

## **ASSESSMENT REPORT 81**

### **Core Breeding Centre and Broodstock Maturation Centre Project Sea Dragon Pty Ltd**

March 2017

## Environmental Impact Assessment Process Timelines

Date	Progress stage
19/02/2016	Receipt of Notice of Intent
07/03/2016	Additional information requested
19/08/2016	NT EPA decision Environmental Impact Statement (EIS) issued
09/09/2016	Draft Terms of Reference (ToR) released for public comment
30/09/2016	Final ToR issued to Proponent
03/11/2016	Receipt of clause 14A notification
11/11/2016	Draft EIS released for public comment
23/11/2016	NT EPA clause 14A decision EIS issued
15/12/2016	NT EPA direction to prepare EIS Supplement issued
13/02/2017	EIS Supplement received
23/02/2017	NT EPA extends relevant period to 42 days
27/03/2017	Assessment Report issued



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27 March 2017

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## Abbreviations and glossary

Advisory bodies	Agencies having administrative responsibilities in respect of the proposed action
AHD	Australian Height Datum
ASX	Australian Stock Exchange
BMC	Broodstock Maturation Centre
BUA	Beneficial Use Area declared under the <i>Water Act</i>
CBC	Core Breeding Centre
D IPL	Department of Infrastructure, Planning and Logistics
Draft EIS	Draft Environmental Impact Statement
EA Act	<i>Environmental Assessment Act</i>
EAAP	Environmental Assessment Administrative Procedures
EIA	Environmental impact assessment
EIS	Environmental Impact Statement
Environment	All aspects of the surroundings of man including the physical, biological, economic, cultural and social aspects (Section 3 of the <i>Environmental Assessment Act</i> )
EPA	Environment Protection Approval under the <i>Waste Management and Pollution Control Act</i>
EPL	Environment Protection Licence under the <i>Waste Management and Pollution Control Act</i>
HDPE	High Density Polyethylene
NT EPA	Northern Territory Environment Protection Authority
PSD	Project Sea Dragon
Responsible Minister	Northern Territory Minister for Primary Industry and Resources
The Minister	Minister for Environment and Natural Resources
The Project	Core Breeding Centre and Broodstock Maturation Centre
The Proponent	Project Sea Dragon Pty Ltd
the/this Report	This Assessment Report 81, for the Core Breeding Centre and Broodstock Maturation Centre
The Supplement	The Supplement to the draft EIS
ToR	Terms of Reference
WMPC Act	<i>Waste Management and Pollution Control Act</i>

## Units and symbols

%	percent
ha	hectare
kL	kilolitre
kL/yr	kilolitre per year
km	kilometre
km/hr	kilometres per hour
km <sup>2</sup>	square kilometre
L	litres
L/s	litres per second
m	metre
m <sup>2</sup>	square metre
m <sup>3</sup>	cubic metre
mg/L	milligrams per litre
ML	million litres
MW	Megawatt
mm	millimetre
$\delta^{15}\text{N}$	measure of the ratio of stable Nitrogen isotopes $^{15}\text{N}:^{14}\text{N}$

## Summary

Environmental impact assessment (EIA) is a process for identifying the potential environmental impacts and risks of a proposed action, evaluating the significance of those impacts and risks and determining appropriate avoidance, minimisation/mitigation measures to reduce those impacts and risks to acceptable levels. This Assessment Report (the Report) examines the EIA of the Core Breeding Centre and Broodstock Maturation Centre (the Project), proposed by Project Sea Dragon Pty Ltd (the Proponent).

The Project is one component of the larger Project Sea Dragon (PSD), with six other key components across the Northern Territory and Western Australia including hatchery, grow-out, feed mill, processing, founder stock and export facilities.

The Proponent is proposing to establish a Core Breeding Centre (CBC) and Broodstock Maturation Centre (BMC) for prawns on vacant unregistered Crown land at Point Ceylon, on the southern side of Bynoe Harbour. The CBC is for the development, production and selection of high performing prawn stock. The top performing individual prawns are transferred to the BMC to produce commercial numbers of broodstock for use in a hatchery. The total development footprint for the Project at full scale will be approximately 152 ha. Infrastructure will be scaled up in stages over time to support the larger PSD as required.

The Northern Territory Environment Protection Authority (NT EPA) has produced this Report as advice to the Northern Territory Ministers for Environment and Natural Resources (the Minister), and Primary Industry and Resources (the responsible Minister) to be taken into account in decisions made by the Northern Territory Government. The responsible Minister, taking into consideration this Report, will decide whether to grant an aquaculture licence for the construction and operation of the Project under the *Fisheries Act* and if so, the conditions that may be applied. This Report provides advice and recommendations; it does not provide an environmental approval.

The NT EPA decided that the Project required assessment at the level of an Environmental Impact Statement (EIS) under the *Environmental Assessment Act* (EA Act). The NT EPA initially identified the following potential impacts and risks that contributed to the decision to assess the Project at the level of an EIS:

- potential impacts from the discharge of waste from the prawn farming activities into receiving waters considered to be of high environmental value
- the significant management requirements for solid and liquid waste and the potential detrimental effects of inappropriate management practices
- potential impacts and risks associated with securing an adequate fresh water supply for the site
- public interest.

The Proponent advised the NT EPA of proposed alterations to the Project during the EIA process. The alterations were:

- an increase in overall project footprint from 132.32 ha to 151.65 ha
- removal of groundwater and desalination plant as options for fresh water supply
- removal of ensiling (dissolving in organic acids) as an option for the management of biological waste
- confirmed nominal life of Project of 30 years.

Information requirements based on potential environmental impacts and risks were described in the final Terms of Reference for the Project and the Proponent submitted its draft EIS to address these requirements. The Proponent prepared a Supplement to the draft EIS to address respondents' issues and concerns following public review of the draft EIS.

In making this Report, the NT EPA had regard to the information provided by the Proponent, submissions on the draft EIS and Supplement, advice from specialists from across the NT Government, and relevant guidelines and standards. The NT EPA assessed the Project against the NT EPA's objectives for the key environmental values of: marine and estuarine water quality, including ecosystem health; groundwater; and recreation and aesthetics.

While the NT EPA considers the potential impacts and risks have been adequately identified and are relatively well-understood, there is inherent uncertainty in predicting with any great precision the magnitude of impacts in impact assessment due to limitations of numerical models and the complexity and variability of natural systems. In such situations, it is important to acknowledge that uncertainty remains and manage this with suitably robust monitoring and management frameworks that can respond with appropriate mitigation and contingency measures and can accommodate new knowledge and understanding as it becomes available.

The NT EPA acknowledges some uncertainty with respect to the nature and extent of the area of influence and potential impacts of operational effluent discharge on water quality in Wheatley Creek. This uncertainty is largely due to the high variability in aspects of the receiving environment including the macro-tidal waters of the estuary, a lack of understanding of this variability and the likely response of the environment to threats and change. Such variability presents challenges for baseline data collection, impact prediction, monitoring and management.

The Proponent has committed to continuing data collection prior to Project commencement and operation, to develop a significant baseline dataset and build its understanding of background conditions in the receiving environment of the Project area. The baseline dataset will form the basis for refinement of water quality modelling, and comprehensive monitoring and mitigation programs that will underpin environmental management of the site.

The NT EPA has made recommendations in this Report for improvements in water quality management and monitoring. The recommendations, if incorporated into relevant conditions and actioned by the Proponent, should see acceptable environmental outcomes for the environmental values of Bynoe Harbour.

Notwithstanding the above, the NT EPA considers that the Project can be managed in a manner that is highly likely to meet the NT EPA's objectives and avoids significant or unacceptable environmental impacts. The NT EPA makes 6 recommendations as an outcome of the EIA of the Project. These recommendations are primarily for the Proponent to address when entering into the next stage of the Northern Territory approval process and for the implementation of the proposed action. The NT EPA considers it essential that the commitments, safeguards and recommendations detailed in the final EIS, this Report, and in the final environmental management plan and underlying strategies, approved by the NT EPA and the Agency responsible for administering the *Fisheries Act*, are implemented and subject to regular reporting and compliance auditing.

## List of recommendations

### Recommendation 1

The Proponent shall ensure that the Core Breeding Centre and Broodstock Maturation Centre is implemented in accordance with all environmental commitments and safeguards:

- identified in the final Environmental Impact Statement for the Core Breeding Centre and Broodstock Maturation Centre (draft Environmental Impact Statement and Supplement)
- recommended in this Assessment Report 81.

The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are commitments made by the Proponent.

