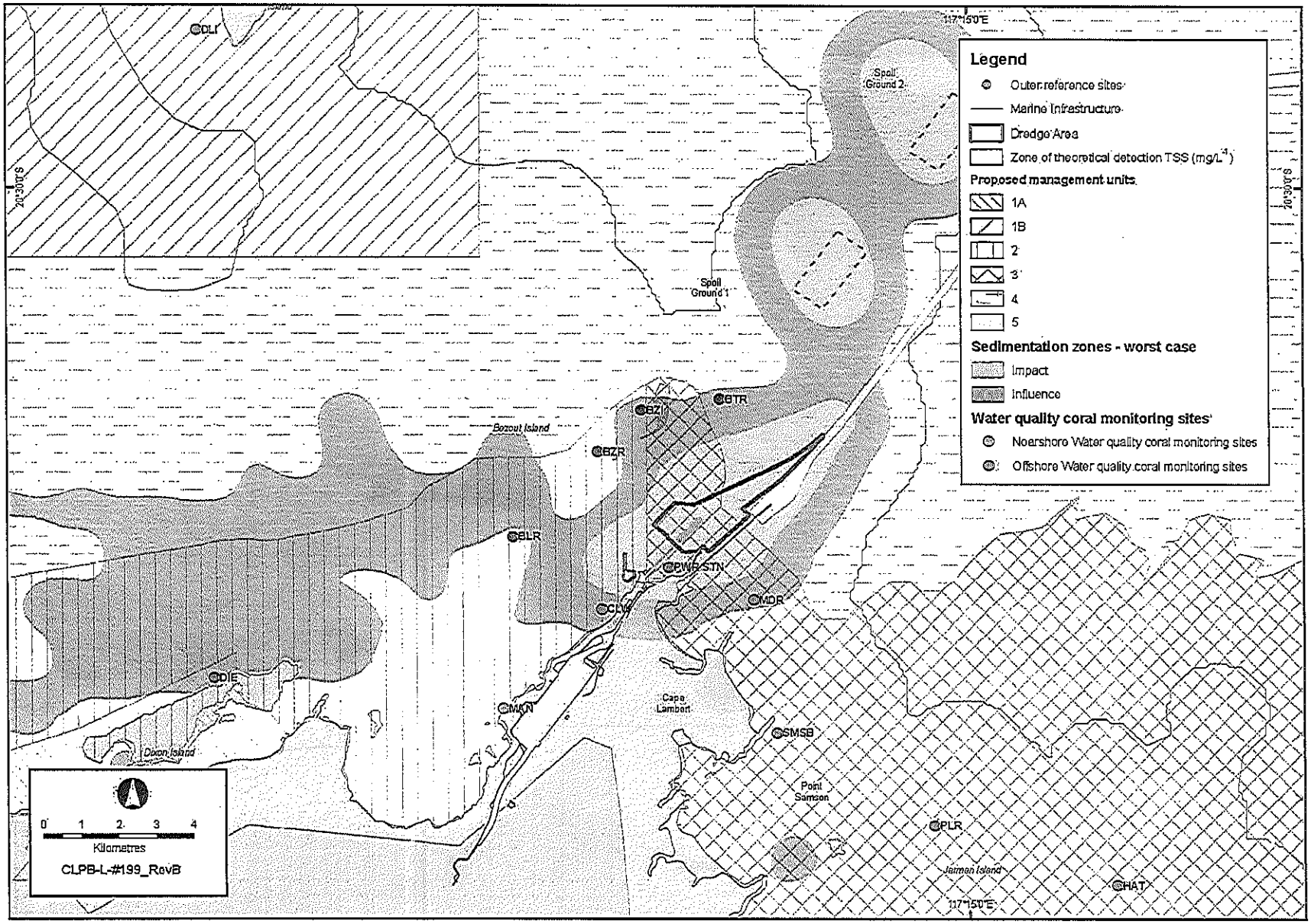

Figure 6a – Predicted Dredging Impacts and Monitoring Sites

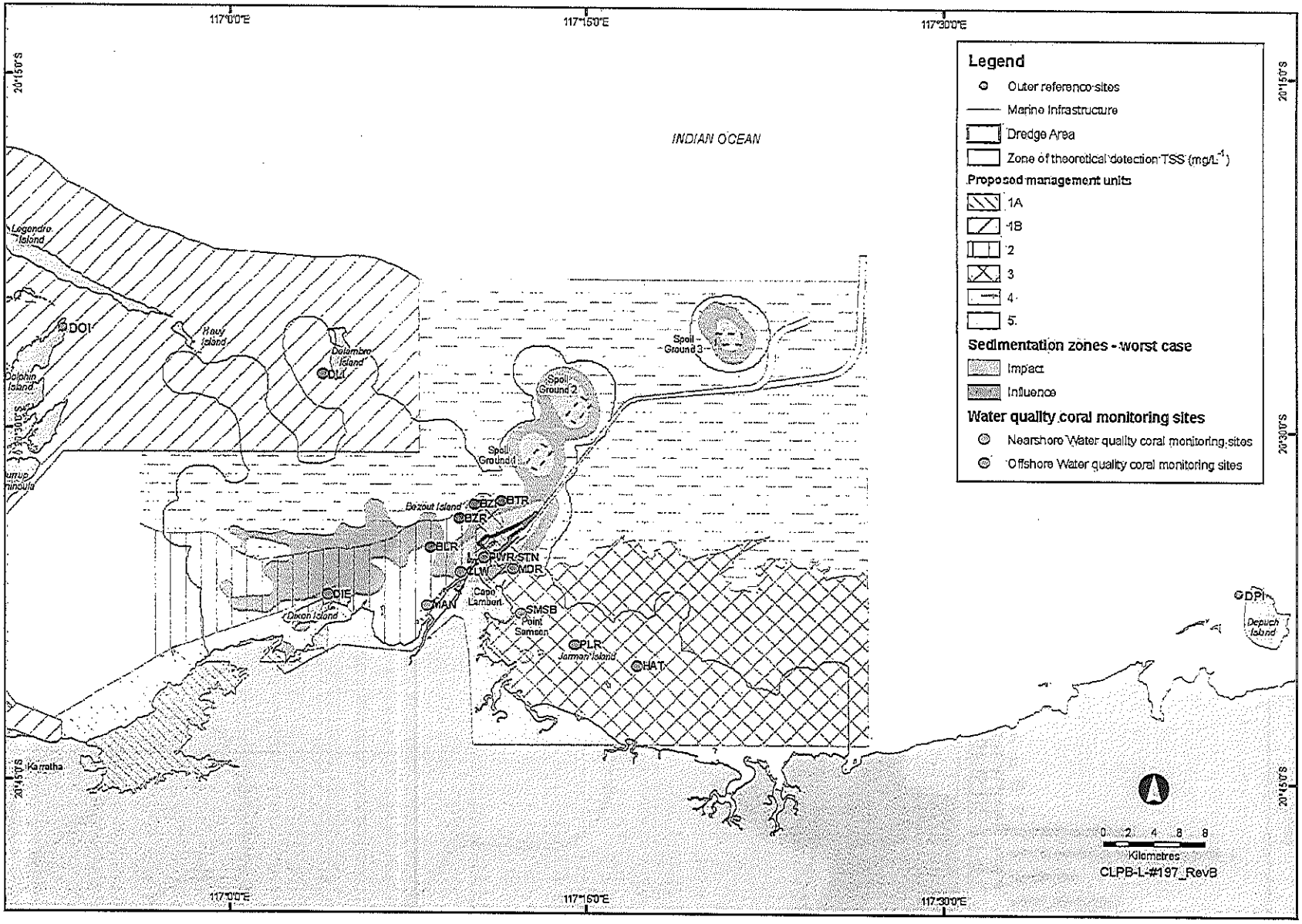

Figure 6b – Predicted Dredging Impacts and Monitoring Sites

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

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."

Bill Marmion

HON BILL MARMION MLA
MINISTER FOR ENVIRONMENT; WATER

31 OCT 2011

Published on

Level 29, 77 St Georges Terrace, Perth, Western Australia 6000
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GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

The Atrium,
Level 8, 168 St Georges Terrace,
Perth, Western Australia 6000.
Telephone: (08) 6467 5000.
Facsimile: (08) 6467 5557.

Postal Address: Locked Bag 33,
Cloisters Square, Perth, Western Australia 6850.
Website: www.epa.wa.gov.au

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

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
Dredging: Volume of sea bed to be dredged for berth pockets, turning basins, departure channel, service wharf B and tug harbour extension:	Up to 14 Mm^3	**Up to 14.545 Mm^3**
Area of sea bed to be dredged:	Up to 320 hectares	**Up to 346 hectares**
Dredging depths; • berth pockets; • approach/departure channel; and • turning basins.	• 20 metres Chart Datum; • 16 metres Chart Datum; and • 10 metres Chart Datum.	• 20 metres Chart Datum; • 16 metres Chart Datum; and • 10 metres Chart Datum
Duration of dredging program:	Approximately 52 weeks	**Approximately 64 weeks**

Dredge disposal:		
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^3	**6.605 Mm^3**
Amount of dredge spoil to be disposed of onshore	0 Mm^3	0 Mm^3
Duration of pile driving operation	Approximately 52 weeks	Approximately 52 weeks
Access jetty and wharf:		
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
Major plant components:		
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^3	million cubic metres
km	kilometre

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

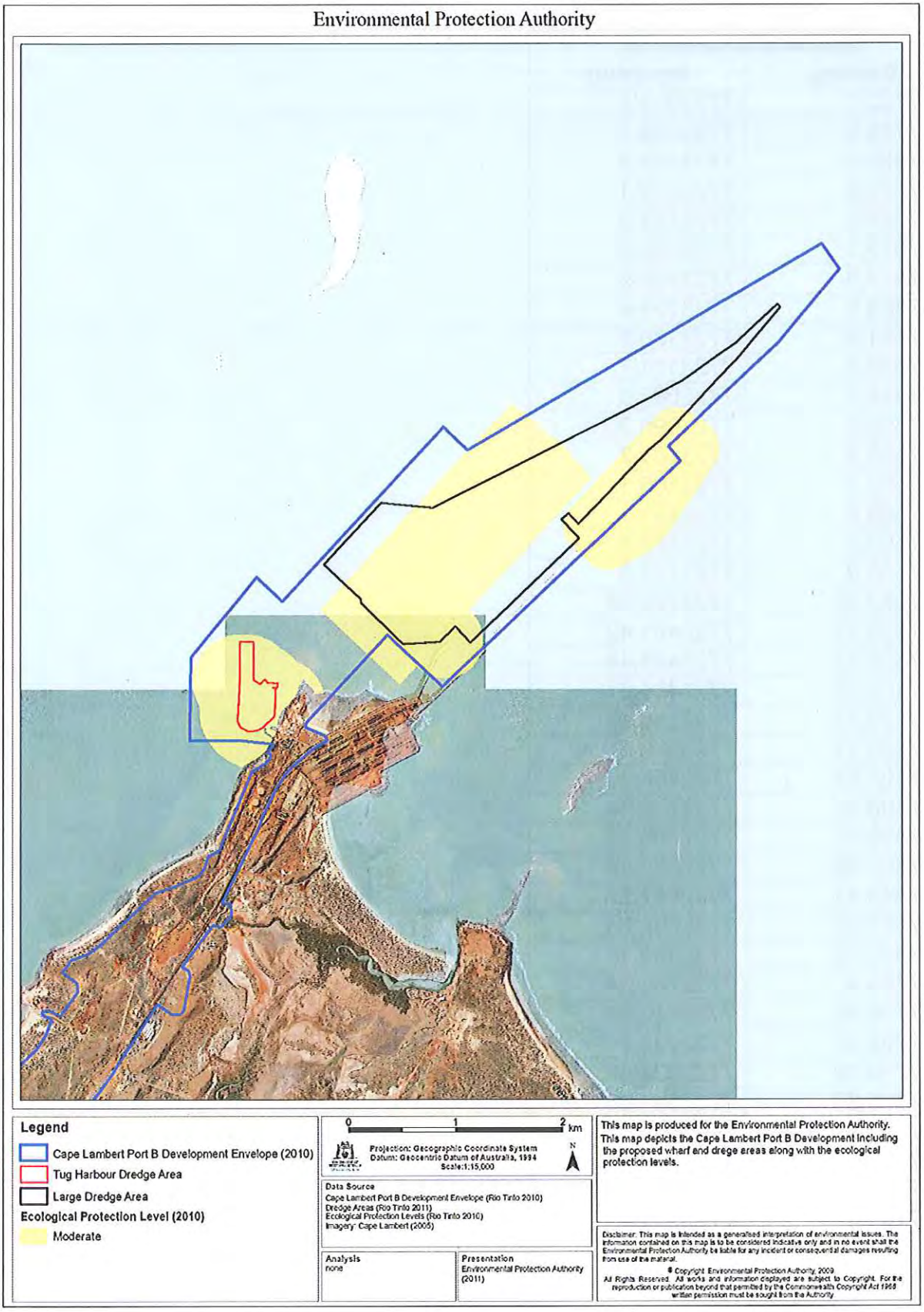


Figure 6: Marine Component of Proposal Footprint

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

GDA94 MGA zone 50	
Easting	**Northing**
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

GDA94 MGA zone 50	
Easting	**Northing**
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 2 - Environment Protection and Biodiversity Conservation EPBC 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 mimimise 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 continous 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, reportor 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 3 - 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.....26th.....day of.....October.....2010

Vicki Middleton

.....

Vicki Middleton
Delegate of the Minister

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

Appendix 1

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

Definitions

In this permit:

"the Act"	means the *Environment Protection (Sea Dumping) Act 1981*;
"the Application"	means the Application for a permit under the *Environment Protection (Sea Dumping) Act 1981* 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 Ports and Marine Section, GPO Box 787, Canberra ACT 2601. Telephone – 02 6274 1111 Facsimile – 02 6274 1620 Email – portsandmarine@environment.gov.au or successor entities;
"Cetacean"	means the migratory whales identified as of significance under the *Environment Protection and Biodiversity Conservation Act 1999;*
"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: (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 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:

<u>Spoil Ground One</u>

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

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_2☐, Inert-Inorganic Geological Material☐,

Comments:

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

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

AUSTRALIA

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.

