PROJECT SEA DRAGON
STAGE 1 LEGUNE GROW-OUT FACILITY
SUPPLEMENTARY ENVIRONMENTAL IMPACT STATEMENT

SUBMISSIONS ON THE DRAFT EIS

CONTENTS

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1 WARREN KEEN

From: Warren Keen
Sent: Sunday, 16 October 2016 10:18 AM
To: eia NTEPA
Subject: Project Sea Dragon Stage 1 Legune Grow-out Facility ATTN: Sally Strohmayr

Hi Sally,

I am an investor interested in this project, but not if this comes at the expense of the environment. I have briefly looked over the Draft Impact statement and I wondered about new research which I read about recently, which indicated that large dams (particularly in the tropics) may be the cause of significant methane production. As methane is perhaps the worst greenhouse gas, I was wondering do you take into account it's unintentional production at this facility and how it might be minimised and/or offset, given that methane is 35 times worse than CO2? Below please find the link to Scientific American article, which has links to the research:

https://www.scientificamerican.com/article/methane-emissions-may-swell-from-behind-dams/

Any feedback would be appreciated. As an investor and environmentalist I do not want the fact that we had not considered this to come up years down the track.

Kind Regards,

Warren Keen

2 DEPARTMENT OF TOURISM AND CULTURE (TOURISM NT)

From: Valerie Smith
Sent: Monday, 14 November 2016 3:43 PM
To: eia NTEPA
Subject: FW: Draft EIS for comment - Project Sea Dragon Pty Ltd - Stage 1 Legune Grow-Out Facility

Hi Sally,

Overall Stage 1 of the Legune Grow-out Facility looks to manage and mitigate specific tourism issues, however, it is recommended that the following comments be considered:

- For the full economic benefit of the project to be realised (see Executive Summary 5.1), the project will need to progress beyond Stage 1 (3 farms, 1489.29ha) to the full scale project (27 farms, 9720ha), possibly strengthening the argument for ongoing development. The degree to which potential impacts on the natural environment, bird-watching and recreational fishing arising from the full project should be considered now is worth some thought.

- Recreational fishing and camping is raised in the EIS however information on access and management is unclear. The risk assessment (Volume 1, Chapter 8, Pg 19) mentions installation of a gate at the entrance to the Legune Station Access Road and access only being permitted to authorised personnel, however, the Executive Summary (under 10.1.4 Mitigation and Management Measures, Pg 53) references engaging Indigenous rangers to monitor and manage impacts of increased public or Project Sea Dragon employees on fishing, camping and cultural areas. The draft EIS provides no detail on resourcing for rangers or how they will be adequately trained and supervised whilst on the project area (responsibility is acknowledged in the Social Impact Assessment, Pg 62).

- The Social Impact Assessment, Pg 74, states that a private property Recreational Fishery Access Policy will be established. It is not clear whether access will be available to the NT community and/or tourists transiting between WA and the NT. Tourism NT supports in-principle new areas being opened up for tourism and recreation, however notes this requires effective resourcing and management.

- The EIS mentions possible 'negative construction worker behaviour in town' (Volume 3, Chapter 1, Pg 23) due to the incoming workforce (444 FTE construction jobs and 334 FTE operations) but does not address this risk in the risk assessment and mitigation measures.

- It is important to ensure there is no conflict of interest with the work Co2 Australia, a subsidiary of the proponent, has done to support this project.

Regards, Valerie

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3 DEPARTMENT OF TOURISM AND CULTURE (HERITAGE BRANCH)

From: Dianne Bensley
Sent: Friday, 11 November 2016 3:51 PM
To: Sally Strohmayr
Cc: Caroline Wilby
Subject: HPRM: Department of Tourism and Culture Heritage Branch - Comments draft EIS - Project Sea Dragon Pty Ltd - Stage 1 Legune Grow-Out Facility

Hi Sally,
I have reviewed the Draft EIS for the Project Sea Dragon Stage 1 Legune Grow-Out Facility. I have also met directly with the proponent and discussed any heritage issues. Heritage Branch are satisfied for the moment that all heritage and archaeological issues have been adequately addressed in the Draft EIS and have no further comments to add at this point.

Regards,
Di

Dianne Bensley
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4 DEPARTMENT OF TOURISM AND CULTURE (PARKS AND WILDLIFE)

From: Megan Horner
Sent: Thursday, 17 November 2016 2:53 PM
To: eia NTEPA
Subject: HPRM: Department of Tourism and Culture Parks and Wildlife - Project Sea Dragon Pty Ltd - Stage 1 Legune Grow-Out Facility Due 18.11.16

Good afternoon,

Please see below comments with regards to the Project Sea Dragon's draft Environmental Impact Statement for the Stage 1 Legune Grow-out Facility (the Project).

It is recommended that formal procedures / protocols be developed and put into place to ensure minimal disturbance by Project Sea Dragon personal at Turtle Point. The increase in access and disturbance to migratory sea birds and turtles is of concern to the Commission.

Sediment, as a result of the construction and operation of the farm may impact upon the water quality and marine environment and the islands.
The project will see an increase in access to the area, including the number of visitors to Keep River National Park.

The project is unlikely to impact on the Parks cultural aspects so long as the increase in recreational use of the park in managed.

The increased numbers of people and access in the land scape have the potential to cause adverse impacts on the biodiversity values. For example the increase access and vehicle traffic into the area from the Ord Vally which has have a number of weed species of national significance such as parkinsonia and other declared weeds such as rubber bush and neem. It is recommended measures to be put into place to mitigate the spread of weeds such as ensuring vehicles / machinery are cleaned.