### Recommendation 2

The Proponent shall provide written notice to the Northern Territory Environment Protection Authority and the responsible Minister if it alters the Core Breeding Centre and Broodstock Maturation Centre in such a manner that the environmental significance of the action may have changed, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

### Recommendation 3

In consultation with the NT EPA, the Proponent shall enhance the baseline water quality monitoring program by:

- increasing spatial representation of sites in Bynoe Harbour
- accounting for natural variation in receiving waters
- including sediment sampling and biological indicators of nutrient impacts.

The water quality monitoring program should be peer reviewed by an appropriately-qualified independent professional, and implemented to the satisfaction of the NT EPA.

### Recommendation 4

The Environment Protection Licence under the *Waste Management and Pollution Control Act* shall include conditions that will:

- define appropriate site-specific trigger values and water quality objectives
- improve confidence in model predictions
- limit discharges of effluent into Wheatley Creek to the high to mid tide
- require a diffuse discharge system to aid dilution in the event that water quality objectives cannot be met
- restrict daily discharge rates to a maximum of 3 ML/day for stage 1 and 12.5 ML/day for the full scale Project.

The licence shall apply for five years at which time it will be reviewed.

### Recommendation 5



The Proponent will be required to apply for:

- an environment protection approval (EPA) under the *Waste Management and Pollution Control (WMPC) Act* for the construction of the Project potentially including an incinerator and waste transfer stations
- an environment protection licence (EPL) under the WMPC Act for the ongoing operation of the incinerator facility
- an EPA and an EPL for construction and operation of operational effluent settlement ponds and the discharge of operational effluent to Wheatley Creek.

#### Recommendation 6

The Proponent taking the proposed action is wholly responsible for implementation of all conditions of approval and mitigation measures contained in the Environmental Management Plan and must ensure all staff and contractors comply with all requirements of conditions of approval and mitigation measures contained in the Environmental Management Plan and sub-plans.

In preparing the Environmental Management Plan, for construction and operation, the Proponent should include any additional measures for environmental protection and monitoring contained in this Assessment Report 81.

The Environmental Management Plan should include management strategies for:

- erosion and sediment control
- land and soils
- acid sulfate soils
- vegetation
- weeds and pests
- fauna
- surface water
- groundwater
- waste
- air and noise
- effluent
- hazardous materials
- traffic
- social impact
- cultural heritage
- decommissioning.

The Proponent shall provide public access to both the Environmental Management Plan and a reporting mechanism to inform compliance with the

**plans. An independent audit of compliance against the Environmental Management Plan shall be conducted at the end of five years after commencement of the Project and reported to the Northern Territory Environment Protection Authority and Department of Primary Industry and Resources.**

# 1 Introduction

Project Sea Dragon Pty Ltd (the Proponent), proposes to develop and operate the Core Breeding Centre and Broodstock Maturation Centre (the Project) at Point Ceylon, Bynoe Harbour, approximately 42 km (120 km by road) south-west of Darwin and 22 km east of Dundee Beach. The Project has been assessed by the Northern Territory Environment Protection Authority (NT EPA) at the level of Environmental Impact Statement (EIS) under the *Environmental Assessment Act* (EA Act).

The NT EPA has prepared this Assessment Report (this Report) in accordance with section 7(2)(g) of the EA Act and clause 14(3) of the Environmental Assessment Administrative Procedures (EAAP). The purpose of this Report is to ensure that matters potentially affecting the environment to a significant extent are fully examined and reported. This Report is provided to the Northern Territory Minister for Environment and Natural Resources (the Minister) and the Minister for Primary Industry and Resources (the responsible Minister) to be taken into account in decisions made by the Territory Government. It is not intended to provide an environmental approval.

## 1.1 Environmental impact assessment process

Environmental Impact Assessment (EIA) is the process for identifying the potential environmental impacts and risks of a proposed action, evaluating the significance of those impacts and risks and determining appropriate avoidance, minimisation/mitigation and offset measures to reduce those impacts and risks to acceptable levels. The main purpose of the EIA is to inform decision-makers of the potential impacts and risks of a proposed action before any decisions are made and to engage and inform the public in the EIA process.

Through the assessment of the potential environmental impacts and risks of the Project, the Proponent must demonstrate:

- the potential impacts and risks can be satisfactorily managed within acceptable levels, e.g. impacts would not result in significant long-term or irreversible environmental detriment
- the effectiveness/feasibility of management measures in a precautionary/risk management framework
- that the assessment gives weighted consideration to:
  - values, potential impacts and risks
  - the likelihood of success of preventative actions and remedial measures
  - the validity and comprehensiveness of programs established to provide ongoing measures of the environmental effects of the Project.

The assessment of potential impacts and risks can be more reliably evaluated where there is a substantial baseline of relevant information. Where this information is limited or not available, assessment is inevitably constrained and less precise. In the absence of sufficient baseline information, and in keeping with the objectives of the *Northern Territory Environment Protection Authority Act* to promote ecologically sustainable

development, the NT EPA adopts the precautionary principle.<sup>1</sup> If potential impacts are understood with a reasonable level of certainty, monitoring programs can be better informed to detect impacts, and adaptive management measures can be more effectively targeted to address those impacts.

The legislation establishing the framework to undertake the EIA process in the Northern Territory is the EA Act administered by the NT EPA.

## 1.2 Environmental impact assessment chronology

The NT EPA received notification under the EA Act of the Project on 19 February 2016 and, following an NT EPA request for further information, decided that the Project required assessment at the level of an EIS on 19 August 2016. The NT EPA issued the final Terms of Reference and directed the Proponent to prepare its draft EIS on 30 September 2016.

The Proponent advised the NT EPA of proposed alterations to the Project on 3 November 2016. The NT EPA decided that the environmental significance of the Project remained unchanged and that the Project would continue to be assessed at the level of an EIS.

The draft EIS for the Project underwent a four week public exhibition period commencing 11 November 2016. The EIS documentation is available on the NT EPA website.

Thirteen submissions on the draft EIS were received from Government agencies and four from members of the public. All submissions were individually forwarded to the Proponent as they were received.

On 15 December 2016, the delegate of the NT EPA directed the Proponent to produce a Supplement to the draft EIS to take account of the written public comments. The Supplement becomes part of the draft EIS it supplements and is collectively referred to as the EIS. The NT EPA received the Supplement on 13 February 2017.

The making of this Report and providing it to the Minister marks the completion of the examination of the EIS by the NT EPA. The EIA chronology and EIS, and supporting documents, can be viewed on the Core Breeding Centre and Broodstock Maturation Centre project page on the NT EPA website at: <https://ntepa.nt.gov.au/environmental-assessments/register/sea-dragon-breeding-centre>.

## 1.3 Approval and regulatory framework

The Project will require approval and regulation by the Northern Territory Government. The framework for approval and regulation of the Project is provided at Chapter 4 of the draft EIS and is summarised below, with an emphasis on the obligations and requirements of the Northern Territory Government.

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<sup>1</sup> Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

- (a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- (b) an assessment of the risk-weighted consequences of various options.

The NT EPA provides this Report to the Minister. The Minister is required to give a copy of this Report to the responsible Minister, together with any written comments made by the Minister in relation to this Report. The Minister has reporting obligations to the NT EPA under section 8B of the EA Act, if the Minister makes a written comment in relation to this Report.

The responsible Minister, taking into consideration this Report, will then decide whether to grant an aquaculture licence for the Project under the *Fisheries Act* and if so, the conditions that may be applied. The *Fisheries Act* is the primary legislation for the construction and operation of an aquaculture facility in the Northern Territory. Section 8A(2) of the EA Act requires the responsible Minister to give the NT EPA notice of the decision as soon as practicable, but within seven days, after making the decision. Alternatively, if the decision by the responsible Minister is contrary to this Report, the responsible Minister must comply with reporting obligations to the NT EPA and the Legislative Assembly in accordance with section 8A(3) of the EA Act.

### 1.3.1 Scope of the assessment

The NT EPA assessed the potentially significant environmental impacts and risks associated with the construction, operation and decommissioning of the Core Breeding Centre (CBC) and Broodstock Maturation Centre (BMC), in accordance with requirements under the EA Act.

The matters relating to the environment the NT EPA considered necessary to be dealt with in the EIS for the Project were identified in the Terms of Reference (NT EPA 2016) in accordance with clause 8(3) to (6) of the Environmental Assessment Administrative Procedures.

This Project assessment does not include an assessment of other components associated with Project Sea Dragon, such as the Legume grow-out facility, hatchery, processing facility or export facilities, which have been, or will be, assessed by the NT EPA or other government jurisdictions in accordance with legislated requirements.