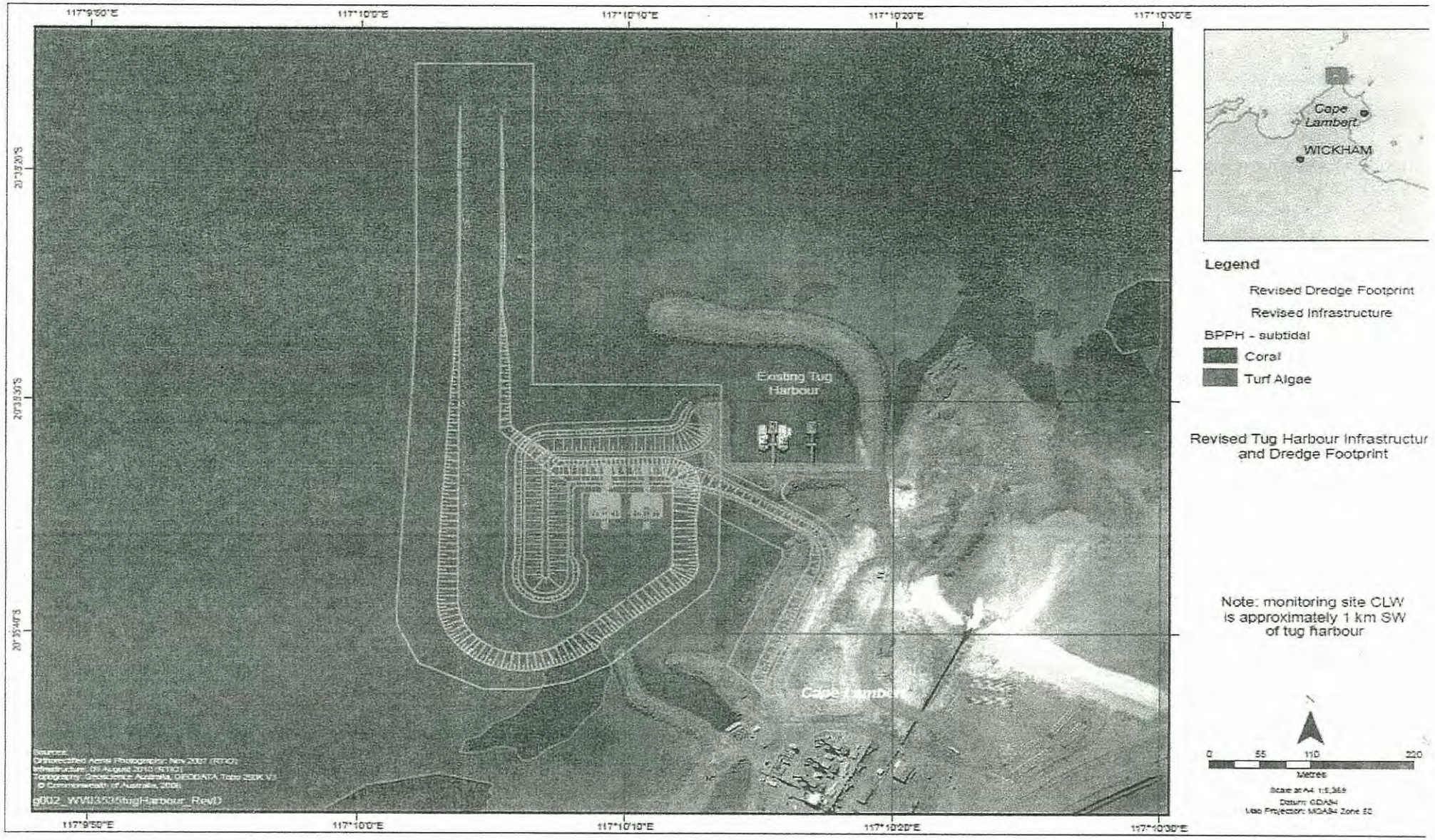
Amending the permit to include Appendix 3 as attached to this variation.

All other conditions of the permit remain unaltered.

Dated 21st day of March 2011

Barbara Ann Jones
Delegate of the Minister

Appendix 3


117°9'50"E
117°10'0"E
117°10'10"E
117°10'20"E
117°10'30"E
20°39'20"S
20°39'30"S
20°39'40"S
Existing Tug Harbour
Cape Lambert
Cape Lambert
WICKHAM
Legend
Revised Dredge Footprint
Revised Infrastructure
BPPH - subtidal
Coral
Turf Algae
Revised Tug Harbour Infrastructur and Dredge Footprint
Note: monitoring site CLW is approximately 1 km SW of tug harbour
N
0
55
110
220
Metres
Scale at A4 1:5,369
Datum: GDA94
Map Projection: MGA94 Zone 50
g002_WW03SlipTugHarbour_Rev03

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

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^3 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

AUSTRALIA

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


520000
530000
540000
7740000
7730000
Legend
Existing Port A Berth & Departure Area
Existing Spoil Ground
Existing Departure Channel
Approved Port B Dredge Footprint
Approved Tug Harbour Extension Dredge Footprint
Proposed Dredge Area
Western CLA Departure Channel
Main Channel Spot Dredging
Tug Harbour Channel Re-alignment
Spoil Ground 1
Spoil Ground 2
Spoil Ground 3
LOCALITY MAP
WESTERN AUSTRALIA
N
2 1 0 2
Scale in kilometres
Projection : UTM50 Datum : GDA94
Produced by Oceanica Consulting
Production : 15 Apr 2011, MN, PuK, PK
Imagery : Bing, ESRI as at 14 Apr 2011
This map is not to be used for navigational purposes. Positional accuracy should be considered as approximate.
Rio Tinto

Appendix 4 - Marine Turtle Management Plan for Cape Lambert for Rio Tinto Iron Ore (Guinea 2009)

Marine Turtle Management Plan for Cape Lambert
For Rio Tinto Iron Ore

Michael L Guinea
School of Environmental and Life Sciences
Faculty of Education Health and Science
Charles Darwin University
Darwin 0909
Northern Territory
Australia

Table of Contents

1 Introduction

The rapidly expanding character of seaborne iron ore freight requires the expansion of port facilities at Cape Lambert. The annual capacity will increase from 55 million tonnes to 85 million tonnes by mid 2009. This improved expansion of infrastructure at Cape Lambert will allow concurrent berthing of four very large bulk carriers. The original ship loader will be replaced. An additional reclaimer will be added in the stock yard and yard and rail infrastructure will be improved. To accommodate the new configuration the wharf will be extended 256 metres. This upgrade of port and loading facilities will cater for the berthing of the new oversized carriers. The increased loading facilities will assist in supplying iron ore to the Chinese market as well as maintaining supply to traditional consumers such as Korea and Japan (Rio Tinto 2007 and pers comm. B Bell).

The proposed upgrades have minimal environmental risks as identified by ongoing environmental management commitments. The marine environment in the vicinity of the Cape Lambert lease is of particular interest and has attracted environmental risk assessment. Identified risks include impacts on corals, coral communities and habitats, benthic primary producer habitat, dredging and spoil disposal, water quality, marine turtle management, and the quality of the marine environment. The mitigation and monitoring requirements are outlined in the Minister of the Environment's Statement No. 743.

As a condition of approval for the expansion of port facilities and associated dredging, Robe River Iron Associates is required to develop and implement a sea turtle management plan to limit the possible environmental impacts on the marine environment. This requirement is set out in the Ministerial Statement No 743 condition 12 "Ongoing Marine Turtle Management" which states:

> *"12-1 The proponent shall within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the Environmental Protection Act 1986, in consultation with the Department of the Environment and Conservation (DEC) prepare a Marine Turtle Management Plan to the requirements of the Minister of the Environment.*
>
> *The objectives of this plan are to:*
>
> *• Provide a management framework to enable the proponent to manage the ongoing aspects of the project to detect and mitigate as necessary any impact upon the natural abundance, species diversity, geographical distribution, behaviour patterns, breeding success, predation levels, demographics and population viability of marine turtles that frequent and rely, wholly or in part on Cape Lambert or the waters adjacent to Cape Lambert;*
>
> *• Identify darkness strategies to reduce as far as practicable lights or light glow interfering with nesting female turtles and hatchlings and determining the impacts thereon; and*
>
> *• Identify the methodology to measure and detect any changes to affected marine turtle populations.*
>
> *The Plan shall:*
>
> *1. Identify project related stressors, causes of environmental impacts and potential consequences to marine turtles (including impact of noise, vibration, light overspill and glow, vessel strike and changes to coastal processes);*
>
> *2. Identify and demonstrate the effectiveness of proposed management measures to mitigate project-related impacts and consequences for marine turtles; and*
>
> *3. Identify a process for identifying, justifying and implementing additional management mitigatory measures in the event that monitoring (by the proponent*

or otherwise) identifies a change in the abundance, species diversity, geographical distribution, behaviour patterns breeding success, predation levels, demographics and population viability of marine turtles which, frequent and rely, wholly or in part, on Cape Lambert or the waters adjacent to Cape Lambert.

12-2 The proponent shall implement the Marine Turtle Management Plan required by condition 12-1.

The proponent shall make the Marine Turtle Management Plan required by condition 12-1 publicly available, in a manner approved by the CEO."

The Marine Turtle Management Plan (MTMP) (Appendix E of the DSDMP, 2007) identifies the actions needed in the short-term to address the impacts of the existing Cape Lambert operation and the long-term monitoring of marine turtle populations within the lease area at Cape Lambert, and at other reference beaches in adjacent coastal waters. Additional to this MTMP is the Memorandum of Understanding (MoU) partnership between Pilbara Iron Pty Limited and the West Pilbara Community Turtle Program to monitor marine turtle nesting on beaches, primarily those within the lease area at Cape. The West Pilbara Community Turtle program has provided three valuable reports that describe the nesting and hatching success of marine turtles on the beaches of the Cape Lambert area.

It should be noted that commitments for Marine Turtle Management as required by MS743, remain the responsibility of the Proponent and it is not intended that the Proponent's responsibilities will be met by community volunteers or that the Proponent's monitoring will in any way replace or negate the WPCTP.

Table 1 Identifications of sections of the Marine Turtle Management Plan (MTMP) that address the Ministerial Statement Condition 743 M12-1

Reference	Description	Reference to section where addressed in MTMP
Condition 743:M12-1.1	Identify project related stressors, causes of environmental impacts and potential consequences to marine turtles including impact of noise, vibration, light overspill and glow, vessel strike and changes to coastal processes.	Section 1.3
Condition 743:M12-1.2	Identify and demonstrate the effectiveness of proposed management measures to mitigate project-related impacts and consequences to marine turtles	Section 1.3 and Section 1.5 and Section 1.6
Condition 743:M12-1.3	Identify a process for identifying, justifying and implementing additional management mitigating measures in the event the monitoring (by the proponent or otherwise) identifies a change in the abundance, species diversity, geographical distribution, behaviour patterns breeding success, predation levels, demographics and population viability of marine turtles that frequent and rely, wholly or in part on Cape Lambert or the waters adjacent to Cape Lambert.	Section 1.8

2 Current Status

Six of the world's seven species of sea turtles are found in Western Australian waters. All are protected under Commonwealth Government and Western Australian Legislation. The Marine Turtle Recovery Plan (Anon 2003) has identified five different habitat types that marine turtles use at different stages of their lives, which are all shared by people. These are: the natal beach; mating areas; inter-nesting habitat; feeding areas and pelagic waters. At least four species of sea turtle nest in the Cape Lambert region; another two species are present as either migratory or foraging species (Table 2). Two species (Flatbacks and Hawksbills) are the main nesting species on Bells Beach and Cooling Water Beach in the Cape Lambert lease (Figure 1).

Figure 1 Satellite image of Cape Lambert foreshore with sea turtle nesting beaches indicated, showing existing wharf (Google Earth image).

Nesting season for turtles in this region starts in October and continues through to March with a maximum number of nesting turtles coming ashore in November and December (Norman et al. 1994; Prince 1994b; Blamires et al. 2003). The first hatched nests appear in

December and continue through March with a peak of hatching in January and February (Salinovich 2006; 2007; 2008).

Feral dogs, introduced foxes and native goannas prey on the eggs of the sea turtles (Blamires et al. 2003; Salinovich 2006; 2007; 2008). Since foxes appeared in southern Western Australia in the 1930s their range has expanded and they have moved north reaching the west Kimberley by 1934 (Butcher personal communication; (King & Smith 1985). Their arrival in the Pilbara is estimated to be less than one generation period for Flatback sea turtles. Mike Butcher (personal communication) indicates that the declines in some species did not occur until well after (i.e. 10-30 years) foxes first occurred in an area. This is due more to the increasing density of foxes in the area rather than other factors. If historical fox densities remained as low as present-day low densities, then their impact may not be detectable in present-day nesting numbers. Eradication and feral animal control measures are in place to remove the feral predators. Physical barriers can protect nests from goanna predation but have not been used at Cape Lambert (Blamires & Guinea 2003).

Preliminary studies indicate that Bells Beach with a length of 600 m is the major nesting area within the Cape Lambert lease with up to 100 individual Flatback sea turtles nesting during the summer breeding season (Figure 2). Cooling Water Beach at just 200 m supports far fewer yet still a significant number of nests. A large number of false crawls are recorded for both beaches and require closer scrutiny of the definition of the term and identification of such tracks. No long term data on turtle nests is available for either Cooling Water Beach or Bells Beach.

Within the vicinity of the Dampier Archipelago a nationally significant number of Hawksbill sea turtles nest on Rosemary Island 50 km west of Cape Lambert (Figure 2). Major Green sea turtle nesting beaches occur on Barrow, Montebello and Muiron Islands (160 to 300 km to the south) and at the Lacepede Islands 125 km north of Broome. Major Flatback nesting beaches occur on Barrow Island (190 km to the south) and at Mundabullangana Station (90 km to the north) and the Eighty Mile Beach 450 km to the north and 150 km south of Broome (Prince 1994b). Cape Lambert is considered to be a minor breeding site as are many of the mainland beaches in the Dampier region (Prince 1994a). As adult Flatback sea turtles lay approximately three clutches per breeding season (Limpus et al. 1984), up to 100 individual Flatback and a couple of Hawksbill and a few Green sea turtles nest on the beaches within the Rio Tinto lease at Cape Lambert (Figure 2). This number is small compared with the several thousand individual sea turtles that nest on the beaches to the south and north of Cape Lambert. Possibly two hundred thousand sea turtles of all species are estimated to live in the coastal waters of the Pilbara. An estimated 50,000 turtles were recorded during aerial surveys of the Pilbara coastal waters shallower than 20 m in April 2000 (Prince 2001). Turtles foraging in deeper waters and near shore streams and turbid waters were not included in the survey. Many more thousands of sea turtles migrate annually into the region during the breeding season to the major rookeries. The nesting populations on the periphery of the major rookeries provide an indication of seasonal trends and fluctuations in the nesting sea turtle population. However the small number of nesting individuals on the periphery of the major rookeries limits the robustness of any statistical analysis of population parameters and extrapolation of population size. However the ease of access to the beaches for monitoring enhances the suitability of the beaches for community-based conservation measures.

Table 2 Species likely to be influenced by Cape Lambert operation and adjacent waters (Prince 1993, 1994 a, b, c, d).

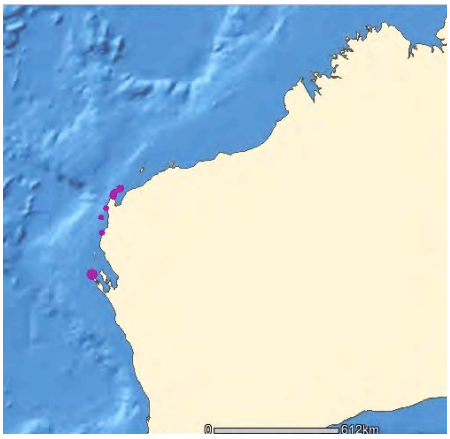
Species	Status (EPBC99)	Status in WA[2]	Presence at Cape Lambert		
			Nesting	Foraging	Migrating
Flatbacks (*Natator depressus*)	Marine Vulnerable	Rare	√	√	√
Greens (*Chelonia mydas*)	Marine Vulnerable	Rare	√	√	√
Hawksbills (Eretmochelys imbricata)	Marine Vulnerable	Rare	√	√	√
Loggerheads (*Caretta caretta*)	Marine Endangered	Rare	√	√	√
Leatherbacks (*Dermochelys coriacea*)	Marine Critically[1] Endangered	Rare	-	√	√
Olive Ridley (*Lepidochelys olivacea*)	Marine Endangered	Rare	-	√	√

[1] Leatherback turtles are undergoing nomination from Vulnerable to Critically Endangered under the EPBC99.