The project aims to avoid dredging, which we would agree with so as to ensure there is no impact on flows and erosion to turtle point.

It is also recommend that as part of the development of the project, that an ongoing monitoring program be established and implemented assessing impacts on the migratory sea birds and turtles at Turtle Point.

Megan Horner
A/Strategic Advisor to the Executive Director
Parks and Wildlife Commission of the Northern Territory
Department of Tourism and Culture

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5 DEPARTMENT OF TOURISM AND CULTURE (ARTS AND MUSEUMS)

From: Michael Hammer
Sent: Friday, 18 November 2016 3:31 PM
To: eia NTEPA
Cc: Lisa Bradley; Chris Glasby
Subject: HPRM: Department of Tourism and Culture - Arts and Museums - comment on Draft EIS - Project Sea Dragon Stage 1 Legune Grow-Out Facility

Hi Sally,

Please find below some comments relating to the Legune draft EIS, this highlights that there were several areas of regional expertise that could have been engaged for the aquatic/marine components.

Museum and Art Gallery NT
Marine Biodiversity, Natural Sciences
Comment on draft EIS Project Sea Dragon Pty Ltd - Stage 1 Legune Grow-Out Facility

>adequacy of the information from your agency's perspective.

Marine invertebrates

The assessment of potential impacts from the Operation is based on modelling and very limited field sampling. Monitoring programs will be important to detect any adverse changes to the environment. At present the proponents have suggested a water quality monitoring program, but no benthic or sediment monitoring based on theoretical modelling outcomes (i.e. sufficient dilution is suggested to occur but no real-situation checks have been added).

The benthic fauna at Turtle Point in the vicinity of the Operation supports a 'nationally important habitat for migratory shorebirds'. The reason the birds are there is because of significant populations of their major food items - polychaetes and bivalves. Therefore the statement that 'benthic macroinvertebrate communities have relatively low abundance and diversity' (42) … cannot be referring to Turtle Point or is not capturing the driver of this ecological relationship (e.g. invertebrate abundance). This statement needs to be addressed.

Data analysis and comparison of data with other studies is generally poor, and the two main conclusions in Vol 5, Appendix 9: Estuarine and Marine Quality and Ecology (and Vol. 2, Chapter 7) are problematic:

1. (p 109) is that "Abundance and taxonomic richness were lower at the intertidal sites than in the subtidal sites. But the proponents have apparently misclassified one of their sites. One of the Turtle Point sites, Site 125, 'foreshore of turtle creek' is clearly intertidal if you check Google Maps. The other Turtle Point site (121) is subtidal as they have reported. Both sites are very similar with respect to abundance and species richness, so clearly in this example there is NO effect of elevation. Proponents should reanalyse these data and check their conclusions.

2. (P 110.). "The abundance and taxonomic richness of the benthic invertebrate communities were low throughout the area". Proponents compare their data against Port Curtis (Qld) and Darwin Harbour. Two problems here – firstly they don't use the same units for comparison (individual per m^2 and individuals per 3L core) and they don't provide a figure for mean abundance and richness (it had to be read off Fig. 7.2), and secondly the implication that Port Curtis has higher abundances is incorrect. Fig. 7.2 indicates abundance for subtidal at roughly 100 individuals per m^2 and for intertidal about 50 individuals per m^2. Compare this with the range for Port Curtis (60-244 individuals per m^2), and one can see it may not be significantly different. Proponents need to standardise abundance and diversity units, better summarise their results, and make comparisons clear; we did not try to compare their data with that reported for Darwin Harbour (as individuals per 3L core!), but is it clearly important in order to gauge the 'benthic quality' of the area, and related conclusion regarding ecological values and assumptions used in risk assessment.

Fishes

Having since the project meeting had more time to review the documents, it is clear the fish survey component of field investigations was poor. Basically they set some bait traps (number not specified) with some low angling effort (also not quantified) which is not a very robust way to assess the assemblage in question. This was acknowledged as a limitation due to crocodiles, and diverted by statements saying the overall results should have no bearing on threatened species (e.g. risk assessment based on presumed presence of threatened sawfish and sharks), however this approach of using bait traps as the primary survey method is inconsistent with other survey programs across northern Australia which routinely sample these sorts of lowland habitats. For example NT Fisheries, CDU, MAGNT and private consultants all sample these sorts of habitats regularly. Boat based techniques including electrofishing, gill net or trawl would provide a much better indication and assessment in freshwater areas (we can supply references if required).

This overall leads to a major shortfall in the information available for assessment, failing to set a baseline or potentially identify any local issues of concern.

As an example of the data quality resulting from the approach used is that a meagre 42 fish total were recorded in the survey, when a survey of this nature would however typically return 100s of individuals. Moreover overnight sets of bait traps in northern Australia typically return low results due to crustaceans entering the traps and eating fish, so this is a non-standard operating approach also. Finally in Table 5 of the fish survey captured fishes were not identified to species which again reduces the value of this component; vouchers or images should have been lodged with the regional biodiversity institution to improve the rigour of this data and quality assurance and quality control.

Quote "No aggregations have been recorded in the area potentially impacted by the Project" – no surveys have been undertaken to support this statement. There is a low likelihood that the creeks in question are spawning areas, but as sheltered side branches in proximity to the mouth it is not out of the question.

Overall species list was minimal. Why not use an areas search in Atlas of Living Australia to provide a species list for the area?