### 1.3.2 Key regulatory instruments

#### ***Fisheries Act***

The *Fisheries Act* provides for the regulation, conservation and management of fisheries and fishery resources so as to maintain their sustainable utilisation. The Proponent requires an aquaculture licence to operate the CBC and BMC at Point Ceylon. An Environmental Management Plan (EMP) is required as part of the application process and the operation of the farm must be in accordance with the approved EMP. While a broad range of aspects can be addressed in the EMP, the Act regulates only those aspects of the environment directly associated with the activities related to aquaculture. The Department of Primary Industry and Resources (DPIR) administers the *Fisheries Act*.

#### ***Waste Management and Pollution Control Act***

The activity proposed is regulated under the *Waste Management and Pollution Control Act* (WMPC Act), which is administered by the NT EPA. Activities that require environment protection approval include “Constructing, installing or carrying out works in relation to premises, other than sewage treatment plants, for the storage, re-cycling, treatment or disposal of listed wastes on a commercial or fee for service basis.” Listed wastes as defined under Schedule 2 of the *Waste Management and Pollution Control (Administration) Regulations* generated by the Project may include:

- prawn tank/raceway sediment and detritus

- prawn effluent and residues including water and soil contaminated with the animal “residue” – prawn faeces, prawn moult etc.

The Proponent may require an approval/licence under the WMPC Act for the following activities on the site:

- the construction and operation of a dedicated area to store and treat pond sludge, which contains prawn effluent and prawn detritus
- the construction and operation of an area for the collection of waste oils, tyres and used lead acid batteries
- the construction and operation of an incinerator for the destruction of reject prawns
- the discharge (or flow through) of aquaculture waste water through settlement ponds into Wheatley Creek.

The Proponent will be required to apply for:

- a) an environment protection approval (EPA) for the construction of the project potentially including pond waste storage facilities, waste transfer stations and incinerator
- b) an environment protection licence (EPL) for the ongoing operation of the facility with respect to the management of listed wastes.

It is expected that an EPL will be required for the Project and regulation of the waste water discharge will be included. Therefore, a waste discharge licence under the *Water Act* is unlikely to be required for the Project.

### ***Crown Land Act***

NT Portion 3192 is currently vacant unregistered Crown land managed by the Northern Territory Government.

The *Crown Land Act* provides for the management, occupation, use and development of Crown land in the Territory. The Proponent has lodged an application for secure tenure of the parcel proposed to be developed, under section 12(3) of the *Crown Land Act*. A seabed lease to permit the construction and operation of the seawater intake pipeline is also proposed to be acquired under the *Crown Land Act*.

## **2 Project**

### **2.1 Proponent**

The Proponent is Project Sea Dragon Pty Ltd which is a wholly owned subsidiary of Seafarms Group Limited (Seafarms), an Australian Stock Exchange (ASX) listed company holding separate subsidiary companies operating in emerging, non-conventional commodities areas - aquaculture, carbon and environmental offsets. These companies are Seafarms Operations Limited, Seafarms Queensland Pty Ltd and CO2 Australia Limited.

Seafarms is Australia’s largest prawn aquaculture enterprise and is currently the largest producer of farmed prawns in Australia with existing operations in Queensland at Innisfail, Cardwell and Ingham.

## 2.2 Project description

A detailed description of the Project is presented in Chapter 2 of the draft EIS. The Proponent is proposing to establish a Core Breeding Centre (CBC) and Broodstock Maturation Centre (BMC) for prawns at Point Ceylon, Bynoe Harbour.

The CBC is to be used for the development, production and selection of high performing prawn stock. The top performing individual prawns would then be transferred to the BMC to produce commercial numbers of broodstock for use in a hatchery. Prawns from the hatchery would then be transported to the proposed grow-out facility at Legune Station.

The Project is proposed to be developed in stages with (nominally) four stages of development of the BMC and three stages of CBC for the Project to reach full scale. A staged approach to the Project is proposed to allow for gradual expansion of infrastructure as Specific Pathogen Free families are produced from the CBC; and as demand increases for small post-larvae for the proposed grow-out facility at Legune Station. Progress of the Project to full-scale will depend on realisation of future stages of the Legune grow-out facility, which will depend on separate assessment and approval processes.

Importantly, this assessment was conducted on the full-scale Project development footprint.

### 2.2.1 Relationship to larger project

The Project is one component of the larger Project Sea Dragon (PSD), with six other key components across the Northern Territory and Western Australia (WA). These are:

- Founder Stock Centre and Back-up Breeding Centre (Exmouth, WA)
- Commercial Hatchery (Darwin region, NT) (to be assessed through a separate Notice of Intent)
- Stage 1 Legune Grow-out Facility (Legune Station, NT) (subject of a separate EIA process)
- Processing Plant (Kununurra, WA)
- Feed mill (Kununurra, WA)
- Export Facility (Initial stage(s) - Wyndham, WA. Potential future stages - Darwin, NT).

### 2.2.2 Project location

The Project is to be located at Point Ceylon on the southern side of Bynoe Harbour approximately 42 km (120 km by road) south-west of Darwin and 22 km east of Dundee Beach. The site is unzoned, unregistered Crown land located between the localities of Dundee Downs and Bynoe, which are approximately 5 km to the west and east respectively. Access to the site would be via Fog Bay Road.

Figure 1 and Figure 2 show the Project's location in relation to these features.

### 2.2.3 Project footprint

The CBC and BMC are located on the same site but are physically separated to assist in the management of biosecurity.

Seawater intake infrastructure, including seawater storage ponds, is located on the northern end of Point Ceylon, immediately adjacent to Bynoe Harbour where the seawater intake pipelines arrive on-shore.

The discharge water settlement ponds for both the CBC and BMC are located on the southern end of the site and adjacent to the waste water release point located on Wheatley Creek.

A number of common facilities are centrally located between the CBC and BMC and will form the entry point to the site.

The entire parcel is 1997 ha, however the Project footprint is approximately 152 ha with the residual area to remain as remnant native vegetation. A 10 ha buffer has been included in the Project footprint to allow for variations to the final design as well as an allowance for a wider construction footprint.

#### 2.2.4 Land use history

The site is currently used by the public for recreational fishing and hunting. There are a number of tracks providing access and an open sided shack. No other activities are known to occur on the site.

Around the 1990s, an experimental Barramundi farm was established at Point Ceylon. The proprietors of that development formed the existing single access track from Fog Bay Road. Farm infrastructure including freshwater bores, concrete foundations, earth wall ponds and a dump site remain.

A land-based aquaculture project at Point Ceylon was proposed by Suntay Aquaculture Pty Ltd (Suntay) and assessed under the EA Act in 2003. Suntay did not proceed with the project and the Crown Lease Term lapsed.



Figure 1 Location of the Project site (from draft EIS, Chapter 1, Figure 1-1)



Figure 2 Project site in the local context (from draft EIS, Chapter 1, Figure 1-2)



Figure 3 Project layout (from draft EIS, Chapter 1, Figure 1-4)



### 2.2.5 Core Breeding Centre (CBC)

The CBC will be used for the genetic development, production and selection of high performing Specific Pathogen Free prawns. At full scale the CBC will consist of 128 raceways (each raceway is 500 m<sup>2</sup>, 1.5 m deep) and associated infrastructure with capacity to house 400 prawn families. The CBC will be stocked over a number of years with prawns sourced from the Founder Stock Centre in Exmouth, Western Australia.

The CBC will supply the BMC with suitable numbers of post larval prawns for the commercial development of broodstock numbers.

### 2.2.6 Broodstock Maturation Centre (BMC)

The BMC will be used to grow selected post larval prawns supplied from the CBC to breeding maturity. The BMC will be responsible for the production of commercial numbers of spawners and their mates for a commercial hatchery.

At full scale the BMC will consist of 192 raceways and associated infrastructure and produce 700 male and 700 female prawns (per stage) each week.

### 2.2.7 Seawater supply

Seawater for the Project will be pumped approximately 2 km from the 10 m depth contour in Bynoe Harbour to onshore storage ponds at Point Ceylon via two nominal 450 mm high-density polyethylene (HDPE) pipelines. Stage 1 will require approximately 2200 kL of seawater per day. Two more pipes will be added at later stages and at full scale, the expected maximum daily seawater intake volume for both the breeding and maturation centres would be 12 400 kL. The seawater intake point will be screened with mesh which will be appropriately sized to prevent hatchling turtles or juvenile sawfish becoming entrapped.

Seawater would be filtered prior to storage to remove coarse particles. These solids would be returned via pipe to Bynoe Harbour with approximately 5% (620 kL) of the total seawater intake.