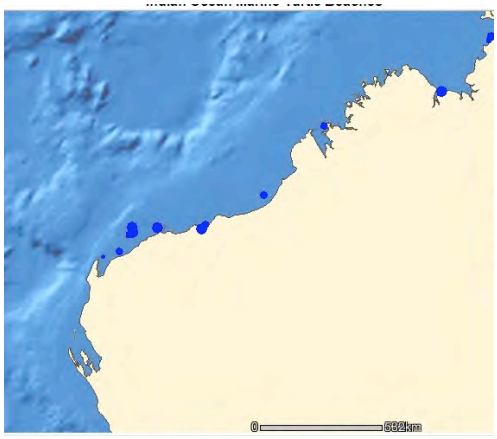
[2] Rare or Likely to Become Extinct in Wildlife Conservation (Specially Protected Fauna) Notice 2006(2).

Table 3 Marine turtle nesting activity within the Cape Lambert Lease (Salinovich 2006, 2007, 2008).

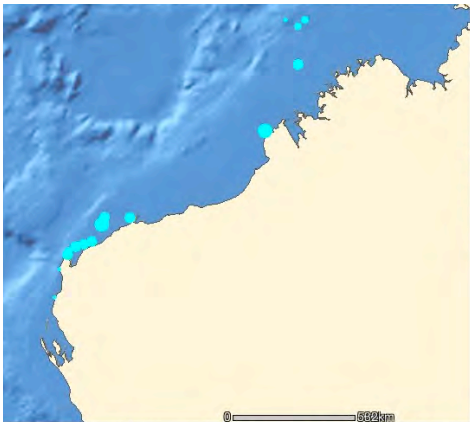
Locality	Marine Turtle Activity	2005/2006	2006/2007	2007/2008
Bells Beach	Flatback Nests (False Crawl)	185 (204)	149 (67)	245 (144)
	Hawksbill Nests (False Crawl)	5 (3)	1 (0)	3 (2)
	Green Nests (False Crawl)	1 (0)	0 (0)	1 (3)
Cooling Water Beach	Flatback Nests (False Crawl)	17 (21)	43 (60)	36 (28)
	Hawksbill Nests (False Crawl)	0 (0)	0 (0)	2 (0)
	Unidentified species	16	0 (0)	0 (0)



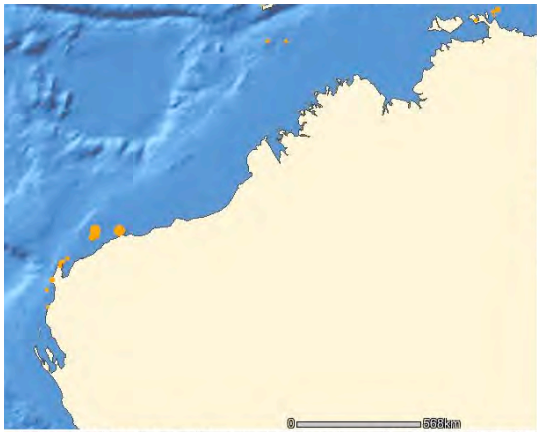
Loggerhead Nesting Beaches



Flatback Nesting Beaches



Green Nesting Beaches



Hawksbill Nesting Beaches

Figure 2 The major nesting beaches of Loggerhead, Flatback, Green and Hawksbill sea turtles in Western Australia (Indian Ocean South-East Asia Marine Turtle MoU website.

3 Potential Impacts

Discussions with DEC personnel and RTIO Environmental Management personnel identified several site specific activities that either exist at Cape Lambert or are likely to exist with the current port upgrade (Table 4).

Table 4 Summary of likely impacts on sea turtles during the dredging and wharf upgrade including impacts not caused by the upgrade project. Likelihood, Consequence and Level of Impact as defined in Risk Matrix and Assessment, Appendix 1.

Impacts	Construction / Operational / Natural / Other related risk	Likelihood	Consequence	Mitigation	Level of Impact
Sand Movement	Natural (cyclones)	Likely	Medium	-	High
Food Sources	Natural	Unlikely	Medium	-	Low
Predation	Natural & Other (pest predators)	Likely	Minor	Monitoring and Management	Low
Light	Operational and Construction	Possible	Minor	Monitoring and Management	Low
Noise (terrestrial and marine)	Operational and Construction	Unlikely	Minor	Monitoring and Management	Low
Vibration	Operational and Construction	Unlikely	Minor	Monitoring and Management	Low
Boat Traffic (non-recreational)	Operational, Construction and Other	Unlikely	Minor	Monitoring and Management	Low
Turbidity (dredge spoil)	Construction	Possible	Minor	Management	Low
Physical Injury (dredging) (management procedures in place)	Construction	Unlikely	Minor	Monitoring and Management	Low
Marine debris (entanglement and ingestion)	Operational, Construction and Other	Unlikely	Minor	Reporting arrangements in place. Waste from shipping requires monitoring	Low

3.1.1 Turbidity

The Cape Lambert coastal province comprises hard rocky shore substrate, sandy beaches, mangroves and intertidal salt pan. Natural processes of wind, wave and tide produce turbid waters during spring tides and during the summer cyclone season. Increased turbidity and movement of sands from beaches are a direct result of cyclone activity. Dredging associated with capital or maintenance work programs will result in increased turbidity above normal conditions for that phase of the tide and time of the year (SKM 2007a, b). The impact of dredging is likely to be small and localised and may reduce the feeding habitat available to resident benthic feeding marine turtles for a short period of time. Several controls were implemented during the dredging programme (SKM 2007 b). This included turtle exclusion devices on the dredge, the use of spotters on dredge vessels and use of minimal lighting required to facilitate safe work. It should be noted that the dredging programme was quite short (5 months) and did not overlap with the breeding season. In addition, extensive water quality (turbidity) modelling was completed prior to the dredging programme as part of the approvals process. This modelling showed that turbidity increases were likely to be low outside the immediate impact areas (dredge and disposal areas). This was supported by monitoring conducted during the dredging programme and the model verification which showed that turbidity levels, even in impact areas, reduced to background levels within 24 hours. Water quality monitoring reports were provided to the Department of Environment and Conservation monthly during the dredging programme. Surveys prior to dumping revealed that dredge spoil will have minimal impact on turtle feeding habitat (SKM 2007 b). Benthic surveys have been completed to identify epibenthic biota (SKM 2008) and possible foraging habitat. Coral, seagrass and sponge habitats have been recorded along with extensive areas of bare sand. Water depths over the survey region exceeded 20 metres in most sample sites. Some of the survey area will receive protection in the proposed Dampier Archipelago Marine Reserve.

No evidence of direct strikes or turtle deaths was recorded during the dredging programme. In addition, no evidence of direct strikes of turtle deaths was recorded during the dredging programme conducted in 2005 for the construction of the tug harbour. Dredging (capital and maintenance) associated with the upgrade were completed in November 2007.

3.1.2 Sand Movement

Sand movement from the beaches has a potentially significant impact on nest site availability for female turtles. Sand removed from beaches during cyclones may take several years to recover by natural processes. Sand removed from Bells Beach and Cooling Water Beach during Cyclone Clare in January 2006 has started to return to the respective beaches. There is no observable decrease in the numbers of sea turtles nesting but alteration to the seaward approach to the nesting beach could be an explanation (Koch & Guinea 2006) for the high numbers of False Crawls in 2005-2006 and 2006-2007 nesting seasons (Salinovich 2006;2007).

3.1.3 Anthropogenic Light

The senses of sea turtles enable the animals to move from their place of hatching to the feeding area and return. Studies of these senses (Table 5) aim to understand the potential impacts of human activities on the survival of sea turtles. The responses by sea turtles to sensory stimuli such as light, are psychological rather than physical (Witherington & Martin 2000) in that the animal remains unharmed. Nesting females are photonegative (i.e. moving or orienting away from light) when coming ashore to nest and photopositive (moving or orienting toward light) when returning to the sea. Hatchlings are photopositive while moving to the water and as they swim from the beach.

Light from port structures have the potential to disrupt normal nesting behaviours by:

- Deterring female sea turtles from coming ashore;

- Misorientation of female turtles returning to the sea after nesting; and
- Disorientation of hatchling sea turtles preventing them from finding the sea.

Responses by sea turtles to light spill on to the beach include:

- Seasoned nesters continue to use the beach;
- Neophyte (first-time) nesters move to more darkened beaches in the area; and
- Hatchings have no avoidance response and may move several hundred metres towards the light until they find a darkened area and regain their correct sea finding behaviour.

Hatchling sea turtles are attracted to the lights of vessels offshore and may swim towards the deck lights. The impact of this positive response to lights at sea depends on:

- Direction and speed of the ocean currents;
- Direction and height of the swell; and
- Time interval from hatching to dawn.

The eye of a sea turtle is adapted in general for finding food in the marine habitat. Typically, sea turtles have a more curved but less pliable lens than is the case in freshwater turtles (Legler 1993; Bartol & Musick 2003). This spherical lens is ideal for underwater vision but behaves less favourably on land (Bartol & Musick 2003). The pigmented choroid contains the reflective layer, tapetum lucidum that gives some animals a noticeable “eye-shine” when illuminated at night (Ollivier et al. 2004). Under low light condition the reflective tapetum lucidum enhances the sensitivity of the eye. The tapetum lucidum is poorly developed in the eyes of sea turtles.

The light sensitive cells of the eye respond to all wavelengths of visible light (Granda & Stirling 1965; Granda 1979; Bartol & Musick 2003). Stimulation of both rod and cone photoreceptor cells of the Green turtle to white light (400 to 700 nm) produced a peak of sensitivity at 520 nm with smaller peaks at 450-460 nm and 600 nm (Granda & Stirling 1965; Granda & O'Shea 1972; Granda 1979). This sensitivity to the shorter blue and ultra violet wavelengths is expected of a marine organism that uses vision to locate food (Granda 1979; Bartol & Musick 2003). An increase in density of rods and cones in the retina provide the visual acuity for Loggerhead turtles to find blue crabs underwater in low light conditions. In general, the eyes of a sea turtle respond to all wavelengths of visible light but are especially sensitive to the short wavelength (blue to ultraviolet) light that dominate in the marine environment.

3.1.4 Anthropogenic Light Action:

Reducing the impact of the light spill from the port facility requires:

- Maintaining a darkened buffer at the top of the beach at Bells and Cooling Water Beach,
- Use of white light when appropriate for safety reason
- Reducing direct light spill on to the beach by appropriate measures such as:
    - shields on the seaward side of lights,
    - non-reflective surfaces to buildings,
    - low-level lighting for walkways,
    - use of yellow sodium vapour lights for external lighting,
    - timer switches,
    - motion sensors as determined by a light audit.

Light spill associated with the “Cape Lambert Upgrade to 85 Million Tonnes” proposal was addressed and will continue to be addressed through the measures detailed in the Dredging and Dredge Spoil Disposal Management Plan (SKM 2007b)and the Marine Turtles

Environmental Work Procedure for Construction (SKM 2007a). Lighting has been kept to the minimum necessary to facilitate safe work.

Table 5 Summary of marine turtle sensory ability.

Sense	In water	In air	Authority
Smell	Acute due to water passing over the nostrils	Poor indicating little response to airborne particles	(Limpus 2006) (Vieyra & Vogt 2007)
Taste	Nil although some taste buds are present	Nil	(Wyneken 2001)
Vision	Sharp image Good vision in the blue to ultra violet wavelengths Rapid attenuation of red and yellow wavelengths in sea	Indistinct image Poor response to red and yellow wavelengths Hatchlings and post nesting females attracted to blue wavelengths	(Witherington & Martin 1996) (Eckert et al. 2006)
Hearing	Good response to low frequency sounds by modified auditory canal and possibly carapace	Poor response due to lack of external ears, fat filled auditory canal	(Wyneken 2001) (Moein Bartol & Ketten 2006)
Magnetic Field	Response to earth's magnetic field in reproductive migrations	Response to earth's magnetic field during incubation	(Irwin & Lohmann 2003; 2005)

3.1.5 Noise and Vibration

Sea turtles have no external ears. The ear canal contains fat and fluid (Ketten et al. 2006). Vibrations travel from the tympanic scale along the stapes to the cochlea (Wyneken 2001). In water, sea turtles respond to frequencies of 100 Hz to a maximum of 500 Hz (Moein Bartol & Ketten 2006). Most studies give values of between 200 Hz to 400 Hz in air (Moein Bartol & Ketten 2006). By contrast the human ear detects frequencies from 20 Hz to 20,000 Hz (Van Wynsberghe et al. 1995). Frequencies below 20 Hz are infrasound and sensory reception is by the bones and air spaces rather than the ear. This sensory pathway is known as tactition. Such infrasounds include the low frequency sound of waves breaking on a beach.

The threshold volume for hearing frequencies at 400 Hz is 121 dB and at 200 Hz is 107 dB. These volumes are roughly equivalent to the sound of a jack hammer or a propeller driven aircraft (Van Wynsberghe et al. 1995). Sound attenuates with distance in water and it is unlikely that sea turtles will hear even loud noises at distance of 100 m (refer Figure 3). Sea turtles may be oblivious to the noise of machinery which reduces their responses to loud noise underwater but makes them prone to collisions with fast-moving boats (Hazel et al. 2007).

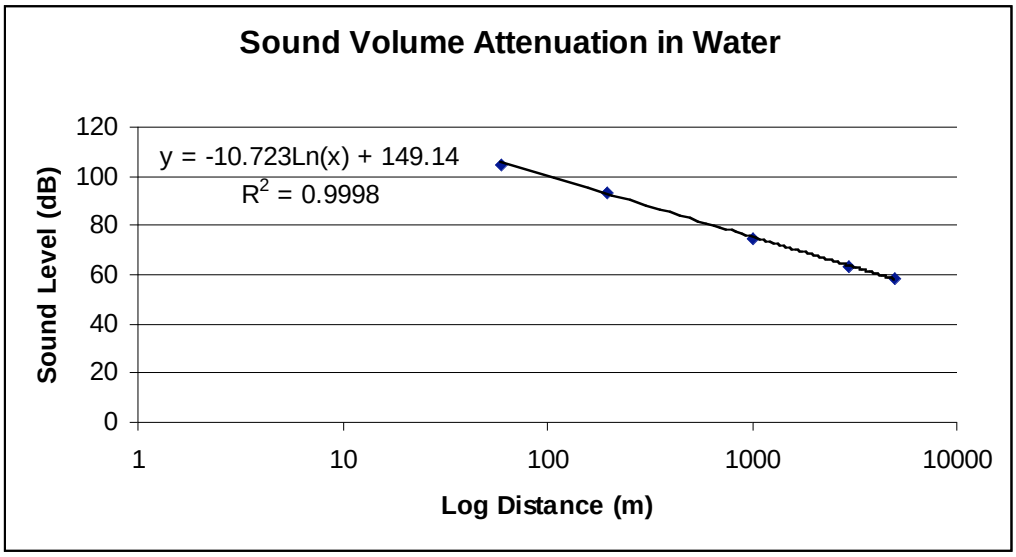


Figure 3 Attenuation of sound volume in water (Appendix E of the DSDMP, 2007).