Genetic diversity prawns

General biosecurity question: has the proponent considered the natural high genetic stock structure of the Tiger Prawn in terms of broodstock source and the risk to genetic diversity of the receiving environment due to potential escapes?

>Advice on how to improve or strengthen their proposed environmental risk management would also be appropriate.

Implement a benthic/sediment monitoring program at sites downstream of the Outfall, especially at Turtle Point. Please consider involving MAGNT staff, who have a broad knowledge of benthic fauna in the area, and important reference collections, including animals from a survey of Keep River. The Proponent may consider downplaying the role of the fish survey in forming any conclusions in the EIS, and acknowledge that if fish surveys are required in relation to this project in the future that they will be more thorough.

6 DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

From: Yvonne Goedemondt
Sent: Thursday, 20 October 2016 7:57 AM
To: eia NTEPA
Subject: HPRM: Department of Housing and Community Development - Comments on draft EIS - Project Sea Dragon - Stage 1 Legune

Hi Alana

I did read the Newmont Tanami and Earthworks NT, and also another in relation to prawn farming towards the Western Australian border which was very interesting.

I have no comments to provide from the Department of Housing and Community Development's perspective.

Kind regards
Yvonne

Yvonne Goedemondt
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7 POWER AND WATER CORPORATION

From: Jared Sellwood
Sent: Tuesday, 1 November 2016 10:02 AM
To: Sally Strohmayr
Subject: HPRM: Power and Water Corp - Comments on draft EIS - Project Sea Dragon Pty Ltd - Stage 1 Legune Grow-Out Facility

Hi Sally,

No comments from PWC,

Thanks Jared

8 DEPARTMENT OF CHIEF MINISTER

From: Tony Mott
Sent: Friday, 18 November 2016 11:25 AM
To: eia NTEPA
Cc: Sally Strohmayr; Anne Walters; Bridgette Bellenger
Subject: HPRM: Department of the Chief Minister - comments on draft EIS - Project Sea Dragon - Stage 1 Legune Grow-Out Facility

Sally

DCM's response to the EPA on the EIS for Project Sea Dragon Stage 1 Legune Station and is below, and has been approved by our Chief Executive (as per the following email chain).

Please do not hesitate to contact either Anne Walters, Director Environmental Policy in DCM, or myself if you wish to clarify anything.

The Department of the Chief Minister has a very positive and supportive view of the project based on the work undertaken by the Proponent around the potential environmental, economic and social impacts of the project. A highly credentialed consultant was engaged to model the potential economic impacts and they used an appropriate technique to do so. The modelling suggests that the project could deliver significant economic and social benefits, based on assumptions which are conservative in some respects. Hence, the potential benefits may be understated and this should be kept in mind when assessing potential risks attributed to the Project. The Proponent has also taken a conservative approach in their risk assessment and this may overstate the residual risks in many areas. Requirements imposed on the project should recognise the conservative approach adopted by the Proponent in their risk assessment. No additional analysis of the potential economic impact is necessary at this stage because the economic analysis provided is rigorous, thorough and comprehensive, and undertaken by a highly skilled specialist.

The Proponent has demonstrated that they have engaged with key stakeholder groups to discuss the project, potential community effects, and workforce opportunities. The Proponent has been attentive to the opportunity to work with traditional owners and this is to be encouraged. The Project EIS includes an outline of a social impact management plan (SIMP), and best practice suggests this should be finalised before a final investment decision is made, but then refined as the project progresses through its various stages. The Department of the Chief Minister welcomes the opportunity to work with the Proponent to finalise and implement an effective SIMP.

Tony Mott
Economic and Environment Policy
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From: Joan Hale **On Behalf Of** Jodie Ryan
Sent: Friday, 18 November 2016 10:05 AM
To: Bridgette Bellenger
Subject: RE: Action required ASAP - approval from Jodie Ryan for DCM's response to the EPA on the EIS for Project Sea Dragon Stage 1 Legune Station

Approved

Jodie Ryan
Chief Executive Officer
Department of the Chief Minister
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Our Vision: Creating a public sector that provides the highest quality service to Territorians
Our Values: Commitment to Service | Ethical Practice | Respect | Accountability | Impartiality | Diversity

From: Bridgette Bellenger
Sent: Thursday, 17 November 2016 8:42 AM
To: Jodie Ryan
Cc: Joan Hale; Rachel Bacon
Subject: FW: Action required ASAP - approval from Jodie Ryan for DCM's response to the EPA on the EIS for Project Sea Dragon Stage 1 Legune Station

Dear Jodie,

The Economic and Environment Policy team have coordinated DCM's response for the Project Sea Dragon EIS for Stage 1 on Legune Station:

1. Legune Station is just one component of Project Sea Dragon, and separate EIS's have been or will be prepared for the other components.
2. DCM Social Policy has been involved, various workshops have been attended, and we have liaised with other Line agencies such as DTF, DENR, and DPIR in an effort to align our thoughts and responses.
3. There is an expectation that responses to the EPA on projects with Major Project status are cleared by CEO's.
4. DCM's proposed response to this particular EIS is below, and is appropriately supportive.
5. Responses to the EPA are due by COB 18 November, and the EPA will share DCM's response with the project Proponent.
6. Hence, we are seeking your approval of the proposed response by COB 17 Nov.