Sixteen seawater storage ponds are proposed for the northern end of Point Ceylon where the seawater intake pipeline arrives onshore (Figure 3). The ponds would allow for approximately 62 200 kL storage of seawater at full scale (or 5 days average daily demand) and some settling out of sediments.

Two HDPE pipelines will deliver seawater from the storage ponds to the CBC and BMC for further treatment and use.

### 2.2.8 Freshwater supply

Freshwater for construction and operational use will be sourced from a combination of rainwater capture on-site and external commercial suppliers.

The Proponent estimates that 750 kL of freshwater will be required for each stage of construction (e.g. concrete batching, dust suppression) and will be supplied by a commercial supplier. 4180 kL/yr of freshwater will be required for ongoing operation of the Project (e.g. potable use, facility cleaning) and will be sourced from a combination of rainwater capture and commercial supply.

One 72 kL rainwater tank will be installed at each stage of the Project (i.e. 8 tanks in total with 576 kL of storage capacity at full scale). Given the freshwater demand of the Project and limited recharge during the Dry season, the Proponent expects approximately two to two and a half deliveries of freshwater by truck each week during the Dry season.

### 2.2.9 Discharge water

During stage 1, the Project is expected to discharge approximately 2200 kL/day of waste water into Wheatley Creek, at the southern end of Bynoe Harbour, via settlement ponds and an open channel. At full scale, the waste water discharge volume is expected to be 12 440 kL/day.

The settlement ponds would allow for a minimum 60-hour residence time to reduce levels of nutrients and suspended sediments in the waste water prior to discharge. Sixteen settlement ponds will have a total storage capacity of 37 223 kL. Stop logs on settlement ponds would restrict discharge to mid to high tide in stage 1. A series of release control ponds are proposed for later stages of the Project, if required, to provide a holding area until water can be discharged at mid to high tide.

Waste water would be discharged into Wheatley Creek via a gravity fed, rip-rap lined channel over an embankment with rip-rap or a rock mattress constructed to the low tide mark to prevent scouring.

### 2.2.10 Waste management

General solid wastes, consisting of domestic and consumable-related waste, produced by the Project will be consolidated on-site at a Waste Transfer Facility before being transported off-site. The Proponent estimates 156 m<sup>3</sup> of general waste will be produced each year of operation.

Hazardous wastes will be stored at a Hazardous Waste Facility before being transported off-site. The Proponent expects minimal amounts of hazardous waste to be produced with 120 kL of grease trap waste and sewage sludge per year the major contributor.

Sewage will be managed onsite at each facility via septic tanks. The Proponent estimates 6909 L of sewage will be produced each day. Treated sewage effluent will be disposed to land via trenched absorption beds.

Biological waste (i.e. prawn bodies) will either be incinerated onsite via a dual-chamber diesel-fired incinerator or transported off-site for disposal. The Proponent estimates 53.4 tonnes per year of mortalities will require disposal. Incineration will generate ash at a rate of approximately 1 – 3% of mass incinerated and will be disposed of off-site.

Sludge removed from seawater storage ponds, discharge water settlement ponds and release control ponds will be dried in a designated area and used on-site as top dressing. The Proponent estimates 105.3 tonnes per year of sludge will be removed from the ponds.

### 2.2.11 Power supply

Power is to be generated onsite via diesel powered generators with a full scale capacity of 6 MW (with associated 210 kL of fuel storage). Fuel will be delivered by road tanker from Darwin.

### 2.2.12 Workforce

The Proponent estimates that, during peak construction, up to 70 personnel will be employed. A workforce of 40 will be required to operate the CBC and BMC at full scale. The majority of the workforce is expected to come from Darwin with technical specialists likely to be from elsewhere in Australia and overseas.

The Proponent expects that both the construction and operational workforce will be drive-in drive-out through the utilisation of a compressed roster. This will permit personnel to return to Darwin on their rostered days off.

### 2.2.13 Roads and traffic

Access to the Project site from the existing road network will be from Fog Bay Road (Figure 2). Public access along a gravel access road will terminate at the site administration area, approximately 8 km off Fog Bay Road. An internal private gravel road network (10.3 km in length) will connect the administration and accommodation buildings, the pump station, BMC, CBC, the discharge water settlement ponds and the release channel. A speed limit of 50-80 km/hr or less will apply on all site roads.

During construction, it is anticipated that a total of 630 truck movements will be required for approximately eight months with truck access peaking at 150 truck movements a week or 25 truck movements a day. Operational traffic will be mainly associated with staff movement from the Dundee region with approximately 16 light vehicle and bus movements required each day (within a 24-hour period).

### 2.2.14 Decommissioning

The Project is proposed to operate for as long as is required to support the proposed grow-out facility at Legune Station.

The Proponent indicates that a two staged approach to decommissioning is likely. Stage 1 would involve the decommissioning of the site via a care and maintenance program so that the facilities could be offered to other users on a lease or sale basis. If this approach was not successful then a process of removal, demolition and rehabilitation would be undertaken.

## 3 Regional setting

Detailed descriptions of the physical and ecological aspects of the Project region are presented in the EIS. The following section provides a broad overview of the regional setting of the Project.

The climate of the region is tropical monsoonal consisting of two predominant seasons; the Dry season, which is characterised by low rainfall and relative humidity, and the Wet season, which is typically humid with significant rainfall events, most rain falling between November and April. The tropical cyclone season generally corresponds with the Wet season.

The land surrounding Bynoe Harbour is part of the Darwin Coastal bioregion, which comprises gently undulating plains and an extensive and diverse floodplain environment associated with the lower reaches of the many large river systems. There are also substantial areas of mangroves, and rainforest and other riparian vegetation fringing the rivers. Inland from the coast, the dominant vegetation type is eucalypt tall open forest, typically comprising Darwin woollybutt (*Eucalyptus miniata*) and Darwin stringybark (*E. tetradonta*).

Bynoe Harbour is part of the Northwest Shelf Transition provincial bioregion with likely biological communities typical of Indo-west Pacific tropical flora and fauna (DSEWPC 2012).

The entrance to the Harbour is from the Timor Sea at the northern end of Indian Island. The Harbour is fed by a number of catchments including McKenzie Arm, Milne Inlet, Annie River and Charlotte River (Figure 2). Wheatley Creek flows along the western side of Point Ceylon and feeds into Mackenzie Arm prior to entering Geranium Channel (Figure 3). The Harbour receives large freshwater inflows during the tropical Wet season with little or no inflow during the remainder of the year. The total catchment for the Harbour is approximately 1000 km<sup>2</sup>.

The Dundee region is home to around 800 residents and a large number of weekenders and tourists. The high environmental value of Bynoe Harbour attracts tourists and local

residents to the area with recreational activities such as land and sea-based fishing and crabbing. Existing commercial enterprises within the area are predominantly aimed at the tourist market and include a number of accommodation and fishing charter operators. Commercial fishing of Mud Crab occurs within Bynoe Harbour, as does the growing of Pearl Oysters. There are limited opportunities for employment in the area with tourism being the predominant employer. While some residents are self-employed and work from home, the majority work closer to Darwin and return to Dundee Beach on weekends.

## 4 Key environmental values

Having regard to the Notice of Intent, the draft EIS and Supplement, and comments from the public and advisory bodies during the EIS review, the NT EPA identified the following key environmental values during the assessment process:

- marine and estuarine water quality
- recreation and aesthetics
- groundwater.

The NT EPA identified the following potential environmental impacts and risks that contributed to the decision to assess the Project at the level of an EIS:

- potential impacts from the discharge of waste from the prawn farming activities into receiving waters considered to be of high environmental value
- the significant management requirements for solid and liquid waste and the potential detrimental effects of inappropriate management practices
- potential impacts and risks associated with securing an adequate fresh water supply for the site
- public interest.

Information requirements based upon identified potential impacts and risks were described in the Terms of Reference for the Project (NT EPA 2016). The Proponent submitted the EIS to address these requirements.

## 5 Environmental impact assessment

### 5.1 Introduction

The purpose of this section is to evaluate the Project and to present the view of the NT EPA on the environmental acceptability of the Project. The environmental acceptability of this Project is based on an analysis of:

- the proposed action (particularly which components or activities are likely to impact the environment)
- the existing environment (particularly environmental values and sensitivities)
- the potential environmental impacts and risks of the Project and the evaluation of the significance of those impacts and risks
- proposed avoidance or minimisation / mitigation measures to reduce potential impacts and risks to acceptable levels and to meet NT EPA objectives.

Conclusions drawn and recommendations made in this Report are derived from consultation on the final EIS with advisory bodies, the NT EPA's examination of the EIS and responses from the Proponent to comments/consultation. Recommendations are made in this Report to add to or emphasise/clarify any commitments made by the

Proponent, where the proposed avoidance or minimisation/mitigation measures are considered insufficient or where a safeguard is deemed particularly important.