The scientific literature contains little information on the impact of terrestrial vibrations on nesting sea turtles. There is an anecdotal suggestion that vibrations may influence the non-synchronous emergence of hatchlings, but this has not been tested. Unlike rock and water, sand is a poor conductor of vibration. It is likely that vibrations from the port facilities will be absorbed by the sand on both Bells Beach and Cooling Water Beach. However this needs to be monitored.

The sound of the Cape Lambert plant at present is inaudible to the human ear on Bells Beach due to the prevailing wind blowing from the west towards the plant. The wind blows during the turtle breeding season at a velocity that places the plant down-wind from the beach. Given the nature of the hearing of sea turtles and the direction of the wind, the sound is unlikely to be audible to sea turtles coming ashore at night during summer months.

3.1.6 Noise and Vibration Action:

It is recommended that the noise and vibration in the sands should be monitored on both Bells Beach and Cooling Water Beach. Works to date have been conducted in accordance with approved management plans. This process will continue. The dredging was conducted under DSDMP (SKM 2007b). The Pile driving was conducted under Construction Environmental Management Plan (SKM, 2007a) and Noise Management Plan (SKM, 2007c). Records will be kept of any opportunistic observations of the frequency of hatchlings emerging from the nest at an immature stage of development and the non-synchronous emergence of hatchlings, to detect natural variations in hatching behaviour and emergence (Koch 2003, Koch *et al* 2008).

3.1.7 Habitat Protection

The dunes backing Bells Beach provides a visual screen and an environmental buffer between the beach with the greatest amount of sea turtles nesting on the lease and the port at Cape Lambert. It is important the dunes remain as a buffer. The dunes show signs of human degradation in that blow-outs now promote human access to the beach. The height of the dunes has been reduced by wind erosion and lack of vegetation.

The dunes form from the westerly winds that blow onshore during the turtle breeding season. The winds during the non-breeding season are from the South-West and South-East which also build the dunes.

The dunes should be preserved, maintained and enhanced by:

- Establishing native vegetation, especially grasses, that will hold the dune together,
- Continue to restrict and prevent vehicle access to the beach,
- Establish foot access by hard surfaces such as board walks to the beach angled to the wind to prevent further erosion,
- The setback area from Bells Beach for future works will be maximised
- Link the buffer zone to the protected heritage sites.

The area available to nesting sea turtles at Cooling Water Beach requires maintenance and enhancement. The newly constructed pile lay down pad restricts the width of the dunes and nest-site options for female turtles. Beach replenishment with available sand or clean dredge spoil would provide a more stable nesting habitat. Non-reflective structures should be positioned on the pile lay down pad to provide a screen between the beach and the existing plant. This beach replenishment with clean dredge spoil and a darkened dune crest would add to the suitability of the beach as a nesting site. Clean dredge spoil placed beneath the existing wharfs would provide further nesting sites that may be suitable to some seasoned nesters.

The marine habitat has been assessed visually in the benthic surveys to identify epibenthic biota (SKM 2008) and possible sea turtle foraging habitat Coral, seagrass and sponge habitats have been recorded and mapped along with extensive areas of bare sand. Some of the survey area will receive protection in the proposed Dampier Archipelago Marine Reserve. Boat surveys of the inshore protected waters proposed in this plan will identify areas with high densities of feeding turtles so that habitat protection measures can be initiated.

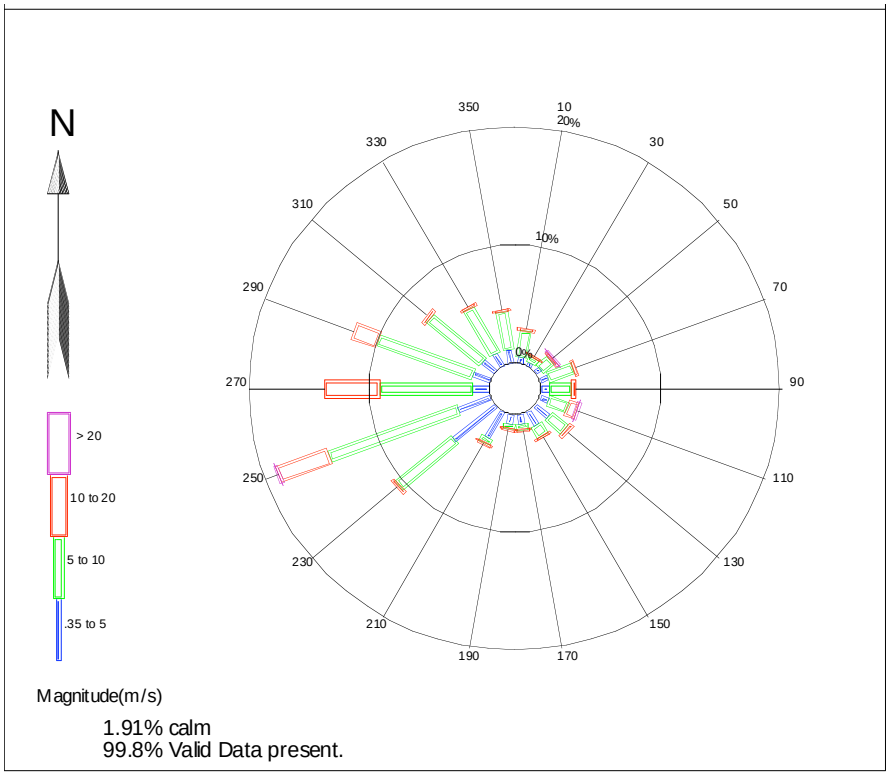


Figure 4. Composite wind rose for Pilbara Iron Met Station during the turtle breeding season (October 2006 to March 2007).

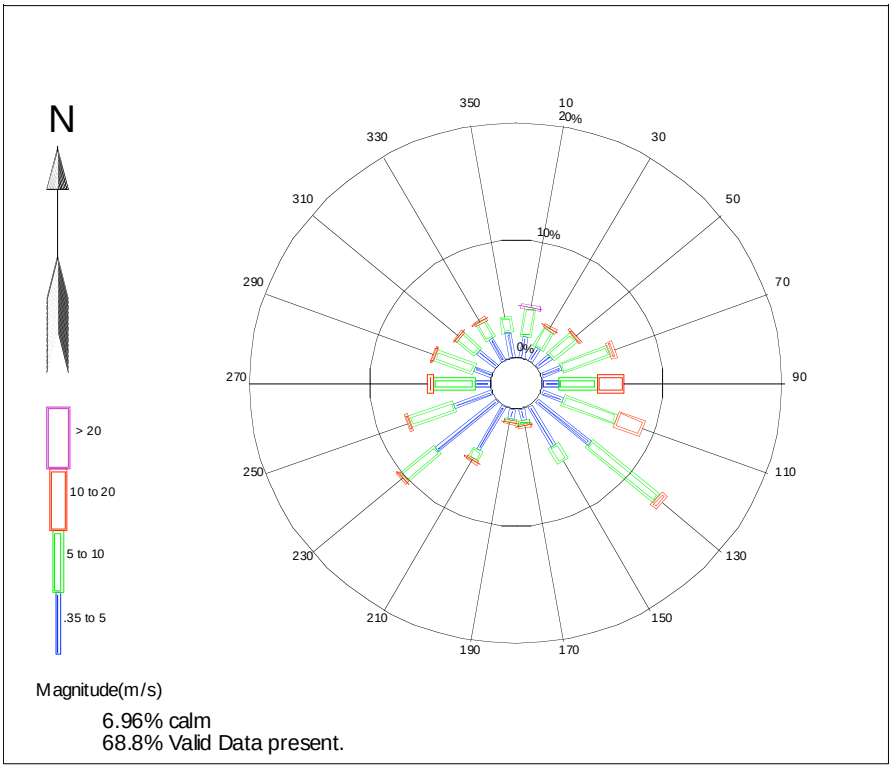


Figure 5 Composite wind rose for Pilbara Iron Met Station during the non breeding season for Flatback sea turtles at Cape Lambert (April 2007 to September 2007).

4 Environmental Objectives

The Marine Turtle Management Plan provides a management framework to enable RTIO to:

- Manage the ongoing aspects of the project to detect and mitigate as necessary any impact upon the natural abundance, species diversity, geographical distribution, behaviour patterns, breeding success, predation levels, demographics and population viability of marine turtles that frequent and rely, wholly or in part on Cape Lambert or the waters adjacent to Cape Lambert;
- Identify darkness strategies to reduce as far as practicable lights or light glow interfering with nesting female turtles and hatchlings and determining the impacts thereon; and
- Identify the methodology to measure and detect any changes to affected marine turtle populations.

4.1 Performance Indicators /Criteria

Table 6 Marine Turtle Attribute and Management Activities.

Marine Turtle Attribute	Management Activity
1 Natural abundance	Literature search for any measures of abundance. Assess current research and surveys at other regional localities. Assess existing data and input from volunteers for regional beaches. Monitor focus beaches within lease with appropriate staff allocation on rotation, if required. Include beach monitoring on the focus beaches in the lease during nesting season as normal operational procedures. Record numbers of nesting turtles to identify annual fluctuations. Complete the Daily Summary Sheet for each Beach (see Appendix).
2 Species diversity	Literature search for information of species of turtles nesting on the beaches and feeding in the waters around Cape Lambert. Identification nesting turtles by: tracks, visual inspection, nests, eggs, and hatchlings. Complete the Tag Data Sheet for each adult tagged and the Hatched Nest Data Sheet for each hatched nest (see Appendix).
3 Geographical distribution	Tagging nesting females and encouraging tag returns Satellite tracking of selected individuals from within the Cape Lambert lease to detect their movement to internesting areas and feeding areas.
4 Behaviour patterns	Record nesting behaviours from the time of coming ashore to re-entering the water to construct a database of normal behaviours. Complete the Tag Data Sheet (see Appendix) for each adult nesting turtle. Record movements of nesting females towards or away from lighted areas on the beaches. GPS the nests and assess in relation to possible light spill. Identify areas of hatchling misorientation or disorientation. Satellite tracking of adults to feeding areas
5 Breeding success	Record background temperature profiles of beach sands. Record number of successful nests Record number of unsuccessful nests Investigate hatched nests to record hatching success. Complete the Tag Data Sheet (see Appendix) for each

	adult and the Hatched Nest Data Sheet for each hatched nest (see Appendix).
6 Predation levels	In nest predation by crabs, flies, dogs, goannas, foxes etc complete the Hatched Nest Data Sheet for each hatched nest (see Appendix). Implement appropriate eradication or control programs Record any detectable predation e.g. birds, crocodiles
7 Demographics	Identification of animals of different life stages Identification of Adults – tagging, digital photographs of individuals Assessing the numbers of hatchlings produced per year. Compile the annual Hatching Success and Emergence Success for each beach (see Hatched Nest Data Sheet in Appendix). Identification of neophyte nesters by laparoscopic investigation of a sample of the nesting females over 2 - 5 nights per season over 2 years, subject to the availability of appropriately trained personnel.
8 Population viability	Assessment of continuing nesting success and retain and enhance nesting habitat (dune stabilization). Ensure security in data collection. Adopt standard methodologies. Report data and summaries responsibly. Input to modelling the population at a regional level.

5 Implementation Strategy

The ministerial statement requires more information in the management plan than is collected currently by the West Pilbara Community Turtle Program volunteers. The Marine Turtle Management plan requires recognition of individual sea turtles by a tagging program. It also requires nightly surveys during the nesting and hatching seasons. Individual nests need identification and the contents of the nest examined after the hatchlings have left the beach. It requires baseline information and recording of physical parameters such as sand temperatures at nest depth, noise and vibrations, to assess the impact if any of the Cape Lambert port expansion against variables that may be attributed to climate change. The research methodologies in order of priority are outlined in Table 7.

Table 7 Research methodologies for long term sea turtle monitoring program within the lease area at Cape Lambert

Research Activity in Order of Priority	Marine Turtle Attribute Number	Personnel Responsible	Duration of Activity
Nesting adult track count	1, 2, 4, 5,	West Pilbara Community Turtle Program volunteers plus RTIO Marine Turtle Environment Personnel	October to April daily on Cape Lambert lease
Hatched nest track count	1, 2, 3, 4, 5, 6, 7	West Pilbara Community Turtle Program volunteers plus RTIO Marine Turtle Environment Personnel	October to April daily on Cape Lambert lease
Temperature data loggers	4, 5,	RTIO Marine Turtle Environment Personnel	Logger placed at 50 cm depth in sand and downloaded yearly prior to cyclone season; 3 years duration
Tagging nesting females	1,2, 3, 4, 5, 6, 7, 8	RTIO Marine Turtle Environment Personnel	2 week period between October and April on Cape Lambert Lease; 3 years duration
Excavating hatched nests	1, 2, 4, 5, 6, 7,	West Pilbara Community Turtle Program volunteers plus RTIO Marine Turtle Environment Personnel	October to April during the early mornings on Cape Lambert lease; 6 nests/year for 2 years
Recording morphometrics of nesting females	1, 2, 3, 5,7,	RTIO Marine Turtle Environment Personnel	One week program between October and April on Cape Lambert lease; 3 years duration
Satellite tracking of nesting females within and at end of season.	3, 4,	RTIO Marine Turtle Environment Personnel.	Satellite tracking can be done within the nesting season and at the end of the season in February; 3 years duration
In-water foraging study	1,2,3, 4,7	RTIO Environment Personnel	Single survey annually; 3 years duration

5.1 Monitoring

It is important that data be collated within 24 hours of collection to ensure the quality of the data and remove errors associated with lapses of memory. This is an important aspect of the MTMP in that the monitoring of the turtles is accompanied by monitoring of the database. RTIO Marine Turtle Environmental personnel will need to monitor the data and report to DEC any sick, injured or dead sea turtles. Sick, injured and dead sea turtles should be reported immediately to DEC on the appropriate after-hours phone number

Zone 1 (Cape Lambert Beaches)

Monitoring of the nesting beaches during the summer months is fundamental to being able to identify individual nesting turtles. The WPCTP track count program will be continued, with morning track counts carried out at beaches on the Cape Lambert Lease during the nesting season. Owing to the reliance on volunteers, 100% coverage across the entire nesting season cannot be guaranteed.

During an agreed two week period for the first three years of the management plan, individual turtles will be tagged with titanium flipper tags to identify individuals and data recorded on the Tag Data Sheet and the Daily Summary Sheet for each Beach. Tagging should begin three hours before the night-time high tide and continue until three hours after the high tide. A successfully nesting Flatback turtle can take between 40 and 60 minutes to complete the nesting process; during tagging, the beach therefore needs to be checked at least every 40 minutes. Tagging activities shall also be carried out in a way so as to minimise disturbance to tracks. Tagging at Bells Beach will be reviewed in light of experiences from the tagging program during the 2008-9 season.