The Department of the Chief Minister has a very positive and supportive view of the project based on the work undertaken by the Proponent around the potential environmental, economic and social impacts of the project. A highly credentialed consultant was engaged to model the potential economic impacts and they used an appropriate technique to do so. The modelling suggests that the project could deliver significant economic and social benefits, based on assumptions which are conservative in some respects. Hence, the potential benefits may be understated and this should be kept in mind when assessing potential risks attributed to the Project. The Proponent has also taken a conservative approach in their risk assessment and this may overstate the residual risks in many areas. Requirements imposed on the project should recognise the conservative approach adopted by the Proponent in their risk assessment. No additional analysis of the potential economic impact is necessary at this stage because the economic analysis provided is rigorous, thorough and comprehensive, and undertaken by a highly skilled specialist.

The Proponent has demonstrated that they have engaged with key stakeholder groups to discuss the project, potential community effects, and workforce opportunities. The Proponent has been attentive to the opportunity to work with traditional owners and this is to be encouraged. The Project EIS includes an outline of a social impact management plan (SIMP), and best practice suggests this should be finalised before a final investment decision is made, but then refined as the project progresses through its various stages. The Department of the Chief Minister welcomes the opportunity to work with the Proponent to finalise and implement an effective SIMP.

If you approve the text above, we will send through our response to EPA who will include it with other Agency feedback and then share our response with the proponent.

Kind Regards,

Bridgette Bellenger
Regional Network Leader
Environment and Economic Policy

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9 DEPARTMENT OF INFRASTRUCTURE, PLANNING AND LOGISTICS

From: Cate Schmidt
Sent: Friday, 18 November 2016 3:26 PM
To: Sally Strohmayr
Cc: Jacquelyn Gill
Subject: RE: Draft EIS for comment - Project Sea Dragon Pty Ltd - Stage 1 Legune Grow-Out Facility

Good afternoon Sally,

The proponent states (in Volume 5 Appendix 23, Section 4.1.1 *"The new roads will not be ready in time for the start of the Projects construction phase. The Construction Traffic Management plan (Discussed further later in this report) will need to demonstrate how access to the site will be achieved using the existing network and/or purpose built construction access tracks"*

This risk has not been addressed in the document. The risks identified, and the traffic management proposals are all based on the premise that the Legune Property Access Road will be upgraded.

Nowhere in the document is the risk of the capacity of the existing road being able to adequately cater for the construction activities identified. The proponent needs to ascertain if the existing pavement and road structure is able to withstand the proposed impacts.

Local traffic users on the Legune Property Access have also not been considered from a traffic management perspective and have not been included in the Traffic component of the report. This information is required to adequately assess and mitigate the risk to local traffic users and the road infrastructure.

The proponent needs to identify processes to ensure the effective coordination between themselves and the WA & NT Governments during construction phase.
It is noted that the breakdown of annual operational traffic for the operation phase is adequately comprehensive, which would be useful to repeat for the construction phase section of the traffic assessment.

I also note that the proponent consistently refers to the "Cave Springs Road" as part of the Legune Property Access Road. This is factually incorrect. The road from the WA border east to Legune Station is known as "Legune Property Access Road".

Regards

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10 DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

NORTHERN TERRITORY GOVERNMENT

DEPARTMENT OF PRIMARY INDUSTRY AND RESOURCES

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Attention: Ms Sally-anne Strohmayr

Re: Draft Environmental Impact Statement – Project Sea Dragon Pty Ltd – Stage 1 Legune Grow-out Facility

Thank you for the opportunity to comment on the draft Environmental Impact Statement (EIS) for the proposed prawn farm development at Legune Station in the Northern Territory.

The draft EIS as presented comprises a comprehensive set of documents that appear to identify the significant risks posed by this project. In particular, the two key risks of interest to this agency are the potential for impacts to water quality in Alligator Creek and the potential for the introduction of disease into local crustacean populations.

On behalf of the Department of Primary Industry and Resources I would like to offer the following comments:

Water Quality

From the information presented in the draft EIS, and from the water quality presentation to Government agencies by the proponent on Wednesday November 9, my agency considers that the risks posed by water discharge from the farm have been adequately addressed. The proponent's waste discharge modelling shows rapid disbursement of the effluent water within the creek system. When this is coupled with the timing of release to coincide with ebb tides to facilitate downstream movement of the discharge water, and prevent upstream nitrification, it can be concluded that accumulation of nutrients in the creek and river system is unlikely.

In addition, the company (Seafarms) has extensive experience operating a prawn farm in the vicinity of the Great Barrier Reef and has demonstrated the ability to effectively manage water quality in this sensitive location. The Legune farm, which includes an extensive bio-remedial waste water treatment system in its design farm (which its Queensland farm does not have), is expected to operate with minimal risks to local water quality.

Disease

The terms of reference for this EIS required an assessment of the risks to the surrounding environment posed by the escape of prawn stock and the transmission of pathogens and/or disease from the project's facilities. The information supplied in the draft EIS notes the obvious point that if juvenile prawn stock is free of a particular disease agent prior to release into the growing ponds then there is no possibility of that agent being released into the environment.

It should be noted that the original breeding prawns (prior to entry into the proponent's breeding and maturation facilities) will all come from waters adjacent to the Northern Territory. The disease status of these stocks has been well documented over recent years as this region has become the primary source of breeding stock for the Australian industry. In addition, the proponent is engaging in a rigorous disease testing and breeding program with

the aim of producing disease-free stock. This process is to be coupled with stringent biosecurity protocols between and within all the sites associated with this project.

DPIR notes that the biosecurity chapter of the report contains an incomplete section which references additional information to be supplied by the proponent to explain the management actions to be taken to minimise the escape of farmed prawns into the environment. This section needs to be completed.