In this Report, the recommendations (in **bold**) are preceded by text that identifies issues and undertakings associated with the Project. For this reason, the recommendations should not be considered or read in isolation.

Minor and insubstantial changes are expected in the design and specifications of the Project following the conclusion of the EIA process. It will be necessary for approval mechanisms to accommodate subsequent changes to the environmental safeguards described in the final EIS and recommendations in this Report. If the Proponent can demonstrate that changes are unlikely to significantly increase potential impacts on the environment, an adequate level of environmental protection may still be achieved by modifying the conditions attached to relevant statutory approvals governing the Project. Otherwise, further environmental assessment may be required.

Therefore, subject to decisions that permit the Project to proceed, the overarching recommendations of this Report are:

### **Recommendation 1**

**The Proponent shall ensure that the Core Breeding Centre and Broodstock Maturation Centre is implemented in accordance with all environmental commitments and safeguards:**

- **identified in the final Environmental Impact Statement for the Core Breeding Centre and Broodstock Maturation Centre (draft Environmental Impact Statement and Supplement)**
- **recommended in this Assessment Report 81.**

**The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are commitments made by the Proponent.**

### **Recommendation 2**

**The Proponent shall provide written notice to the Northern Territory Environment Protection Authority and the responsible Minister if it alters the Core Breeding Centre and Broodstock Maturation Centre in such a manner that the environmental significance of the action may have changed, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.**

In making this Report, the NT EPA considered the information presented in the draft EIS; submissions from Government advisory bodies, interested persons and organisations; the Supplement to the draft EIS in response to submissions; and final advice from Government advisory bodies on the Supplement.

A range of potential impacts and risks identified through the EIA process were addressed by the Proponent to the satisfaction of the NT EPA and advisory bodies. Where potential impacts were considered to have been satisfactorily addressed and can be managed through other legislated processes and recognised standards, they are not discussed in detail in this Report. Some of these include:

- biting insect impacts (addressed through a biting insect management plan to the satisfaction of the Department of Health)
- historic or aboriginal archaeological heritage (addressed to the satisfaction of Department of Infrastructure, Planning and Logistics (DIPL), Heritage Branch with amendments to the Cultural Heritage Strategy)



- erosion and sediment control (addressed through an Erosion and Sediment Control Plan in accordance with Department of Environment and Natural Resources requirements)
- acid sulfate soils (addressed through an acid sulfate soil management plan)
- weed introduction and spread (addressed through a weed management plan with inclusion of Class B weeds).

The remainder of this section of this Report discusses the key environmental values and potential impacts and risks to those values based on likely significance as identified in the NT EPA's Statement of Reasons, and the Proponent's investigations and studies and/or commitments to identify, avoid, mitigate, monitor and manage the potential impacts and risks. For each key environmental value, the NT EPA assesses whether or not the proposal is likely to meet the environmental objective set for each value. The key areas of concern relate to potential impacts and risks to estuarine and marine water quality, and recreational and aesthetic values from waste water discharge and sludge from settlement ponds.

## 5.2 Marine and estuarine water quality

### 5.2.1 NT EPA objective

To ensure the waters of Bynoe Harbour, including Wheatley Creek, are protected both now and in the future, such that the ecological health and uses, and the health, welfare and amenity of people are maintained.

### 5.2.2 Waste water (operational effluent)

#### 5.2.2.1 Marine and Estuarine values

The Project site, Bynoe Harbour and Wheatley Creek, are all located within the Fog Bay Beneficial Use Area (BUA), declared under the *Water Act*, with beneficial uses specified as aquatic ecosystem (environment) and recreational water quality and aesthetics (cultural).

Indian Island is one of the more significant features in Bynoe Harbour (Figure 2). The Island was the Northern Territory's first conservation area, listed under the *Woods and Forest Act* in 1889. As with many Territory islands, the island is important in that it provides refuge from many introduced plant and animal species that occur extensively across mainland areas. In June 2016 the Island was granted to the Kenbi Aboriginal Land Trust pursuant to the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) as part of the Kenbi Land Claim.

There are approximately 24 000 ha of mangroves in Bynoe Harbour with the shoreline of the Project area characterised by mangrove forest. Sponges and soft corals dominate reef benthos of Bynoe Harbour, together with some hard corals. Seagrass beds are present in the intertidal–subtidal areas of the Harbour, including patchy seagrass beds near Point Ceylon (Smit *et al.* 2000). The Harbour contains ideal habitat for fauna species of conservation significance and for angling fish.

Bynoe Harbour potentially hosts 26 threatened species and 37 migratory species listed under the EPBC Act, though there has been little survey effort in Bynoe Harbour and surrounds to document the species present. The Hawksbill, Flatback and Olive Ridley turtles are known to occur in Bynoe Harbour with nesting habitat for both the Flatback and Olive Ridley turtles occurring approximately 15 km from the Project site at the northern end of Indian Island. Beaches around Indian Island are known to be used by migratory shorebirds. Other listed marine fauna known to occur or possibly occurring in Bynoe Harbour include several species of sawfish and shark, dolphins (including the Indo-pacific humpback dolphin (*Sousa chinensis*), spotted bottlenose dolphin (*Tursiops*

*aduncus*), offshore bottlenose dolphin (*Tursiops truncatus*) and Australian snubfin dolphin (*Orcaella heinsohni*), dugong (*Dugong dugon*), sea snakes, crocodiles and potentially, seahorses/pipefish. The Harbour also provides habitat for popular recreational fish species including barramundi (*Lates calcarifer*) and golden snapper (*Lutjanus johnii*).

As well as recreational land and sea-based fishing and crabbing activities, commercial fishing for mud crab occurs within the Harbour and there are pearl oyster leases located to the north of the Project site (Figure 2).

### 5.2.2.2 NT EPA assessment

The Project proposes to discharge waste water from prawn raceways (operational effluent) via settlement ponds into Wheatley Creek, beginning in stage 1 with 2200 kL/day and at full scale up to 12 440 kL/day. A smaller discharge is also proposed direct to Bynoe Harbour comprising seawater from the intake mixed with coarse particle filtrate. Details for these discharges are provided in Chapter 2 and Chapter 11 of the draft EIS and Chapter 3 of the Supplement.

In assessing the potential impacts of the operational effluent on Bynoe Harbour, the Proponent used the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000), referred to hereafter as the Australian Water Quality Guidelines (AWQG), as a framework. The AWQG state that '*for the long-term management of any water resource, there must be:*

- a designated and clearly stated set of environmental values;
- understanding of the links between human activity (including indigenous uses and values) and environmental quality, at an acceptable level of confidence;
- unambiguous goals for management;
- appropriate water quality objectives; and
- effective management frameworks, including cooperative, regulatory, feed-back and auditing mechanisms.'

Bynoe Harbour is identified in the National Land and Water Resources Audit (2001) as 'near pristine' and has declared beneficial uses under the *Water Act*, which provide for protection of environmental and cultural aspects of the water resource. Bynoe Harbour is also very important to the regional community in terms of its biophysical and recreational values, a key factor in the NT EPA's decision to assess the proposal and is also reflected in comments on the draft EIS and from the community during the Proponent's consultation activities. An appropriate level of protection for Bynoe Harbour, however, has not yet been formally defined in terms of the AWQG, nor have management objectives for the water resource been designated.

The Proponent proposed an ecosystem protection level for Bynoe Harbour of 'slightly to moderately disturbed' (condition 2), in accordance with the AWQG classification system. With very little data available to support this proposition, the NT EPA is of the opinion that further consideration must be given to the appropriate level of protection commensurate with the values of Bynoe Harbour. The appropriate process for this is described in the Management Framework for Applying the Guidelines (ANZECC & ARMCANZ 2000), which will be considered in finalising water quality objectives for Bynoe Harbour through the EPL application process under the WMPC Act.

In the absence of water quality objectives or interim site-specific trigger values for Bynoe Harbour, the Proponent compared Bynoe Harbour's water quality background data (based on two 'Wet season' sampling events) with Darwin Harbour water quality guidelines and AWQG criteria and guidelines from a tropical Queensland estuary. Water quality data across these sources were comparatively similar and the Proponent

consequently adopted the Darwin Harbour water quality guideline values as interim trigger values to predict impacts in Bynoe Harbour. While there was some question from NT Government advisory bodies regarding the suitability of Darwin Harbour as a proxy site due to the differences in catchment inputs, the NT EPA considered that it provided a reasonable basis for assessment of potential impacts until such time as guideline values could be refined with further data collection.