Zone 2 (Inshore beaches and Dixon Island)

During the agreed two week period for three years, the sea turtles nesting on a selected beach in Zone 2 will be tagged with titanium flipper tag to identify individuals. The data will be recorded on the Tag Data Sheet and the Daily Summary Sheet for each Beach. The data will be collated and included in the report by RTIO Marine Turtle Environmental personnel.

Zone 3 (Delambre and Legendre Island)

During the agreed two week period for three years, all nesting sea turtles nesting on selected beaches on Delambre and Legendre Beaches will be tagged with titanium flipper tags to identify individuals. The data will be recorded on the Tag Data Sheet and the Daily Summary Sheet for each Beach. The data will be collated and included in the report by RTIO Marine Turtle Environmental personnel.

Satellite Tracking

Bells Beach will be the focus site for the deployment of satellite tags. The most appropriate PTT's for flatback sea turtles will be used. The satellite tagging program will address:

- identification of the internesting habitat during the nesting season,
- recording the migration path from Bells Beach to the internesting habitat and the return path.
- finding the location of the foraging location or locations as the turtle moves away from the Bells Beach to the presumed inter-breeding locations.

Foraging studies

In-water studies will be restricted to inshore waters in the vicinity of Zone 1, Zone 2 and Zone 3. In-water studies aim to identify the area where sea turtles aggregate in protected waters. The survey will be conducted by a small boat with RTIO personnel and or consultants and will consist of bow surveys. The vessel will travel at a safe speed from known GPS points along a straight course. All sea turtles seen within an estimated distance from the path will be recorded to species, sex, age class and GPS location. These transect data will be used to identify sea turtle densities and species diversities at identifiable locations within the zones.

Figure 6. The Cape Lambert region showing the approximate survey areas with Zone 1 being the beaches and inshore waters adjacent to the Cape Lambert Lease, Zone 2 being the sea turtle nesting beaches and coastal waters from Cleaverille to Point Samson, and Zone 3 the reference beaches on Delambre and Legendre islands (positions from Google Maps).

5.2 Contingencies

Table 8 Environmental Triggers and Mitigation actions

Marine turtle Attribute	Environmental Trigger	Mitigation Action
Natural abundance	A decrease in the number of sea nesting turtles during the summer nesting period for three successive years.	Review Marine Turtle Management Plan. Assess nesting activity on other beaches in the Cape Lambert area through the MoU with West Pilbara Community Turtle Program. Assess change in nesting numbers on previously unutilized beaches. Identify likely causes for the decrease in nesting turtle numbers. Address the likely cause for the decline in nesting turtles if associated with RTIO activities.

Marine turtle Attribute	Environmental Trigger	Mitigation Action
Species diversity	Decrease in the numbers of each species of nesting sea turtle on the beaches within the Cape Lambert lease.	Public awareness and education campaign to alert the public and industry to the increased likelihood of negative impact on sea turtles by activities outside of the Cape Lambert lease.
Geographical distribution	Tag returns identify areas of intense mortality. Internesting females moving into areas with increased danger.	Public awareness and education campaign to alert the public and industry to the increased likelihood of negative impact on sea turtles by activities outside of the Cape Lambert lease.
Behaviour patterns	Repeated aberrant behaviour of individuals to the presence of light spill, vehicle movement or changes in beach topography.	Identify the causative factors. Implement mitigation measures to reduce light spill by shading, buffer zones, light audit and subsequent rectification.
Breeding success	Elevated numbers of unsuccessful clutches laid per season over three consecutive years. Temperature profiles at 50 cm depth reach lethal temperatures during the summer months. Increased numbers of late embryonic deaths or deformed hatchlings in clutches above normal parameters.	Implement environmental manipulative measures to either reduce or increase hatching temperatures to normal levels by relocating clutches to either shade or sunny positions.
Predation levels	Any incidence of feral animal predation. Increased numbers of nest raided by goannas.	Implement a feral animal eradication program through the appropriate channels. Implement appropriate nest protection strategies using mesh exclusion barriers.
Demographics	Decrease in the number of turtles nesting on the beaches with a corresponding increase in the number of turtles nesting on other beaches. Decrease in the number of neophyte nesters on the beaches.	Identify the causative factors. Take appropriate mitigation measures to reduce the light spill, light audit, Screen nesting beaches, beach replenishment, dune stabilisation or re-vegetation.

Marine turtle Attribute	Environmental Trigger	Mitigation Action
Population viability	Decrease in nesting and or hatching success over three consecutive years.	Identify the causative factors. Review historical records and annual reports. Assess the situation in the region to identify the scale of any decline. Annual Environmental Report (AER) to DEC by RTIO Marine Turtle Environment Personnel. Using appropriate data base model the sea turtle population of the Dampier Region.

6 Stakeholder Consultation

The requirements of the Ministerial Statement were discussed with Rio Tinto Representatives (Peter Royce, Steve Abbott, Phil Beddoes, Anthony Radici, Todd Jess, Roy Teale, Dennis Kelly, Bronwyn Bell, Sam Samaraweera) on 24 September before a visit to the Cape Lambert site that night. Meetings the following day (25 September 2007) with the Environmental Unit (Damon Newling, Andrew Johnston, Jarrad Sherborne) at Cape Lambert proved positive and constructive as did subsequent meetings with DEC personnel (Marissa Spears, Allan Kendrick, Hayley Valentine and Raquel Carter) and interested members of the public (Anna Vitenbergs and Rob Vitenbergs) at Point Samson on 25 September 2007 and 13 November 2008).

7 Auditing

Auditing should be conducted on an annual basis by the RTIO Marine Turtle Environment personnel and the Environmental Unit of RTIO.

8 Review and Revision

The Marine Turtle Management Plan should be reviewed after three years from it implementation. The review should address the outcomes of the management plan. This would be an appropriate time to undertake a revision of the MTMP should the review identify such action.

8.1 Public availability of MTMP

While implementation of activities within the MTMP has effectively commenced, once approved, the MTMP will be made publicly available in the manner outlined in the 2006 procedure developed by the DEC.

Making the MTMP publicly available will be achieved by:

- Two copies of the MTMP will be provided to the Shire of Roebourne libraries (including those at Wickham, Roebourne, Karratha and Dampier) as well as the JS Battye (State) Library and the DEC Library in Perth for a period of 2-3 months. These libraries will be requested to put the approved MTMP on display so that it can be readily viewed by interested members of the community.
- A copy of the approved MTMP will be placed on the Rio Tinto website.

- An advertisement will be placed in the Pilbara News in the format specified by the DEC advising readers of the availability of the MTMP for review at the mentioned libraries and Rio Tinto website.

Documentary evidence of the above actions will then be provided to the Compliance Monitoring Section of the DEC for clearance of the Condition 743:M12-3.

8.2 Key Management Actions Table

Table 9 Key Management Actions and Objectives.

Ref #	Key Management Action	Objective	DoE Reporting	Status
Condition 743:M12-1.1	Identify project related stressors	Mitigation of stressors	Ensure that the project complies with the Ministerial Conditions 743:M12-1.	Ongoing
Condition 743:M12-1.2	Mitigation of stressors	Identify means of limiting impact by identification of key habitats and features of those habitats that support successful sea turtle nesting.	Reporting to DEC by way of AER.	Annual Environmental Report usually in the non nesting period of the year.
Condition 743:M12-1.3	Identifying processes to manage or mitigate changes in sea turtle attributes in the vicinity of Cape Lambert	Provide a data set capable of interrogation to identify changes in the nesting environment and the success of nesting sea turtles.	Reporting to DEC by way of AER.	Review of the MTMP after three years to identify revision of the MTMP if needed.

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Appendix 1 Risk Matrix and Assessment

Likelihood	Consequence				
	1-Minor	2-Medium	3-Serious	4-Major	5-Catastrophic
A-Almost Certain	Moderate	High	Critical	Critical	Critical
B-Likely	Moderate	High	High	Critical	Critical
C-Possible	Low	Moderate	High	Critical	Critical
D-Unlikely	Low	Low	Moderate	High*	Critical
E-Rare	Low	Low	Moderate	High*	High*

Likelihood	Descriptor
Almost Certain	**Recurring** event during the life-time of an operation / project
Likely	Event that **may occur frequently** during the life-time of an operation / project
Possible	Event that **may occur** during the life-time of an operation / project
Unlikely	Event that is **unlikely** to occur during the life-time of an operation / project
Rare	Event that is **very unlikely** to occur very during the life-time of an operation / project

Consequence	Descriptor
Minor	Alteration to the behaviour of one life stage of a single species. Changes are at the lower level of detectability and are of a short duration
Medium	Disruption of behaviours of more that one life stage of a single species. Changes are measureable but lasting less than a generation
Serious	More than one life stage is impacted of more that one species. Changes are measurable and lasting more that one generation.
Major	Multiple life stages are impacted leading to measurable declines in abundance over several generations
Catastrophic	Multiple life stages are impacted leading to measurable declines in abundance over several generations leading to the extinction of the respective populations

Appendix 5 - Background on Marine Turtle Species Present in the Management Area (Source: Biota 2008a)

Flatback Turtle *Natator depressus*

Distribution: The Flatback Turtle (*Natator depressus***Error! Reference source not found.**) is found only in the tropical waters of northern Australia and the island of New Guinea (Zangerl et al. 1988; **Error! Reference source not found.**), and is one of only two species of marine turtle without a global distribution. Adults are known to inhabit soft bottom habitat over the continental shelf of Northern Australia (Zangerl et al. 1988), although the extent of their range is not fully known (Zangerl et al. 1988). In Western Australia, the species occurs in waters of the Kimberley region, the North Western shelf and Pilbara coastal waters.

Flatback Turtle Natator depressus.

Australian distribution of Flatback Turtle (source: Wilson and Swan 2008).

Foraging Ecology: There is limited knowledge on the foraging habits of this species, but juveniles are known to eat crinoids, hydroids, jellyfish, molluscs, soft corals, squid and siphonophores (Zangerl et al. 1988). Larger juvenile and adult turtles may occupy similar habitat and forage primarily on benthic organisms.

Breeding: Peak nesting activity occurs in the summer months in the Pilbara region of WA, while in the Kimberley nesting occurs in the middle of the year (Prince 1994). Pilbara region nesting sites are known from Barrow Island (Prince 1994), Rosemary Island and Cowrie Beach (Mundabullangana Beach) (R. Prince pers. comm. 2008). The periodicity of reproductive migrations is recorded to be between one and five years in Queensland, with a mean of 2.7 (Limpus et al. 1983), but this may differ in Western Australia. Nesting habitat comprises sandy beaches in the tropics and subtropics, with sand temperatures between 25°C and 30°C at nest depth (Limpus et al. 1993). Females

lay a mean of 2.4 clutches per season, with an inter-nesting interval of 15 days. Egg clutches are laid at a depth of 55 cm (Limpus 1971) and contain approximately 50 eggs, with an average size of 5.2 cm in diameter and 78 g in weight (Limpus et al. 1984). The sex ratio of the hatchlings is determined by the temperature of the sand, with males produced below 29°C and females produced above this temperature (Limpus et al. 1983). Hatchling weight ranges from 30-51g (mean of 40g; Limpus et al. 1983). This species is the dominant user of the rookeries present at Bells Beach and Cooling Water Beach.

Green Turtle *Chelonia mydas*

Distribution: The Green Turtle (*Chelonia mydas***Error! Reference source not found.**) has a worldwide distribution in tropical and subtropical seas with temperatures above 20°C. In Western Australia, Green Turtles nest on beaches from the Ningaloo coast northwards (**Error! Reference source not found.**).

Green Turtle Chelonia mydas (source: Faunabase 2008).

Australian distribution of Green Turtle (source: Wilson and Swan 2008).

Foraging Ecology: Adults are herbivorous, feeding on seaweeds and seagrasses, while immature green turtles are carnivorous, feeding on jellyfish, small molluscs, crustaceans and sponges.

Breeding: There are significant rookeries on Barrow Island, in the Montebello Islands, the Dampier Archipelago and the Lacepede Islands, with smaller rookeries on many smaller Pilbara islands, as well as in the Kimberley (Prince 1994). Adult females breed approximately once every six years, although the nesting interval varies considerable from year to year, with very little breeding occurring in some years and more in others. Females lay about 115 eggs per clutch and about five clutches per season (Limpus 2008a). Hatchling sex ratios vary, depending on incubation temperature: warmer northern beaches produce predominantly females and southern beaches produce mainly males. Green Turtles nest very infrequently on the mainland beaches adjoining Cape Lambert.

Hawksbill Turtle *Eretmochelys imbricata*

Distribution: Hawksbill Turtles (*Eretmochelys imbricata***Error! Reference source not found.**) forage near coral reefs in the warm tropical waters of the central Atlantic and Indo-Pacific regions. They rarely stray into temperate seas.

Hawksbill Turtle Eretmochelys imbricata (source: Faunabase 2008).

Australian distribution of Hawksbill Turtle (source: Wilson and Swan 2008).

Foraging Ecology: This species feed on sponges, seagrasses, algae, soft corals and molluscs.

Breeding: In Western Australia, Hawksbill Turtles nest from the Ningaloo coast northwards, including the Lowendal Islands, Rosemary Island, the Dampier Archipelago and some other small Pilbara islands (Burbidge, 2004; Limpus 2004b **Error! Reference source not found.**). Western Australian supports the only remaining large population in the Indian Ocean (Burbridge, 2004). Females migrate long distances between feeding and breeding grounds. They lay about 130 eggs per clutch, and hatchling sex ratios depend on incubation temperature (Burbidge, 2004). The species is a very minor user of the mainland beaches adjoining Cape Lambert.

Appendix 6 - Marine Turtles Lighting Design Guidelines (source: Witherington and Martin 1996)

APPENDIX C

The following table describes the generally available incandescent lamps (yellow, bug-light bulbs) that can be suitable for use near nesting beaches if employed properly. Lighted lamps are properly employed if they are not visible from the beach. These bulbs can be used in place of white light bulbs in incandescent fixtures (*e.g.*, porch, balcony, doorway, walkway, stairway, and security lighting) and can be used in conjunction with motion-detector fixtures.

Manufacturer	Trade Name	Lamp Wattage
General Electric Lighting	40 A/Y Bug Lite	40
"	60 A/Y Bug Lite	60
"	100 A/Y Bug Lite	100
"	85 PAR/FL/BG Outdoor Floodlight	85
Osram Sylvania	15 A/Y	15
"	25 A/Y	25
"	40 A/Y	40
"	60 A/Y Bug Lite	60
"	100 A/Y Yellow Bug Lite	100
"	100 PAR/EL/Y/RP Yellow Flood	100
"	150 A/Y Yellow Bug Lite	150

Remarks: Other amber or yellow incandescent bulbs and floodlights are available from various manufacturers and are expected to be much better than comparable white incandescent lamps for applications near nesting beaches. However, yellow or amber color alone does not ensure that the lamp will, like true buglights, only moderately disrupt hatchling orientation. Amber-tinted, compact-fluorescent tubes are also sold and are far better than white fluorescent tubes but are not as acceptable as incandescent bug lights. *JANMAR Lighting* (Appendix G) offers 5-, 7-, 9-, and 13-watt (PL-5, PL-7, PL-9, and PL-13), amber-tinted compact-fluorescent tubes.