Additionally, the biosecurity chapter makes reference to a comprehensive biosecurity plan. This plan was not included in the draft EIS. DPIR offers to work with the proponent, at the appropriate time, to develop a biosecurity plan that meets the farm's operational needs and that provides assurance to Government that biosecurity management is being adequately addressed. This will include reporting instances of high or escalating prawn mortality to the Director of Fisheries in accordance with statutory requirements of the Territory's Fisheries legislation.

DPIR advises that the supply to the farm of disease-free stock, coupled with the use of founder stock from Territory Waters addresses a significant proportion of the disease risk of the proposed farm. Additional risks can be managed by the (still to be developed) comprehensive biosecurity plan.

Other Comments

Whilst the project is unlikely to impact on any mining or petroleum developments, it is noted that the proponent proposes to build up to 6 MW power generation capacity to be supplied with diesel. Consideration should be given to compressed natural gas (CNG) which can be trucked from Middle Arm (a CNG project is currently under consideration at Middle Arm to supply CNG to ERA). This will reduce diesel imports and make use of cleaner and locally available natural gas. The project would require about 0.4 MMscfd (~0.4 TJ/d) of natural gas to run a 1.5MW power plant or 1.5TJ/d for a 6 MW power plant. CNG can be trucked at a capacity of 1TJ per truck load. This means a truck movement of 1 every 2 days to 1 or 2 per day at full scale.

The project should also consider whether renewable energy sources or alternative technologies can be implemented to generate power or reduce the overall power required in light of the current administration's renewable energy target.

DPIR acknowledges the substantial economic benefit that this project represents, not only to the Northern Territory, but to the Australian economy. The scale of this aquaculture project is without parallel in Australia and its successful delivery will have long-standing and far-reaching value for regional communities.

If you require any further information, please contact me in the first instance and I will direct you to the appropriate area within this department.

Yours sincerely

IAN CURNOW
A/Chief Executive

18 November 2016

11 DEPARTMENT OF HEALTH

From: Nicola Slavin
Sent: Friday, 25 November 2016 10:31 AM
To: eia NTEPA
Cc: Xavier Schobben; ChiefHealthOfficer DoH; OfficeoftheChiefExecutive DOH
Subject: HPRM: Department of Health - Comment on Draft EIS - Project Sea Dragon - Stage 1 Legune Grow-Out Facility

Attention: Sally Anne Strohmayr

Thank you for the opportunity to provide comment on the above Environmental Impact Statement (EIS). The following comments from the Environmental Health Branch of the Department of Health are provided for your consideration.

Executive Summary
Approvals, Conditions and Agreements
The Northern Territory *Food Act* should be added to the list of NT legislation which is applicable to the project

Volume 1, Chapter 3 Project Description
7.5 Accommodation Village

Under the *Public and Environmental Health Act 2011* all public accommodation including staff accommodation must be maintained in a good state of repair and in a clean and sanitary condition so as not to cause a public health nuisance. *The Public and Environmental Health Guidelines for Public Accommodation* outline the general requirements for conducting a public accommodation business such as the need to prevent overcrowding and provide an acceptable standard of sanitation, amenity and safety.

It is noted that a mess and a wet mess will be provided as part of the accommodation village. The Northern Territory *Food Act* defines a food business as 'any business or activity that handles food intended for sale or selling regardless whether the business is of a commercial, charitable or community nature, or whether it involves handling or selling on one occasion only'. Consequently the accommodation village's commercial food preparation area and bar area are considered to be a food business and will therefore require registration with the Environmental Health Branch in accordance with the *Food Act*.

It is recommended that the proponent also contact Licensing NT, Department of the Attorney-General and Justice in regards to the service of alcohol.

It is noted that the mess and dining hall will be designed to be used as a shelter in the event of a cyclone. It is recommended that the proponent contact NT Emergency Services in regards to emergency preparations

8.6 Potable Water
It is noted that potable water will be sourced from Forsyth Creek Dam and treated by chlorination and UV. The potable water supply must meet the 2011 NHMRC Australian Drinking Water Guidelines (ADWG).

In accordance with the *Australia New Zealand Food Safety Standards* the mess and wet mess as a Food Business must be supplied with potable water, For the purpose of the annual *Food Act* registration it is necessary for Food Business owners to demonstrate to Environmental Health that they have a potable water supply. The proponent will need to arrange for a certified analysis of the water to confirm the water meets the requirements of the ADWG, i.e. an annual credible analysis of a kitchen tap sample showing "pass" in total coliform and *E. coli*.

Volume 2 Environmental Assessment
Chapter 9 Waste Management
4.2.4.1 Sewerage Systems
It is noted that sewage will be managed via a packaged wastewater treatment plant and that treated effluent will be disposed to land application areas using either subsurface or surface irrigation or evapotranspiration beds. The NT Department of Health is the approval authority for onsite wastewater systems and must be contacted prior to the installation of any system.

For further information and advice on Environmental Health's requirements the proponent should contact the Manager Top End Environmental Health on 89227375.

Kind regards

Nicola Slavin | Senior Program Development Officer
Environmental Health Branch | Office of the Chief Health Officer | Department of Health

http://www.health.nt.gov.au/Environmental_Health

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12 UNIVERSITY OF TECHNOLOGY SYDNEY

From: Peter Ralph
Sent: Thursday, 24 November 2016 1:51 PM
To: eia NTEPA
Subject: HPRM: Public Comment - Peter Ralph - University of Technology Sydney - Project Sea Dragon - Stage 1 Legune Grow-out Facility

Attention Sally Strohmayr

We are pleased to provide the following comments on the Sea Dragon Environmental Impact Statement.