The Proponent conducted modelling to assess the likely dispersion of nutrients released from the full scale Project into the receiving waters of Wheatley Creek and the wider Bynoe Harbour using a 2-Dimensional model (MIKE21). Modelling predictions were based on licensed effluent discharge concentrations from a Seafarms' prawn aquaculture operation in Cardwell, North Queensland (Table 1).

**Table 1 Cardwell operations discharge water quality – licence conditions and performance (from draft EIS, Table 11-6 with corrections)**

Condition	Median	80th Percentile	Maximum
Total nitrogen (mg/L)			
Licence conditions	2.0	2.5	4.0
Performance	1.1	1.5	2.8
Total phosphorous (mg/L)			
Licence conditions	-	0.4	0.6
Performance	0.08	0.11	0.27

Simulated concentrations in receiving waters were compared with the interim trigger values derived from Darwin Harbour. The NT EPA was advised by specialists in government agencies of a number of issues in the Proponent's modelling including:

- simulations used a discharge rate of 11 000 kL/day rather than the 12 440 kL/day that was subsequently proposed in the EIS
- the lack of accounting for spring and neap tidal cycles or seasonal influences in the model inputs
- limited measured data, both spatially and temporally, used to validate the model.

The model predicted that average levels of nutrients originating from the facility under a constant discharge scenario were higher upstream in Wheatley Creek due to insufficient tidal flushing during the Dry season, although the EIS stated that, further afield, nutrients from the release would be '*undetectable and/or indistinguishable*' from background levels. Finer-scale 'near-field' modelling focussing on Wheatley Creek indicated that a zone of influence or initial 'mixing zone' in which elevated nutrient levels would occasionally be experienced for short durations, would extend approximately 100 m upstream and downstream of the proposed discharge location. This was simulated to occur primarily under spring tide, low water slack conditions, when creek volumes and tidal flows would be very low, and to a lesser degree high water slack conditions. The EIS indicated that the discharge waters would be expected to rapidly mix and dilute with the incoming tide.

Whilst there remains some uncertainty in respect of the quantitative conclusions drawn for predictions of effluent dilution, the NT EPA considers that the modelling assumptions were conservative as:

- biological assimilation and the deposition of particulate material in receiving waters were not included in the model. In reality, the uptake of nutrients by organisms, gaseous exchange and settling of suspended sediments and degradation of chlorophyll *a* would tend to reduce water column nutrient concentrations in the receiving environment.
- discharge of effluent into Wheatley Creek was modelled as constant, whereas the Proponent proposes to discharge on mid to high tides to enhance dispersion and dilution
- discharge concentrations were based on median licence conditions adopted from Seafarms' Cardwell operations (Table 1), which are much higher than is likely to be achieved by the Project.

The NT EPA examined the Cardwell licence limits in respect of their suitability as proposed discharge conditions for the Project, within the context of the perceived values of Bynoe Harbour held by the community. The NT EPA acknowledges that, unlike the Cardwell operations, the Project includes settlement ponds with capacity for a 60-hour withholding period. The findings of Jackson *et al.* (2003) suggest that significant reductions in total phosphorus, total suspended solids and total nitrogen (likely to be the limiting nutrient for Bynoe Harbour) can be achieved within 36 to 48 hours using passive treatment. The Cardwell data indicate total nitrogen and total suspended solids loads in discharge are between 4% and 13% of the allowable limits without the use of settlement ponds, suggesting that the discharge criteria may be higher than required. Final discharge concentrations for the Project will need to be considered and agreed as part of the licensing process under the WMPC Act.

The Proponent's Notice of Intent included construction of a tidal weir/pond in the intertidal area adjacent to Wheatley Creek to regulate the discharge of effluent to higher tides and so facilitate pre-discharge dilution. Despite the support expressed for the weir concept by the NT EPA and government agencies, the weir was not part of the draft EIS. Instead, the EIS proposed discharge release control ponds above the intertidal zone, to be installed at a later stage of the Project, if additional management of water was required to meet water quality objectives. The NT EPA considers that pre-discharge dilution or diffuse discharge is likely to enhance mixing at the discharge location and may help to mitigate potential impacts to the regional water quality of Bynoe Harbour. This could be a vital part of the Proponent's discharge management, particularly if water quality objectives determined for Bynoe Harbour improve upon those proposed in the EIS. In such a case, the Proponent may be required to install discharge regulation structure/s earlier than anticipated.

The NT EPA advises that the number of monitoring sites, both in Wheatley Creek and in Bynoe Harbour, will need to be increased to provide better spatial representation and improve the likelihood of detecting potential impacts from the discharge. Monitoring needs to be of sufficient statistical power to distinguish between the effects of effluent discharge and natural variability. Standardisation of sampling and data treatment will also be required to account for natural variability due to tides and lunar cycles. The NT EPA recommends the deployment of tide gauges and acoustic doppler current profilers for a minimum of one month during both Wet and Dry seasons. This data would enable the development of a more comprehensive hydrodynamic model to improve predictions of water quality dynamics.

The Proponent has committed to:

- determination of more appropriate site-specific trigger values based on two years of monthly water quality data in accordance with the AWQG
- consideration of additional monitoring sites in Wheatley Creek to better define the zone of influence or 'mixing zone'
- collection of sediment samples prior to construction to assess the potential impacts of the Project on sediment quality
- collecting data regarding macro-invertebrates and  $\delta^{15}\text{N}$  signatures from mangroves to assess potential impacts to ecological values
- timing the effluent discharge to maximise dilution and mixing in accordance with differing tides and water levels
- providing a diffuse discharge structure to increase initial mixing
- monitoring of effluent discharge and regular sampling of water quality in Wheatley Creek and Bynoe Harbour during operations.

The NT EPA supports these commitments. With improved understanding of the receiving environment and enhancement of the monitoring program, the NT EPA considers that the dataset will be robust enough to define more appropriate site-specific trigger values, and ultimately to develop water quality objectives appropriate to the ecosystem protection level and values for the receiving waters of Wheatley Creek and Bynoe Harbour. Baseline data will also be more suitable to refine the modelling, which is likely to be required as part of licensing under the WMPC Act.

The discharge regime is likely to be improved with the proposed measures, and the staged development of the Project will allow for an adaptive management approach to effluent discharge, enabling the avoidance of potentially significant impacts to the receiving environment and maintenance of the current ecosystem health of Bynoe Harbour.

### **Recommendation 3**

**In consultation with the NT EPA, the Proponent shall enhance the baseline water quality monitoring program by:**

- **increasing spatial representation of sites in Bynoe Harbour**
- **accounting for natural variation in receiving waters**
- **including sediment sampling and biological indicators of nutrient impacts.**

**The water quality monitoring program should be peer reviewed by an appropriately-qualified independent professional, and implemented to the satisfaction of the NT EPA.**

### **Recommendation 4**

**The Environment Protection Licence under the *Waste Management and Pollution Control Act* shall include conditions that will:**

- **define appropriate site-specific trigger values and water quality objectives**
- **improve confidence in model predictions**
- **limit discharges of effluent into Wheatley Creek to the high to mid tide**
- **require a diffuse discharge system to aid dilution in the event that water quality objectives cannot be met**

- restrict daily discharge rates to a maximum of 3 ML/day for stage 1 and 12.5 ML/day for the full scale Project.

The licence shall apply for five years at which time it will be reviewed.

### 5.2.2.3 NT EPA conclusion

Having regard to the AWQG, the information presented in the EIS and advice from specialists in government agencies, the NT EPA makes Recommendations 3 and 4 to address the residual uncertainty in relation to the limited baseline data for Bynoe Harbour, improve confidence in the water quality modelling and enhance the monitoring program for effluent discharge to Wheatley Creek.

The NT EPA considers that with the inherent conservatism of the modelling, implementation of Recommendations 3 and 4, and development of an adaptive management program with contingency measures built in to mitigate impacts, the Project is highly likely to meet the NT EPA's environmental objective for marine and estuarine water quality (Section 5.2.1).

The NT EPA considers that by maintaining marine and estuarine water quality, the Project is unlikely to cause a significant impact to the ecosystem health of Bynoe Harbour, so that populations of threatened and migratory species such as cetaceans, marine turtles and dugong, and fish species that are targeted by recreational fishers, can be maintained.

The NT EPA should be notified of any requirement for larger mass load discharges in accordance with Recommendation 2 of this Report. Any such requirement would need further modelling to predict potential impacts.

## 5.2.3 Waste

### 5.2.3.1 Values

As for section 5.2.2.1 above.