APPENDIX D

The following tables describe common styles of light fixtures that may be suitable for use near sea turtle nesting beaches if they are employed properly. Fixtures are properly employed if their light is neither directly nor indirectly visible from the beach. Other fixtures are listed here as conditionally acceptable for use near nesting beaches because they contain low-pressure sodium lamps. These light sources should be positioned so that their light is not directly visible from the beach. In all cases, LPS fixtures are greatly preferred to comparable incandescent or HID (high-intensity discharge) fixtures. Abbreviations are as follows: HPS = high-pressure sodium vapor, LPS = low-pressure sodium vapor, MV = mercury vapor, MH = metal halide, Incan. = incandescent, Fluor. = fluorescent.

Low-Profile Luminaires, Tier Lights

Used for safety along walkways and around pools and decks.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Intermatic, Inc.	Malibu Tier Lights	Low-voltage incandescent	11
"	Malibu Tier II Lights	"	7
"	Malibu Tier Deck Lights	"	7, 11
"	Malibu Dimension Prismatic	"	11
"	Malibu Shaded Tier Lights	"	11
"	Malibu Metal Tier Lights	"	11
"	Malibu Walklights	"	11
"	Malibu Mushroom Lights	"	11

Remarks: Tier lights are preferable to globe lights, pole-mounted lighting, or floodlights for applications near the crest of the dune or on the seaward side of buildings. However, the fixture should be positioned so that vegetation, topography, or buildings screen the light from the beach, or the fixture should be equipped with shields so that light sources are not visible from the beach. Optional timers are available for the models listed above.

Low-Profile Luminaires, Bollard Lights

Used for safety along walkways and around pools and decks. Also suitable for parking areas.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Lithonia Lighting	KBS6 (6" square bollard)[1]	incandescent	116 max.
"	KBS8 (8" square bollard)[1]	"	150 max.
"	KBR6 (6" sound bollard)[1]	"	116 max.
"	KBR8 (8" round bollard)[1]	"	150 max.
Quality Lighting	Design 310 (16" bollard)	HPS[2]	150
		MH and MV[2]	175
"	Design HB Post-mounted Luminaire	LPS	18 and 35
"	Design HBB Bollard	LPS	18
Spaulding Lighting	Fresno I LPS (square bollard)[3]	LPS	18 and 35
"	Fresno II LPS (round bollard)[3]	LPS	18 and 35
Sterner Lighting Systems	Softform Bayshore	incandescent	100 max.
"	Annapolis (square bollard)	"	150 max.
		MV, MH, and HPS[2]	175 max.
"	Annapolis (round bollard)	incandescent	150 max.
		MV, MH, and HPS[2]	175 max.

Remarks: See remarks for tier lighting. Many of the lamp wattages given here are maximum values for the fixture; the lowest-wattage lamp (and corresponding ballast) needed for a specific application should be used. Incandescent bug-light lamps and LPS are the most suitable for use near nesting beaches.

[1]Half shields are available for Lithonia bollards.
[2]HID lamps (HPS, MV, MH) are not recommended for use close to nesting beaches because of the color and high light output of these lamps. LPS and incandescent bug-light lamps are good substitutes.
[3]Spaulding bollards should be used with optional internal louvers that provide a 90° light cutoff (a complete blocking of lateral light).

Low-Profile Luminaires, Miscellaneous Low-Level Lighting

Used for safety along walkways, around pools and decks, and in parking areas.
Rail lighting and tivoli lighting are used for lighting stairways, steps, and handrails.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Sterner Lighting Systems	Quantico	incandescent	150 max.
		MH and HPS	175 max.
"	Softform Illuminated Rail[1]	fluor. and incan.	varies
Lithonia Lighting	Recessed Step Light ELA VSL H1212[2]	Low-volt. incan.	12
Starfire Lighting	Startube Linear Lighting[3]	Low-volt. incan.	0.5
ERS, Inc.	Single-faced LED Strip Lighting[4]	Red LED	2 W per light strip
Hydrel	9600 Recessed Wall Lights with Filter[5]	MH and HPS	100

Remarks: See remarks for tier and bollard lighting.

[1]This lighting, which is hidden within handrails, is greatly preferred over elevated lighting for illuminating stairways and walkways. Where possible, incandescent bug-light lamps or amber-tinted fluorescent tubes should be used.

[2]This louvered lighting is recessed at foot- to waist-level within walls and is greatly preferred over elevated lighting for illuminating stairways and walkways.

[3]Linear lighting comes encased in plastic strips and is also sold under the trade names Tivoli, Xanadu, Tracktube, Tubelite, and Step Lite. Yellow tubes can be used with this lighting to further reduce effects on sea turtles. Linear lighting mounted at foot-level along walking paths or stairways is greatly preferred over elevated lighting.

[4]A very good light source for beach steps and walkovers. This lighting can be customized for many applications. Red LEDs (light-emitting diodes) should be specified.

[5]This fixture can be equipped with a yellow, dichroic, band-pass filter. This application has been used by *Specified Lighting* (Appendix G).

Wall- and Ceiling-Mounted Downlighting

Used for safety and security along walkways, near doorways, on balconies and porches, and along stairways.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Lithonia Lighting	Gotham Incandescent C Series Downlighting (includes wall-, ceiling-, and pendant-mounted cylinders and cuboids)	incandescent	50–300
Voigt Lighting	Pragmatic Universal Indoor/Outdoor Downlights	incandescent	40–60
		LPS	35

Remarks: Matte-black nonreflective baffles are recommended. For high-elevation applications (*e.g.,* upper-story balconies) or applications near the beach, low-wattage bug-light lamps or LPS lamps are recommended.

Recessed, Ceiling Downlighting

Used for safety and security in place of floodlighting and globe lights. These fixtures are recessed into the soffit (positioned under eaves) or into porch and balcony ceilings.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Lithonia Lighting	Advantage Incandescent LPJ and LP Frame-in Modules	incandescent	75–150
"	Advantage Incandescent LICS, LICJ, and LICM Housings	incandescent	40–100
"	Gotham Incandescent: A, D, E, and R Series with black baffles	incandescent	100–200

Remarks: See remarks for wall- and ceiling-mounted downlighting.

Arm-Mounted and Pole-Top HID Cutoff Luminaires

Used for safety and security at parking areas, roadways, and other outdoor areas.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Lithonia Lighting	KSF: Arm-mounted Premium Cutoff, HID	HPS	70–1,000
		MH	100–1,000
		MV	100–1,000
"	KVS: Arm-mounted Square Cutoff, HID	HPS	150–1,000
		MH	175–1,000
"	KAS: Arm-mounted Rectilinear Cutoff, HID	HPS	70–1,000
		MH	100–1,000
"	KQS: Square Post-top Cutoff, HID	HPS, MH, MV	250–1,000
"	KKS: Square Post-top Cutoff HID	HPS	70–400
		MH	175–400
Quality Lighting	Design SND Arm-mounted Luminaire	HPS	400
		MH	400
"	Design SJ Sharp-cutoff Arm-mounted Rectilinear Luminaire	HPS	150–1,000
		MH	250–1,000
"	Design SNDY Post-top	HPS, MH	400
Sterner Lighting	Executive 20, 25, and 30	incandescent, HPS, MH	1,000 max.
"	Diplomat 20 and 25 (pole-top)	incandescent, HPS, MH	400 max.
"	LeBox (pole-top or wall- mount)	HPS, MH	1,000 max.

Remarks: These HID fixtures are not recommended for applications within 50 meters of a nesting beach or where luminaires are visible from a nesting beach. However, these cutoff luminaires are preferred to less directional luminaires (*e.g.,* globe-style, cube-style, and cobra-head lighting). The luminaires listed here have optional shields that can further reduce the light reaching the beach. Specific reflectors can also be used with each fixture to better direct light. Arm-mounted LPS fixtures are greatly preferred over HID fixtures for the same applications.

Arm-Mounted and Pole-Top LPS Cutoff Luminaires

Used for safety and security at parking areas, roadways, and other outdoor areas.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Voigt Lighting	Slimliner LPS[1]	LPS	35, 55, 90, 135, 180
"	Wideliner LPS	LPS	35, 55, 90, 135
"	SEPOL (*S*ea turtle *E*nvironment *P*rotective *O*utdoor *L*uminaire)[1]	LPS	18, 35, 55, 90, 135
Lithonia Lighting	KT: Arm-mounted Cutoff, LPS	LPS	90
Spaulding Lighting	Palomar LPS	LPS	35, 55, 90, 135, 180
"	Oakland LPS	LPS	35, 55, 90, 135, 180
"	Berkeley LPS	LPS	35, 55, 90, 135, 180
"	Phoenix LPS	LPS	35, 55, 90, 135, 180
"	Sunnyvale LPS	LPS	90, 135, 180
Quality Lighting	SM Series Arm-mounted Cutoff LPS	LPS	35, 55, 90, 135, 180
"	Designs SS/SE Rectilinear LPS	LPS	55, 90, 135, 180
Thomas Industries	Form Ten/LPS Rectilinear		
Gardco Lighting	Sharp Cutoff Luminaire[2]	LPS	90, 135, 180
Sterner Lighting	Softform Pacific LPS	LPS	90, 135
Solar Outdoor Lighting	Solar LPS[2]	LPS	18, 35,
C-Ran Corp.	Anytime Lighting, LPS[2]	LPS	18, 35

Remarks: These cutoff luminaires are preferred to less directional luminaires (*e.g.,* globe-style, cube-style, and cobra-head fixtures). Optional shields on some fixtures can further reduce the light reaching the beach. Specific reflectors can also be used with each fixture to better direct their light. Arm-mounted LPS fixtures are greatly preferred over HID fixtures for the same applications.

[1]Optional shields are available for these fixtures.
[2]These luminaires are powered by solar panels for use at remote locations.

LPS Ceiling-Mounted Fixtures

Used for safety and security at parking garages and large doorway and stairway areas.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Voigt Lighting	Slimliner LPS[1]	LPS	35, 55, 90, 135, 180
"	Under-decker LPS	LPS	35, 55, 90, 135, 180
"	SEPOL (*S*ea turtle *E*nvironment *P*rotective *O*utdoor *L*uminaire)[1]	LPS	18, 35, 55, 90, 135
"	Indoor/Outdoor Frugalume II	LPS	35, 55
Spaulding Lighting	Troy LPS Ceiling Mount Luminaire	LPS	18, 35, 55, 90, 135, 180
Thomas Industries, Benjamin Division	New Horizon/OLH Ceiling Mount Luminaire	LPS	35
"	Intensifier/IVP Ceiling Mount Luminaire	LPS	35, 55, 90, 135, 180

Remarks: Ceiling-mounted luminaires on upper stories facing the beach should be shielded or positioned so that their light is not visible from the beach.

[1]Optional shields are available for these fixtures.

LPS Wall-Mounted Fixtures

Used for safety and security at parking garages, walkways, and large doorway and stairway areas.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Lithonia Lighting	KTW: Wall Pak, LPS with Full Shield	LPS	90
"	TWH: Glass Refractor Wall Pak	LPS	35
Quality Lighting	Design NW-II: Aluminum Wall Pak	LPS	18
"	Design NW-IV: Aluminum Wall Pak	LPS	90, 135, 180
Spaulding Lighting	Mesa LPS Wall Pack	LPS	35, 55, 90
"	Phoenix LPS Luminaire, PWM	LPS	35, 55, 90, 135, 180
"	Scottsdale LPS Wall Mount	LPS	35, 55
Thomas Industries, Benjamin Division	LEO, OLB, and OLW Luminaires	LPS	18
"	OWP Wall Mount LPS	LPS	35, 55
Voigt Lighting	Pragmatic Universal Downlight	LPS	35
"	Little Protector Wall Mount	LPS	10, 18
"	Midas Touch Wall Mount[1]	LPS	18

Remarks: The light from these wall-mounted fixtures is typically poorly directed, but these fixtures are highly recommended when their light will not be directly visible from the beach. Small 10- and 18-watt LPS fixtures are greatly preferred to incandescent and HID luminaires for porches, balconies, and doorways on the beach side of buildings.

[1]Has an optional internal shield.

Floodlighting Fixtures, LPS and HID

Used for safety and security at large walkways, parking lots, road intersections, and other expansive areas.

Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Voigt Lighting	Wall-Most LPS Flood[1]	LPS	35, 55, 90, 135, 180
Sterner Lighting	Model 871, 872, 875, and 876 Area Lighting	HPS	250, 400, 1,000

Remarks: Floodlighting can be directed well. Floodlighting is properly directed if it faces away from the beach and is mounted at an elevated position facing downward rather than mounted low and facing upward. LPS fixtures are greatly preferred over HID fixtures for applications near nesting beaches. In all cases, care should be taken not to brightly illuminate buildings and other large objects visible from the nesting beach.

[1]This fixture has an optional internal uplight shield.

Motion-Detector Lighting

Used for safety and security at walkways, yards, doorways, stairways, and storage areas.

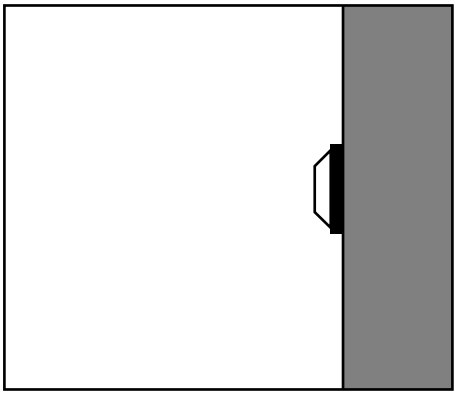
Manufacturer	Trade Name	Lamp Type	Lamp Wattage
Heath Zenith	Reflex Professional Motion Sensor Model SL 5314	incandescent	15–300
Intelectron	Motion Detector Conversion Kit Model BC 8950	incandescent	15–300
"	Motion Detector Security Light Model BC 8700 KW	incandescent	15–300

Remarks: Motion-detector lighting fixtures switch on when approached by moving objects and remain on for a specified time, which can be set at the fixture. This specified time should be 30 seconds or less for fixtures near nesting beaches. To reduce impacts to sea turtles to the greatest extent, yellow bug-light bulbs should be used with these fixtures. If floodlights are used, they should be directed away from the nesting beach.

APPENDIX E

Diagrams of common lighting fixtures showing mounting position, light distribution, and overall suitability for use near sea turtle nesting beaches. For purposes of recommending suitable mounting distances from nesting beaches, the crest of the primary dune is considered to be the landward limit of the beach. Fixtures are assessed for their suitability in minimizing direct and indirect lighting of the beach. For all fixtures, glowing portions of luminaires (including reflectors and globes) should not be visible from the nesting beach.

WALL–MOUNTED AREA LIGHTING



MOUNTING SUITABILITY:

Poor. Very poor when mounted on upper stories.