Project Seagrass Dragon should be commended for their well-presented and considered Environmental Impact Statement which includes a design of the Legune Station Grow-out Facility (Stage 1) based on the Aquaculture Stewardship Council Shrimp Standard and the Environmental Code of Practice for Australia Prawn Farmers. This shows the company's willingness to work co-operatively and collegially with local and international ecologically sustainable aquaculture practices.

We would like to provide several comments to enhance nutrient recycling strategies described in this proposal. The proponents describe how the effluent water from the grow-out facility will be passed through the EPZ and then into the Alligator Creek (Executive Summary, page 5). This practice could be further improved by passing this water through an "algal scrubber". Such a solution could include a large sloping open raceway where microalgae form a biofilm on the bottom of the channel and remove nutrients as the algae grows. The algal biomass could be harvested and used as a component in a fishmeal replacement. The selection of the most effective algal strain would need to be carefully considered. A similar solution could be implemented to reduce nutrients in the Internal Farm Recycling Pond (IFRP; see page 10) by using an algal scrubber, which would also produce algal biomass.

The proponents suggest that dried/leached pond sediment (mud/algal accumulation) could be used to help revegetate pond banks (see page 12). Although this strategy will remove nutrients from the pond floor, it is unlikely to remove nutrients from pond water. After any rainfall event, nutrients trapped in dried mud on top of the banks will be re-mobilised (dissolved) and run off the banks back into the pond, resulting in possible eutrophication and a decrease in dissolved oxygen in the pond water. This pulse of nutrients could also trigger algal blooms, which would be uncontrollable in both timing and species composition. We suggest that it would be more effective to consider options where organic rich sediment is actually removed from the catchment of ponds. Alternatively, the nutrients could be used to produce additional algal biomass that could be used as part of a replacement fish meal.

We hope these comments assist the ecological sustainability of this project.

Regards Peter Ralph

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Professor of Marine Biology | Executive Director, C3

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13 DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

NORTHERN TERRITORY GOVERNMENT

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File Ref: DLRM2016/0693
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Sally-anne Strohmayr
Department of Environment and Natural Resources
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Dear Ms Strohmayr

Re: Draft Environmental Impact Statement (EIS) for Comment - Project Sea Dragon Pty Ltd – Stage 1 Legune Grow-out Facility

The Department of Environment and Natural Resources has assessed the information contained in the above draft EIS and provides the following comments:

- The Draft EIS generally correctly identifies the key biodiversity values of the site. Field surveys undertaken in 2015/16 for the Draft EIS were generally well designed and adequate to detect or quantify target species.

  The key ecological value of the site is the internationally significant aggregations of waterbirds. The dynamics of these species and their habitats on Legune are complex, and there remains some uncertainty about the potential impacts of the development on this value, particularly in relation to any changes in the hydrology and inundation regimes of the freshwater wetlands.

  The site has at least national significance for migratory shorebirds, but the risk posed by the project to these values is low.

  A number of other threatened marine and terrestrial species are known to occur, or are likely to occur on or near the site, but the risks posed by the project to these species is low.

  The Draft EIS does not adequately consider the need for a robust medium-term monitoring program for waterbirds, which may inform an adaptive response in management of the site if negative impacts are observed.

  The treatment of introduced species in the Draft EIS should be reconsidered to focus effort on biosecurity and surveillance and management of high priority species.

  Attachment A contains the detailed commentary of the Draft EIS by the Flora and Fauna Division.

- A physical inspection was conducted on 6 July 2016 by the Weed Management Branch of NT Portion 798 for this retrospective land clearing application. Weeds observed and previously recorded on NT Portion 798, adjoining roads and parcels are listed below.

COMMON NAME	BOTANICAL NAME	DECLARED
mimosa	*Mimosa pigra*	Class A
gamba grass	*Andropogan gayanus*	Class A
water hyacinth	*Eichhornia crassipes*	Class A
neem	*Azadirachta indica*	Class B
parkinsonia	*Parkinsonia aculeata*	Class B
Neem	*Azadirachta indica*	Class B
sida	*Sida acuta*	Class B
coffee senna	*Senna occidentalis*	Class B

olive hymenachne	*Hymenachne amplexicaulis*	Class B
mossman river grass	*Cenchrus echinatus*	Class B
sicklepod	*Senna obtusifolia*	Class B
flannel weed	*Sida cordifolia*	Class B
hyptis	*Hyptis suaveolens*	Class B

All the above listed weeds have been recorded on NT Portion 798. Sida and parkinsonia were recorded close to the clearing areas and there is a risk they could be spread if appropriate weed hygiene measure are not applied.

Declared Class A weeds; mimosa, gamba grass and water hyacinth which are known to occur on NT Portion 798, these weeds have not previously been recorded on the specific land clearing site, spread of these weeds through machinery and vehicles is a high risk.

Declared Class B weed; parkinsonia has undergone considerable control, however this plant is still wide spread.

Weed Spread is Everybody's Business is a document that has been produced by the Weed Management Branch to highlight the areas of risk for all activities associated with weed spread. The document: https://landresources.nt.gov.au/rangelands/publications/weed-management-publications details the pathways through which weeds are spread and provides actions to reduce weed spread that should be addressed by proponents seeking to develop land. Specifically, pages 8 and 9 detail the importance of weed hygiene and the requesting of weed free machinery and ensuring appropriate wash downs procedures occur prior to and post machinery entering the property.