### 5.2.3.2 NT EPA assessment

In its assessment of the Project, the NT EPA noted uncertainty with respect to the production of organic wastes, in particular the constituents, quantities and management of sludge from settlement ponds and biological waste (i.e. reject prawns).

#### *Pond sludge*

Accumulated sludge removed from seawater storage ponds and operational effluent settlement ponds is proposed to be removed periodically and placed in a dedicated drying area. The EIS indicates that this material is initially anoxic, but upon drying and stabilisation is an inert waste, although high in nutrients (and salt). However, a reduction in water quality could result should this material enter waterways and/or leach into groundwater.

The EIS estimates that 105 tonnes of this material would be removed from ponds annually. Drying areas would be 35 m x 35 m earth-bunded structures, excavated approximately 0.5 - 0.75 m deep, with a clay base and walls to minimise impacts to groundwater and sedimentation of waterways. An internal perimeter drain would direct water from within the bunded area back to the first settlement pond to prevent direct discharge to the environment. Following a six month drying and aeration process, the resulting material is proposed for use around the site as a top dressing and may also be mixed with other organic wastes to improve soil conditioning if undertaken on the site.

The Proponent's proposed management of the material is in compliance with the *Environmental Code of Practice for Australian Prawn Farmers* (Donovan 2011), which

requires that any designated storage area be sufficiently compacted to minimise leaching and be designed to minimise entry of overland flows (e.g. perimeter bunding). The Code also requires that methods be used to minimise erosion of material from storage areas (or areas where material is disposed/deposited) into adjacent waterways. These measures also comply broadly with Victorian EPA Guidelines for Environmental Management of Biosolids Land Application (an NT EPA endorsed guideline) which, although aimed primarily at biosolids generated from municipal sewage treatment plants, provide greater detail than the Code in terms of matching the quality of the material with its end use. This is important as the material could impact surface and/or ground waters if applied to land in amounts exceeding plant growth demand. The Proponent has identified the calculation of NLAR (Nutrient Limited Application Rate) and CLAR (Contaminant Limited Application Rate) from the Guidelines as relevant when considering the use of treated pond sludge as a top dressing. Where not able to be used on the site, the material is proposed to be stockpiled and compacted into a low stable landform.

#### *Biological waste*

Biological waste (i.e. reject prawns) is proposed to be frozen and then either incinerated on-site or disposed off-site by licensed waste handlers. The Proponent considers both methods to be feasible options. Should incineration become the preferred option, emissions from the incineration process could impact on nearby sensitive receptors through a reduction in air quality.

The incinerator is proposed to be co-located with the power facility (Figure 3). The Supplement identified that the incinerator would be located approximately 1 km to the north-west of the location proposed in the draft EIS to utilise flatter land and to centralise infrastructure and minimise cable runs. The new location also provides for a greater separation distance between the facilities and on-site accommodation (the closest sensitive receptor). The incinerator is to be a small diesel-fired dual chamber system whereby waste is burnt in the primary chamber and hot gases and emissions in the second. Preliminary air and noise assessments to determine potential impacts to nearby sensitive receptors determined that a buffer of 300 m was required. On-site accommodation is approximately 1 km to the south-east with the closest off-site sensitive receptor being approximately 3 km to the south-west in Dundee Downs (Figure 2). The Proponent expects that the incinerator will operate for one hour, four days a week to deal with the estimated volumes of biological waste. The incinerator and its operation will need to meet the requirements of the NT EPA *Guideline for Disposal of Waste by Incineration*, which provides specific operating and monitoring requirements for the use of multiple chamber incinerators, including a separation distance of at least 500 m between the incinerator and sensitive land uses.

Biological waste and pond sludge containing prawn effluent, prawn detritus and dead prawns fit the description of “animal effluent and residues (abattoir effluent, poultry and fish processing waste)” under the WMPC Act and are regulated as “listed wastes”.

The activity of constructing, installing or carrying out works in relation to a premise for storing, recycling, treatment or disposal of listed waste will require an environment protection approval. Proposed operational activities relating to listed waste handling activities may require an environment protection licence depending on the level of environmental risk. The Proponent will be required to submit an application for an environment protection licence for assessment. Detailed design and management plans will need to be provided as part of the application. The level at which relevant industry codes of practice and guidelines apply will also be determined through this process. All permanent and temporary storage facilities will be designed and operated according to relevant Australian Standards and guidelines.

The Proponent has prepared a draft Environmental Management Plan which includes strategies for the management of sludge and prawn bodies.

### Recommendation 5

The Proponent will be required to apply for:

- an environment protection approval (EPA) under the *Waste Management and Pollution Control (WMPC) Act* for the construction of the Project potentially including an incinerator and waste transfer stations
- an environment protection licence (EPL) under the WMPC Act for the ongoing operation of the incinerator facility
- an EPA and an EPL for construction and operation of operational effluent settlement ponds and the discharge of operational effluent to Wheatley Creek.

#### 5.2.3.3 NT EPA conclusion

The Proponent has noted that applications will be required for the appropriate approvals and licences under the *Waste Management and Pollution Control Act* for relevant activities during the construction and operational stages of the Project.

The NT EPA makes Recommendation 5 to ensure the Proponent is aware of its obligations under the WMPC Act. The NT EPA considers that with the implementation of Recommendation 5 and commitments made in the EIS, the Project is highly likely to meet the NT EPA's environmental objective for marine and estuarine water quality (Section 5.2.1).

## 5.3 Groundwater

### 5.3.1 NT EPA objective

To ensure that the groundwater and surface water resources are protected both now and in the future, such that ecological health and the health, welfare and amenity of people and land uses are maintained.

### 5.3.2 NT EPA assessment

The Proponent originally proposed that freshwater required for the Project would be supplied primarily by rainwater collection on-site, with groundwater on the property and desalination making up the deficit. The NT EPA considered that the sustainability of the groundwater resource was a significant uncertainty as groundwater in the region is limited in its pumping capacity and there was the potential to impact other groundwater users in the area. The Power and Water Corporation indicated that it had no plans to extend reticulated potable water supply to the area.

The Proponent subsequently provided notice of an alteration to the Project under clause 14A of the EAAP, stating that freshwater would be supplied from a combination of rainwater collection on-site in the Wet season, with additional water trucked to site from an appropriately licensed commercial supplier where required. Details for the supply and use of freshwater are provided in Chapter 10 of the draft EIS and summarised in Section 2.2.8 of this Report.

Given that groundwater extraction and/or desalination to supply freshwater are no longer proposed, impacts to the sustainability of groundwater and availability for other users in the vicinity of the Project are no longer considered to be relevant.



### 5.3.3 NT EPA conclusion

The NT EPA is satisfied that the Proponent has adequately addressed the uncertainty around potential impacts to local groundwater availability by replacing groundwater extraction with an alternative supply option.

The NT EPA considers that the Project meets the NT EPA's objective for groundwater (Section 5.3.1).

Should the Project require supplementation of its freshwater supply through groundwater extraction in the future, the NT EPA must be notified in accordance with Recommendation 2 of this Report.

## 5.4 Recreation and aesthetics

### 5.4.1 NT EPA objective

To monitor and manage the intended and unintended social and economic consequences, both positive and negative, of the Project.

### 5.4.2 Values

The values as they relate to the use of Bynoe Harbour for recreation are similar to those associated with marine and estuarine water quality and ecosystem health and are included in Section 5.2.2.1 of this Report.

### 5.4.3 NT EPA assessment

In its decision to assess the Project at the level of an EIS, the NT EPA determined that substantial development of Bynoe Harbour would be of interest to the community, given that the Harbour is considered to be an area of high environmental value and an important area for recreational fishing, mud crabbing and other recreational activities.

The Proponent undertook a number of studies for the EIS, including an economic impact assessment and workforce development assessment. Community consultation was also conducted using a variety of contact methods and many key community stakeholders were consulted directly. Chapter 14 of the draft EIS provides detail of the social and economic aspects of the Project.

A key issue for the Project is the expectation of the community that fishing and the environmental quality of Bynoe Harbour should not be negatively impacted. The importance of this issue was reflected in submissions received from the public and community groups on the draft EIS. While there was some concern about potential access restrictions from the Project impacting on recreation in the Harbour, of greater concern was that water quality and ecosystems could be impacted thereby impacting on fish and the aesthetics of the Harbour.

The Proponent stated that the Project would not impede existing access to fishing and crabbing by water. However, for security and biosecurity reasons, access to the land area of the Project will be restricted to authorised personnel. The NT EPA considers this restriction necessary for the Project and likely to affect only a small number of individuals.