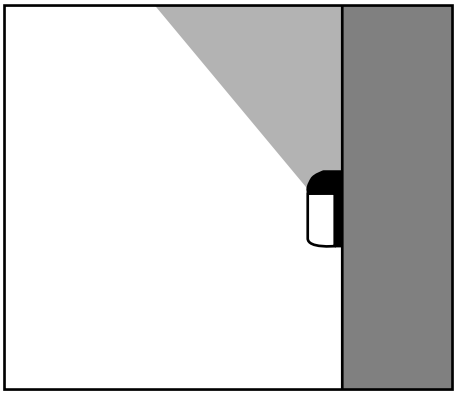
DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor. Not suitable for the beach sides of buildings.

WALL–MOUNTED AREA LIGHTING, "WALL PAK"



MOUNTING SUITABILITY:

Poor. Very poor when mounted on upper stories.

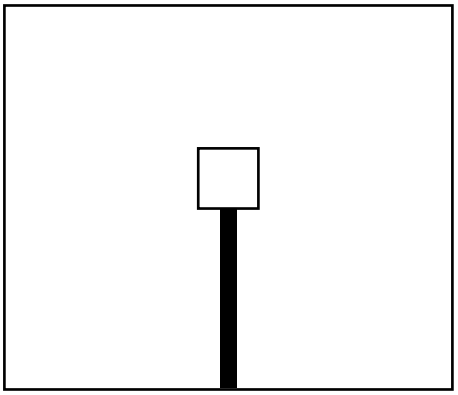
DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor. Not suitable for the beach sides of buildings.

DECORATIVE CUBE LIGHT



MOUNTING SUITABILITY:

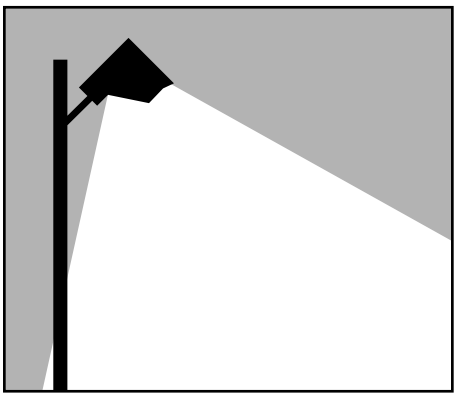
Fair if mounted at heights lower than 2 m. Poor if mounted higher.

DIRECTIONAL SUITABILITY:

Very poor.

OVERALL SUITABILITY:

Very poor. This fixture is difficult to shield and should not be used near nesting beaches.



POLE–MOUNTED FLOODLIGHTING WITH FULL VISOR

MOUNTING SUITABILITY:

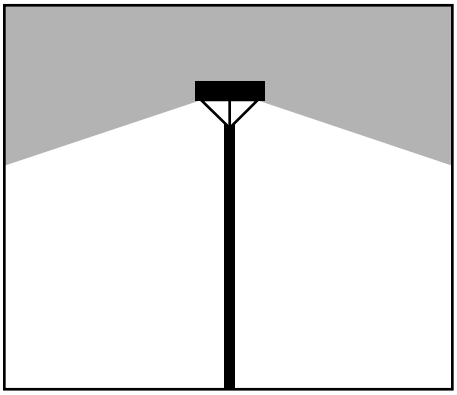
Good if directed downward and away from the beach.

DIRECTIONAL SUITABILITY:

Good.

OVERALL SUITABILITY:

Good if directed downward and away from the nesting beach and if light does not illuminate objects visible from the beach.



POLE–TOP–MOUNTED CUTOFF LIGHTING, "SHOEBOX" FIXTURE

MOUNTING SUITABILITY:

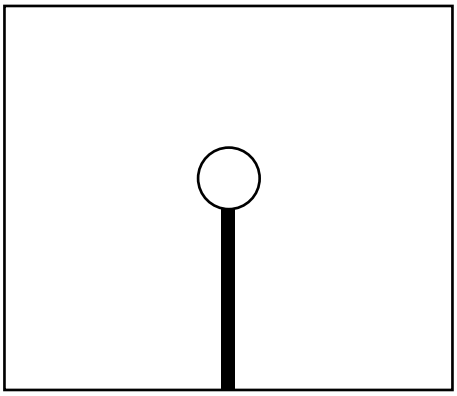
Good to poor, depending on mounting height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low.



DECORATIVE GLOBE LIGHT

MOUNTING SUITABILITY:

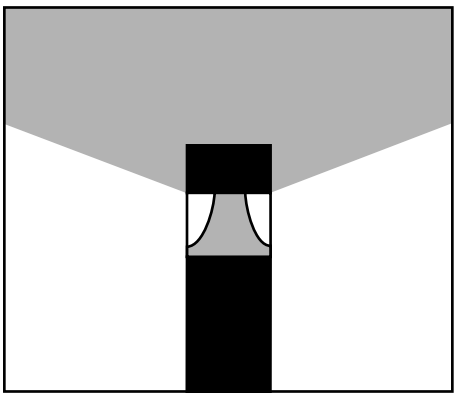
Fair if mounted at heights lower than 2 m. Poor if mounted higher.

DIRECTIONAL SUITABILITY:

Very poor.

OVERALL SUITABILITY:

Very poor. This fixture is difficult to shield and should not be used near nesting beaches.



LIGHTING BOLLARD WITH HIDDEN LAMP

MOUNTING SUITABILITY:

Good if mounting height is near 1 m.

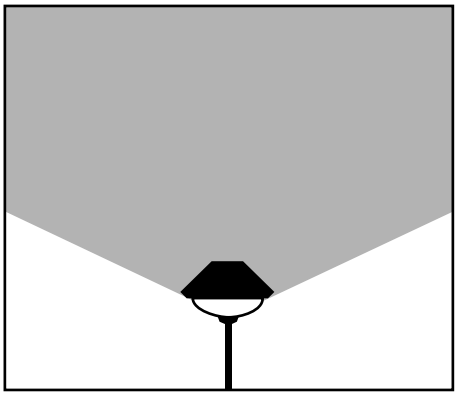
DIRECTIONAL SUITABILITY:

Poor to fair.

OVERALL SUITABILITY:

Fair. Good if additional shields on the beach side of the fixture are used.

LOW-LEVEL "MUSHROOM" LIGHTING



MOUNTING SUITABILITY:

Good if mounted at foot level.

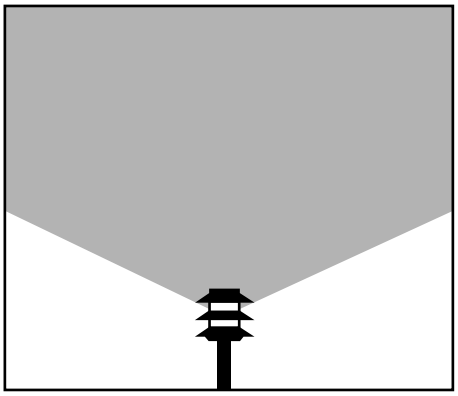
DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Fair. Good to excellent if used so that vegetation and topography block its light from the beach.

LOW-LEVEL "TIER" LIGHTING



MOUNTING SUITABILITY:

Good if mounted at foot level.

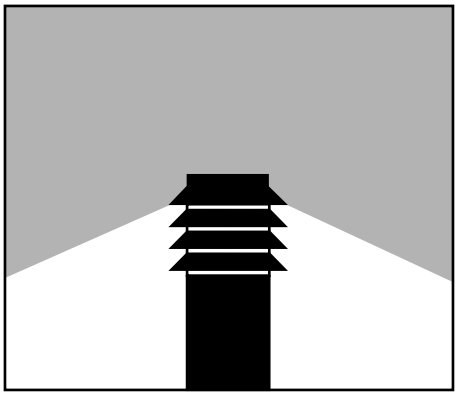
DIRECTIONAL SUITABILITY:

Poor but can be good if the fixture has louvers that eliminate lateral light.

OVERALL SUITABILITY:

Fair. Good to excellent if used so that vegetation and topography block its light from the beach.

LIGHTING BOLLARD WITH LOUVERS



MOUNTING SUITABILITY:

Good if mounting height is near 1 m.

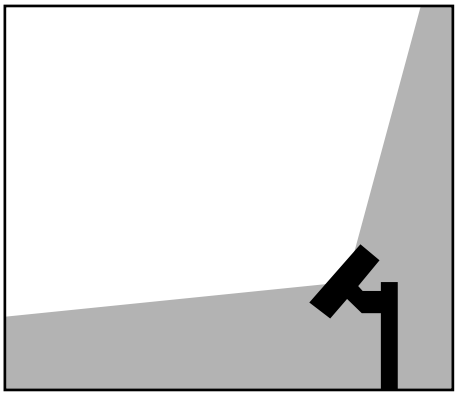
DIRECTIONAL SUITABILITY:

Good.

OVERALL SUITABILITY:

Good.

GROUND-MOUNTED FLOODLIGHTING



MOUNTING SUITABILITY:

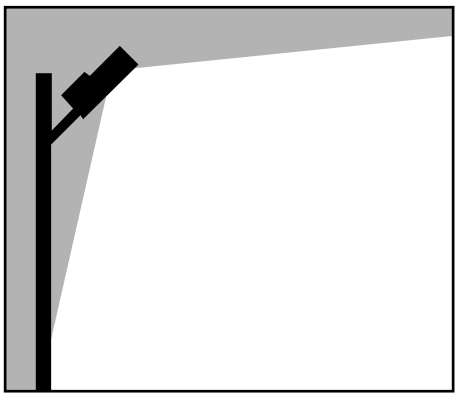
Poor, because of its upward aim.

DIRECTIONAL SUITABILITY:

Fair to good.

OVERALL SUITABILITY:

Fair to poor if directed away from the beach. Very poor if directed toward the beach.



POLE–MOUNTED FLOODLIGHTING

MOUNTING SUITABILITY:

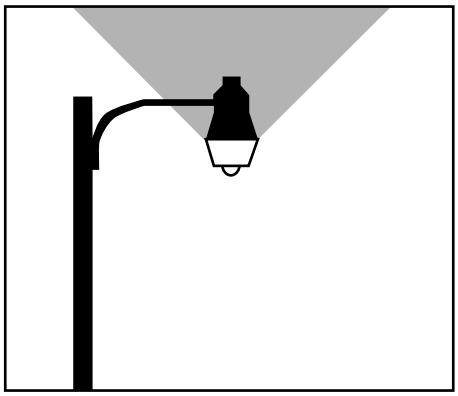
Fair if directed downward and away from the beach.

DIRECTIONAL SUITABILITY:

Fair to good.

OVERALL SUITABILITY:

Fair to good if aimed downward and directly away from the nesting beach and if light does not illuminate objects visible from the beach. Otherwise, poor to very poor.



ARM–MOUNTED AREA LIGHTING, "OPEN–BOTTOM" OR "BARN LIGHT" FIXTURE

MOUNTING SUITABILITY:

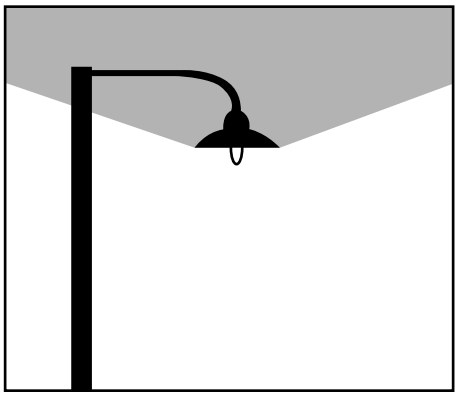
Poor to very poor, depending upon mounting height. Should not be mounted higher than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor if unshielded. Fair if shielded.

OVERALL SUITABILITY:

Poor.



ARM–MOUNTED AREA LIGHTING, DECORATIVE "PENDANT" FIXTURE

MOUNTING SUITABILITY:

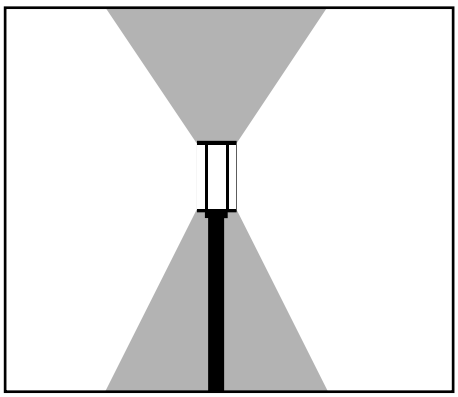
Poor to very poor, depending upon mounting height. Should not be mounted higher than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Difficult to shield properly.

OVERALL SUITABILITY:

Poor.



DECORATIVE "CARRIAGE" LIGHTING

MOUNTING SUITABILITY:

Fair if mounted at heights lower than 2 m. Poor if mounted higher.

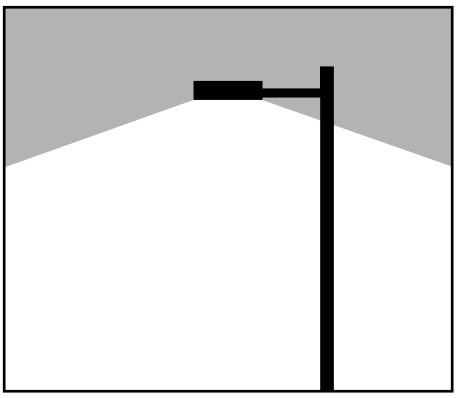
DIRECTIONAL SUITABILITY:

Very poor. Fair if properly shielded.

OVERALL SUITABILITY:

Poor.

ARM–MOUNTED CUTOFF LIGHTING, "SHOEBOX" FIXTURE



MOUNTING SUITABILITY:

Good to poor, depending on mounting height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

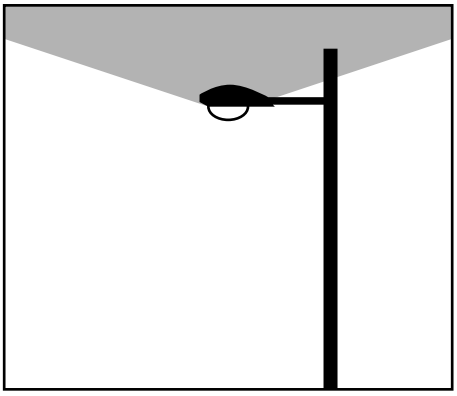
DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low and fixtures are aimed directly downward.

ARM–MOUNTED AREA LIGHTING, "COBRAHEAD" FIXTURE



MOUNTING SUITABILITY:

Poor to very poor, depending on mounting height. Mounting height should be no more than 5 m within 150 m of a nesting beach.

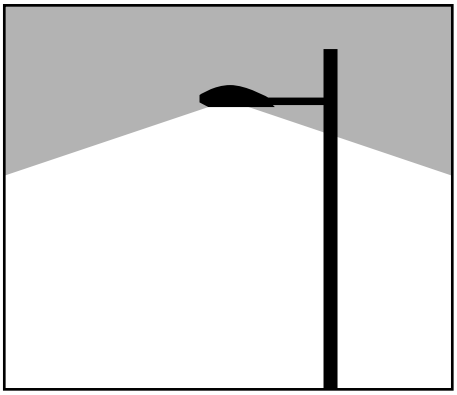
DIRECTIONAL SUITABILITY:

Poor. Difficult to shield properly.

OVERALL SUITABILITY:

Poor.

ARM–MOUNTED AREA LIGHTING, "FLAT–FACE" CUTOFF FIXTURE



MOUNTING SUITABILITY:

Good to poor, depending on pole height. Mounting height should be no more than 5 m within 100 m of a nesting beach.