It is highly recommended that follow-up chemical control occur post land clearing activities to manage weed germination triggered by soil disturbance. If the land manager is unsure of the best ways to control any newly germinated species, advice should be sought from the Weed Management Branch.

The *Weeds Management Act* (the Act) enables the following weed declarations: Class A (to be eradicated); Class B (growth and spread to be controlled); Class C (not to be introduced into the NT); All Class A and B weeds are also Class C.

All land is the Northern Territory is subject to the Act. The Act states that the owner and occupier of land must - (a) take all reasonable measures to prevent the land being infested with a declared weed; (b) take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land.

Mimosa, gamba grass, parkinsonia and neem are all subject to Statutory Weed Management Plans. Management obligations outlined in the plans must be adhered to by all landholders. Copies of the Weed Management Plans can be found at: https://nt.gov.au/environment/weeds/weed-management-planning.

If you would like further information on chemical weed control or copies of the Statutory Weed Management Plans, please contact the Weed Management Branch on (08) 8973 8857.

- The Proponent states that between seven and 10 GL of freshwater will be required per year for the project. This water will be sourced from Forsyth Dam. Legune Land Pty Ltd is currently the holder of a 50 GL/year surface water extraction licence (811019) for Forsyth Creek (Dam) for the beneficial use of Irrigation. This licence is valid until 18 September 2018. The Proponent will need to demonstrate its stake in this licence in order to extract water from Forsyth Dam. The development poses a change to the beneficial use of the water and the licence holder will need to apply to change the beneficial use.

The Proponent states that on average, the seawater consumption requirement will be 575 ML/day from Forsyth Creek. The *Water Act* states that a person is required to hold a licence to take any water flowing or contained in a waterway; groundwater; or tidal water. The Proponent will need to apply for a licence to extract seawater.

Management of storm water drainage and overland flow are important to reduce impact on environment. Flood mitigation measures have been mentioned. In channel and dam designs, the updated rainfall intensities should be used.

The water quality management objective for the project is to adopt an Australian and New Zealand Environment and Conservation Council (ANZECC) (2000) ecosystem classification of "slightly to moderately system" (condition 2) for the marine receiving waters. The National Land and Water Resource Audit (2002) classified the condition of the Keep River estuary as "near-pristine", the highest category, which would broadly equate to the "high conservation" condition of ANZEC. Acceptance of the "high conservation" (condition 1) system requires no change in ambient condition unless it can be demonstrated that such change will not compromise the maintenance of biological diversity in the system. Thus, the choice of the management objective is critical. The adoption of the of "slightly to moderately system" (condition 2) could be justified based on catchment grazing and its impact on wet season sediment loads, which are assumed to have an impact during the dry season when river inflows cease. Note, in the future, the Keep River Irrigation Area will further impact on runoff water quality. In Summary, the adoption of the "slightly to moderately disturbed" system seems reasonable.

Ebb flow release of wastewater should be required, and be used to define the mixing zone.

The wastewater license should set maximum annual or seasonal loads of total N, total P and TSS, and not only water quality concentration maximum. The receiving environment is responding to the load rather than the concentration of the effluent.

The EIS has developed guidelines derived from the monitoring data. The efficacy of the monitoring program will very much be dependent on the validity of these guideline trigger values. ANZEC (200) recommend a minimum of monthly for 2 years. ANZECC (2000; page 3.3-7 vol 1) however encourage the development of seasonal guidelines where ecosystems are seasonally driven. This is the case for the Keep River estuary where catchment inflow is seasonally determined. The Department recommends the development of seasonal trigger values, for periods of catchment inflow (e.g. January to April) and no or negligible inflow (remainder of the year). Additionally, trigger values be determined for different waters, such as within close proximity to the mixing zone (may be contained within Alligator Creek), and more distant, Keep River estuary. Given this, a more comprehensive water quality trigger values will need to be developed as part of an Environmental Management Plan, not as part of the supplementary EIS.

Phytoplankton biomass in the estuary is light limited, though some relatively high chlorophyll values have been recorded (eg 12 µg/L). The natural high turbidity of the system will mediate the impact of nutrient pollution. Monitoring chlorophyll *a* and turbidity are the highest priority, and can be done by the use of logging instruments (e.g. Seabird instruments, recently used by INPEX for Darwin Harbour), which could be considered for monitoring, though there are some challenging practical considerations about deployment is a macro-tidal environment that may be overwhelming. Certainly, this would provide a much better baseline data, and monitoring program when the project is in operation.

> "For naturally-occurring stressors, use data from appropriate reference systems to determine the low-risk trigger value for each key indicator. For these Guidelines, data collected after two years of monthly sampling are regarded as sufficient to indicate ecosystem variability and can be used to derive trigger values. Ideally, in ecosystems not characterised by large seasonal or event-scale effects, develop trigger values for each month, i.e. a total of 12 low-risk trigger values. However, in some ecosystems, the relationships between physical and chemical indicators and key biological responses can be influenced by strong seasonal or event-scale effects. In these systems, it will be necessary to monitor so as to detect these seasonal influences or events. For ecosystems where seasonal or event-driven processes dominate (e.g. tropical wetlands), it is possible to group the data and derive a number of trigger values corresponding to the key seasonal periods. For example, in wet-dry tropical systems two trigger values can be derived, one for the wet season and another for the dry season. In these instances, collect, partition and compare reference and test data according to specific flow regimes and/or seasons, particularly where biological responses to a particular stressor can be identified to be more pronounced in a particular season or flow regime".
>
> ANZECC (2000). Page 3.3-7 vol 1

- A preliminary Geotechnical Investigation confirmed the presence of Potential Acid Sulfate Soils (PASS) at a number of locations on the coastal floodplain. These materials were found at or below 2.5 - 3 m below ground level. The investigation indicates that where PASS are likely to be present, the proposed depth of excavation will not disturb or expose them, which is the preferred practice. There is also recognition of the requirement the implementation of, and adherence to, an Acid Sulfate Soil Management Plan should it be required.