Maintenance of the environmental quality of Bynoe Harbour, particularly water quality and its potential impacts on ecosystem health, has been addressed in Section 5.2 of this Report. The NT EPA considers that significant impacts to the wider Bynoe Harbour from effluent discharge are unlikely but there may be some localised impacts in Wheatley Creek around the discharge point associated with nutrient levels at full scale operation. The Proponent has committed to implementing a number of strategies to ensure that nutrient concentrations in discharge water are at levels that can be assimilated within the creek with minimal impact. The NT EPA makes Recommendations 3 and 4 to emphasise

and build upon the Proponent's commitments to avoid and mitigate potential impacts to Wheatley Creek and Bynoe Harbour.

A Social Impact Management Strategy has been developed for the Project and the Proponent has committed to implementing a Stakeholder Communication Plan and to offer twice-yearly community information and consultation sessions.

While this is supported, the NT EPA advises that the Proponent must keep the community (e.g. tourist operators and residents) informed about the construction of particular components of the Project that are likely to temporarily affect access to parts of the estuary or aesthetics such as the Wheatley Creek outfall and the seawater inlet and pipeline. The community should also be provided with information regarding proposed road works for the Project and any associated access restrictions that may affect amenity around the time of works. The Proponent has developed a Traffic Management Strategy which is included in the draft Environmental Management Plan and has committed to preparing an integrated Traffic Impact Assessment and Traffic Management Plan to cover both this Project and the hatchery, once a location for that PSD component is finalised. The Proponent will need to liaise with the Transport and Civil Services Division of the DIPL regarding the timing and scope of commitments made to satisfy DIPL requirements for the Project.

The Proponent has identified a number of positive socio-economic impacts from the Project, including local employment opportunities, economic benefits for the region and opportunities for tertiary institutions to be engaged in ongoing research and development. The NT EPA is of the opinion that the Project will benefit the region with respect to employment and flow-on effects.

#### 5.4.4 NT EPA conclusion

Based on the information provided in the final EIS and commitments made by the Proponent to address social and economic impacts specific to the Project, the NT EPA is satisfied that the Proponent has adequately identified the potential social and economic consequences of the Project and considers that the Project is highly likely to meet the NT EPA's objective (Section 5.4.1).

## 5.5 Environmental management

Chapter 15 of the draft EIS included a summary of the Proponent's Environmental Management System and draft environmental management plans. The Supplement provided updated management plans to account for amendments made in response to comments on the draft EIS. The EMP is considered a sub-plan under the Proponent's overarching Environmental Management System which is modelled on AS/NZS ISO 14001.

The draft EMP included the following management strategies:

- Erosion and Sediment Control
- Land and Soils Management
- Acid Sulfate Soil Management
- Vegetation Management
- Weeds and Pests
- Fauna Management
- Surface Water Management
- Groundwater Management
- Waste Management

- Air and Noise Management
- Effluent Management
- Hazardous Materials Management
- Traffic Management
- Social Impact Management
- Cultural Heritage Management.

Additionally, the Project will be managed in accordance with the requirements of the Project Sea Dragon Biosecurity Manual and the Proponent has committed to developing a Decommissioning and Rehabilitation Plan 12 months after commencing operations. This plan would be updated every three years. The plan should address the two-stage proposal for decommissioning as outlined in the EIS and Section 2.2.14 of this Report.

These environmental management strategies and plans consolidate and summarise the commitments made as part of the EIS. The Proponent intends to use the strategies to develop site specific management procedures and has committed to updating the draft EMP to be stand-alone and reflect approval requirements, upon approval. The EMP would then be implemented on the Project site.

While the Proponent refers to audits, both internal and external, in its EMS Manual, there is no explicit requirement for audits mentioned. The EMP and its procedures and controls should be audited by the Proponent throughout the Project; during construction and operation. The audits should compare on-ground works with management commitments and performance objectives. Any non-conformance with these criteria should trigger the implementation of corrective actions, and associated reporting.

The NT EPA considers it essential to the performance of the Project that the requirements in the EMS, management strategies and procedures are incorporated into the Proponent's tendering and contracting procedures. The Proponent is responsible for ensuring that all employees, subcontractors and agents associated with the Project are familiar and comply with the elements of the approved EMP, which should address all relevant requirements under environmental legislation and relevant licences. The information should be provided to all personnel as part of an induction process.

All management strategies and procedures developed for the Project must be finalised and approved by, or developed to, the satisfaction of relevant Government agencies and stakeholders. These approved strategies and procedures will be one of the primary tools by which the Proponent will implement management and monitoring commitments made in the EIS and the recommendations detailed in this Report.

### **Recommendation 6**

**The Proponent taking the proposed action is wholly responsible for implementation of all conditions of approval and mitigation measures contained in the Environmental Management Plan and must ensure all staff and contractors comply with all requirements of conditions of approval and mitigation measures contained in the Environmental Management Plan and sub-plans.**

**In preparing the Environmental Management Plan, for construction and operation, the Proponent should include any additional measures for environmental protection and monitoring contained in this Assessment Report 81.**

**The Environmental Management Plan should include management strategies for:**

- erosion and sediment control
- land and soils

- acid sulfate soils
- vegetation
- weeds and pests
- fauna
- surface water
- groundwater
- waste
- air and noise
- effluent
- hazardous materials
- traffic
- social impact
- cultural heritage
- decommissioning.

**The Proponent shall provide public access to both the Environmental Management Plan and a reporting mechanism to inform compliance with the plans. An independent audit of compliance against the Environmental Management Plan shall be conducted at the end of five years after commencement of the Project and reported to the Northern Territory Environment Protection Authority and Department of Primary Industry and Resources.**

The NT EPA acknowledges the Proponent will be required to report to the NT EPA in accordance with the reporting obligations prescribed in the EPL under the *Waste Management and Pollution Control Act*. The NT EPA makes Recommendation 5 to ensure that environmental outcomes of the EIA are incorporated into compliance investigations, audits and reporting of the environmental performance of the Project. It is the NT EPA's expectation that any reporting on the implementation of the EMP should demonstrate that environmental impacts from the Project are no greater than those predicted in the EIA. This should be done through reporting performance of environmental commitments, including the effectiveness of the environmental safeguards and mitigation measures applied in respect of the Project, and an assessment of the accuracy of the predictions of the potentially significant environmental impacts of the Project.

## 6 Conclusion

In making this Report, the NT EPA had regard to the information provided by the Proponent, submissions on the draft EIS and Supplement, advice from specialists from across the NT Government, and relevant guidelines and standards. The NT EPA assessed the Project against the NT EPA's objectives for the key environmental values of: marine and estuarine water quality, including ecosystem health; groundwater; and recreation and aesthetics.

While the NT EPA considers the potential impacts and risks have been adequately identified and are relatively well-understood, there is inherent uncertainty in predicting with any great precision the magnitude of impacts in impact assessment due to

limitations of numerical models and the complexity and variability of natural systems. In such situations, it is important to acknowledge that uncertainty remains and manage this with suitably robust monitoring and management frameworks that can respond with appropriate mitigation and contingency measures and can accommodate new knowledge and understanding as it becomes available.

The NT EPA acknowledges some uncertainty with respect to the nature and extent of the area of influence and potential impacts of operational effluent discharge on water quality in Wheatley Creek. This uncertainty is largely due to the high variability in aspects of the receiving environment including the macro-tidal waters of the estuary, a lack of understanding of this variability and the likely response of the environment to threats and change. Such variability presents challenges for baseline data collection, impact prediction, monitoring and management.

The Proponent has committed to continuing data collection prior to Project commencement and operation, to develop a significant baseline dataset and build its understanding of background conditions in the receiving environment of the Project area. The baseline dataset will form the basis for refinement of water quality modelling, and comprehensive monitoring and mitigation programs that will underpin environmental management of the site.

The NT EPA has made recommendations in this Report for improvements in water quality management and monitoring. The recommendations, if incorporated into relevant conditions and actioned by the Proponent, should see acceptable environmental outcomes for the environmental values of Bynoe Harbour.

Notwithstanding the above, the NT EPA considers that the Project can be managed in a manner that is highly likely to meet the NT EPA's objectives and avoids significant or unacceptable environmental impacts. The NT EPA makes 6 recommendations as an outcome of the EIA of the Project. These recommendations are primarily for the Proponent to address when entering into the next stage of the Northern Territory approval process and for the implementation of the proposed action. The NT EPA considers it essential that the commitments, safeguards and recommendations detailed in the final EIS, this Report, and in the final environmental management plan and underlying strategies, approved by the NT EPA and the Agency responsible for administering the *Fisheries Act*, are implemented and subject to regular reporting and compliance auditing.

## 7 References

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