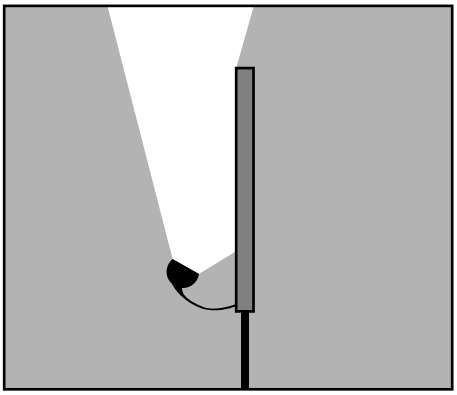
DIRECTIONAL SUITABILITY:

Fair to good, as determined by reflectors.

OVERALL SUITABILITY:

Fair to good when mounting heights are low.

SIGN LIGHTING, BOTTOM–UP STYLE



MOUNTING SUITABILITY:

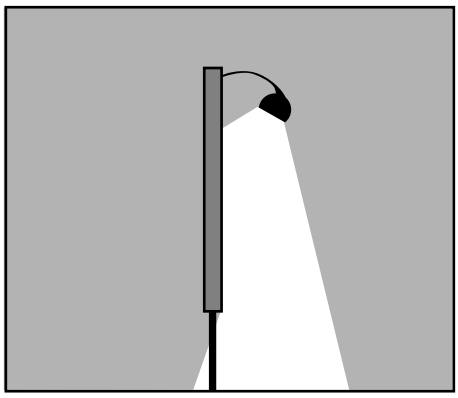
Poor, because of its potential for producing uplight scatter.

DIRECTIONAL SUITABILITY:

Poor to good.

OVERALL SUITABILITY:

Poor. Signs near nesting beaches should be lighted from the top down. In no case should lighted signs be visible from the beach.



SIGN LIGHTING, TOP–DOWN STYLE

MOUNTING SUITABILITY:

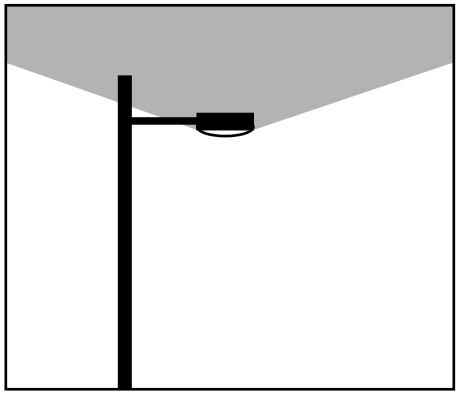
Good.

DIRECTIONAL SUITABILITY:

Poor to good.

OVERALL SUITABILITY:

Generally good if the sign is not visible from the beach and if the lighting is well aimed.



ARM–MOUNTED AREA LIGHTING, FIXTURES WITH REFRACTING GLOBES OR CONVEX LENSES

MOUNTING SUITABILITY:

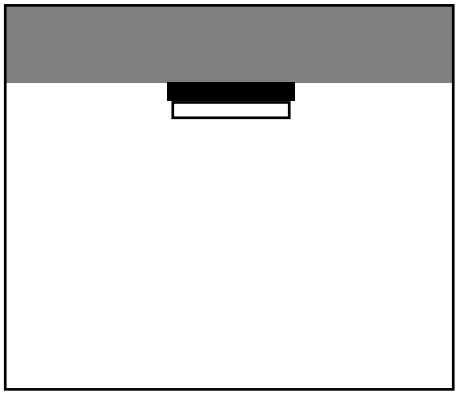
Poor to very poor, depending upon mounting height. Mounting height should be no more than 5 m within 150 m of a nesting beach.

DIRECTIONAL SUITABILITY:

Poor. Fair to good if shielded properly.

OVERALL SUITABILITY:

Poor.



CEILING–MOUNTED AREA LIGHTING, FIXTURES WITH REFRACTING GLOBES OR CONVEX LENSES

MOUNTING SUITABILITY:

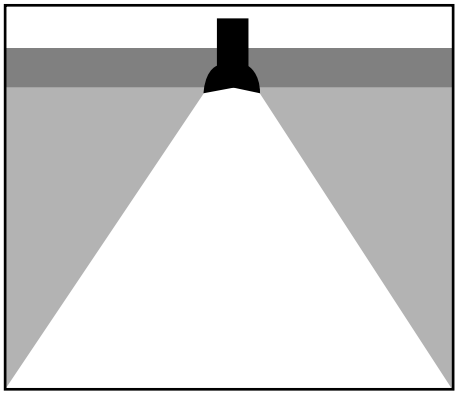
Poor if mounted on the beach sides of buildings or on upper stories. Good if shielded from the beach by buildings.

DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor to fair, depending upon mounting location.



CEILING–RECESSED DOWNLIGHTING WITH BAFFLES TO ELIMINATE LATERAL LIGHT

MOUNTING SUITABILITY:

Good to excellent when mounted in lower-story ceilings and soffits.

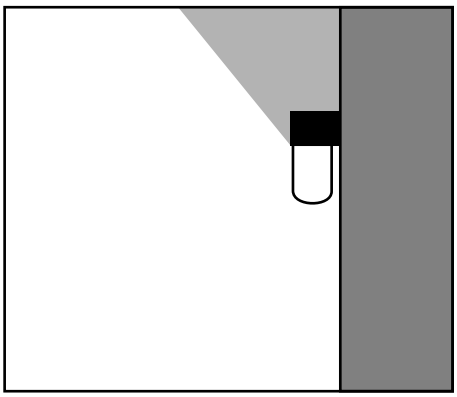
DIRECTIONAL SUITABILITY:

Excellent.

OVERALL SUITABILITY:

Good to excellent.

WALL–MOUNTED AREA LIGHTING, "JELLY–JAR" PORCH LIGHT FIXTURE



MOUNTING SUITABILITY:

Poor. Very poor when mounted on upper stories.

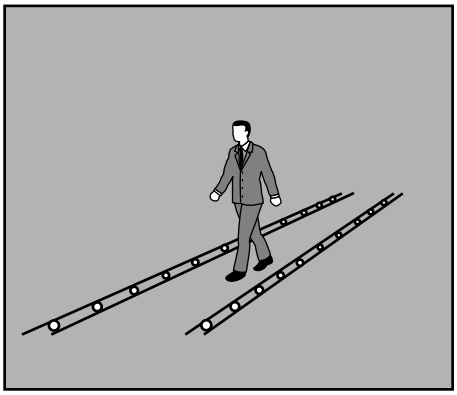
DIRECTIONAL SUITABILITY:

Poor.

OVERALL SUITABILITY:

Poor.

LINEAR TUBE LIGHTING



MOUNTING SUITABILITY:

Excellent if mounted at foot level.

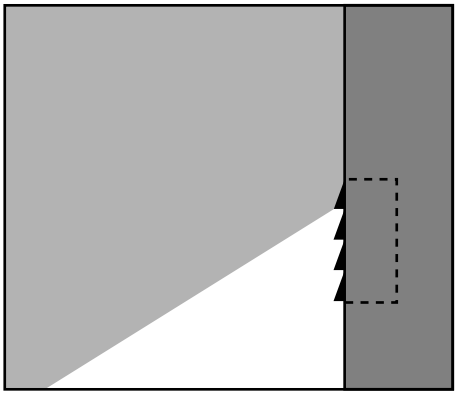
DIRECTIONAL SUITABILITY:

Fair to poor, but this lighting is of concern only if mounted high or if large numbers of high-wattage (>3 W) lamps are used.

OVERALL SUITABILITY:

Excellent if low-wattage strips are used sparingly in recessed areas.

LOUVERED STEP LIGHTING



MOUNTING SUITABILITY:

Excellent if mounted at foot level.

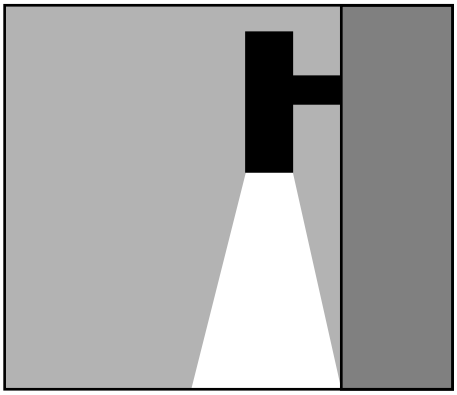
DIRECTIONAL SUITABILITY:

Excellent.

OVERALL SUITABILITY:

Excellent.

WALL–MOUNTED DOWNLIGHTING



MOUNTING SUITABILITY:

Good to excellent when mounted on lower-story walls.

DIRECTIONAL SUITABILITY:

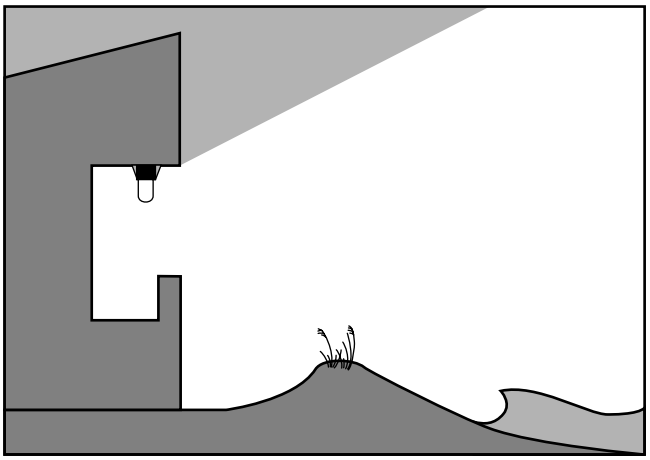
Excellent.

OVERALL SUITABILITY:

Good to excellent.

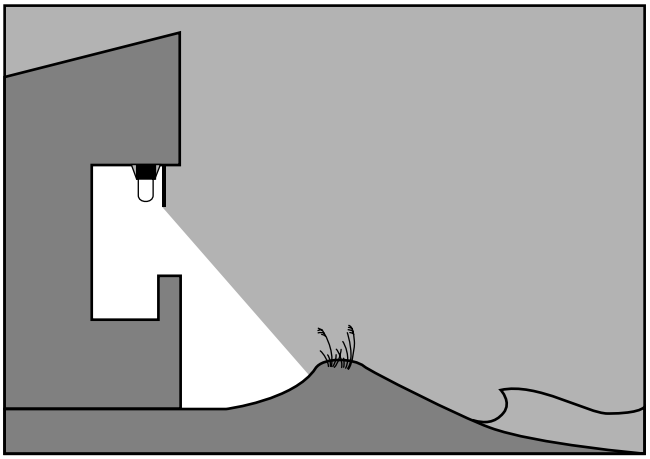
APPENDIX F

Diagrams depicting solutions to two common lighting problems near sea turtle nesting beaches: balcony or porch lighting and parking-lot lighting.



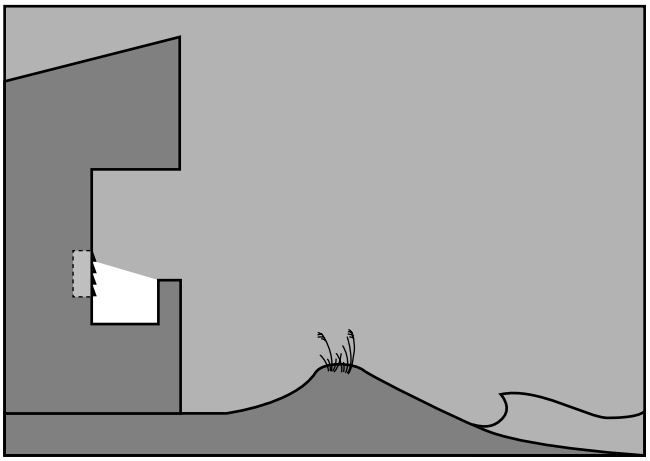
POOR

Poorly directed balcony lighting can cause problems on sea turtle nesting beaches.



BETTER

Completely shielding fixtures with a sheet of metal flashing can reduce stray light reaching the beach.

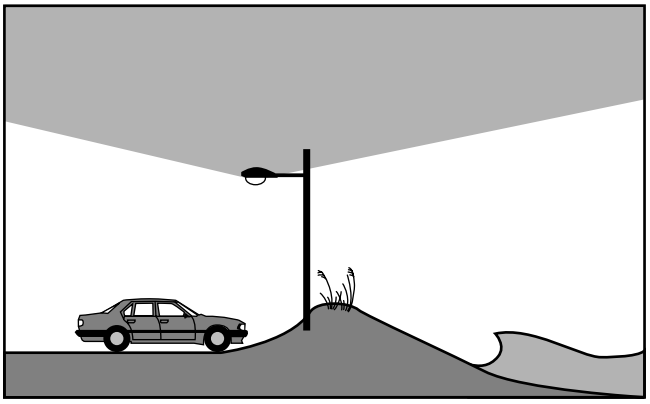


BEST

Louvered step lighting is one of the best ways to light balconies that are visible from nesting beaches.

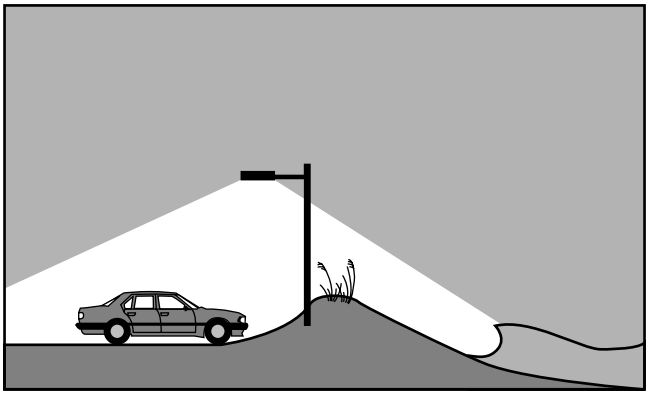
POOR

Poorly directed parking lot lighting can cause problems on sea turtle nesting beaches.



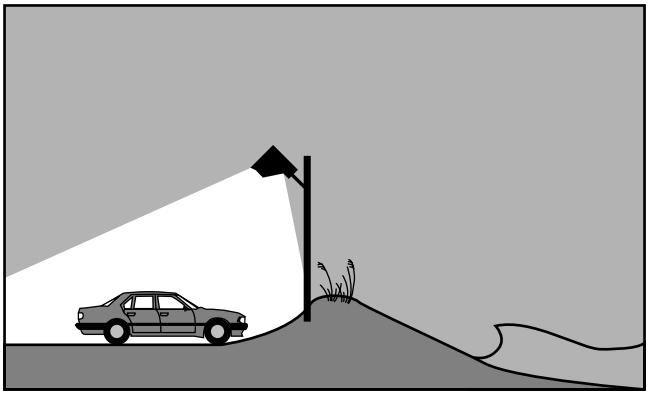
BETTER

Fixtures with 90°cutoff angles can reduce the amount of stray light reaching the beach.



MUCH BETTER

Fully hooded floods can direct light accurately and reduce stray light even more.



BEST

Low-mounted, louvered bollard fixtures are the best way to light parking lots near nesting beaches.