- An "Erosion and Sediment Control Strategy" has been provided in Appendix C1 of the draft Environmental Management Plan (EMP); however preparation and implementation of a detailed Erosion and Sediment Control Plan (ESCP) will still be required. Previous comments provided on 11/8/2016 for the Notice of Intent (NOI) (DLRM2015/5021) regarding an ESCP remain valid.

Should you have any further queries regarding these comments, please contact Kate Rogers by email kate.rogers@nt.gov.au or phone (08) 8999 4446.

Yours sincerely

Luis Da Rocha

23 November 2016

The Draft EIS generally correctly identifies the key biodiversity values of the site. Legislatively-listed threatened and migratory species occurring or likely to occur on the site are correctly identified. The information provided in the EIS (from previous data and surveys undertaken for the EIS) support the value of the site as of international significance for waterbirds, and of at least national significance for migratory shorebirds. The Department's assessment is that these are the key ecological values in relation to management and mitigation of potential risk arising from the project, and risks to other biodiversity values such as terrestrial threatened species are of minor concern.

The presentation format of some of the biological information in the EIS (Vol 2, Ch 6) makes interpretation more difficult than necessary. Field survey results are ordered by season, whereas it would be more sensible to order them by subject. The term "shorebirds" is used as a subset of "waterbirds", while it would be more sensible in this context to consistently distinguish shorebirds (that primarily use saline intertidal habitat and are typically international migrants) and waterbirds (that primarily use freshwater wetlands and are typically resident or nomadic).

Waterbirds – values

The proponent has undertaken surveys for waterbirds within the site over a one year period in 2015/16. These surveys are well-designed and adequately comprehensive both spatially and temporally (across seasons within one year), with appropriate observer expertise. However, it is important to stress that, given the dynamic nature of seasonally inundated wetland systems and the mobility of many waterbird species, a single year of data needs to be cautiously interpreted, including in the context of seasonal rainfall histories. Limited previous data for waterbirds are available for the Legune area (Jaensch 1994, Chatto 2006) but these support the ecological importance of the site. There are some differences in species composition and relative abundance of particular species between this earlier and 2015/16 data (for both waterbirds and shorebirds) and, without a more complete time-series, it is not possible to determine whether this difference reflects "normal" intor annual variation or real trends over time.

In this context, the comparisons drawn in the FIS for waterbird and shorebird numbers at Legune (2015/16 data) and other areas in northern Australia (multiple years and data sources) is not particularly meaningful (eg. Vol 2, Ch 6, Tables 5 and 6). The proponent is also correct in pointing out that Legune is not listed under the Ramsar Convention, and this reduces some assessment requirements under the *Environmental Protection and Biodiversity Conservation* (EPBC) *Act*. Nevertheless, the site clearly meets criteria for Ramsar listing, and such a listing need not be incompatible with multiple anthropogenic uses.

As documented in the EIS, the 2015/16 surveys by the proponent support previous data on the importance of the site for waterbirds, which was recognised in the inclusion of the area as a NT Site Of Conservation Significance (*Legune Coastal Floodplain*; Harrison *et al.* 2009). More than 20,000 waterbirds have been consistently reported across the Legune Coastal Floodplain, meeting RAMSAR Criterion 5. In addition, the proponent recorded internationally significant numbers of individuals for six waterbird species (RAMSAR Criterion 6: regularly supporting 1% of the individuals within a population of one species; Table 1). Previous surveys (Chatto 2006) additionally recorded internationally significant numbers of Pied Heron and nationally significant numbers of Purple Swamphen and Glossy Ibis (>1% Oceania population: Wetlands International 2012).

Table 1: Waterbird Species recorded at internationally significant numbers at Legune Station under the RAMSAR Criterion 6 during 2015/16 surveys by the proponent.

Name	Species
Magpie Goose	*Anseranas semipalmata*
Green Pygmy-goose	*Nettapus pulchellus*
Plumed Whistling Duck	*Dendrocygna eytoni*
Wandering Whistling-duck	*Dendrocygna arcuata*
Radjah Shelduck	*Tadorna radjah*
Pied Heron	*Ardea picata*

Five waterbird breeding colonies have been recorded at the site (from all data sources), and three were reported as active in March 2016 by the proponent. One colony was on the floodplain of Forsyth Creek while the other two were in the vicinity of two previously recorded colonies on the Keep River intertidal area.

The key ecological value of the Legune area is the aggregation of a high species diversity and large total numbers of waterbirds. The only threatened waterbird species (excluding shorebirds) likely to occur on the site is the Australian Painted Snipe *Rostratula australis* (Endangered EPBC Act; Vulnerable *Territory Parks and Wildlife Conservation* (TPWC) *Act*). This species was not detected by field surveys but the proponent assessed it as likely to occur on site, due to the mobility of the species and the large extent of suitable habitat. The primary area of suitable habitat for this species is associated with the Osmans Lake complex, with smaller areas within the Forsyth Creek catchment. Seven per cent of the potential habitat for this species will be cleared, but the Osmans Lake complex will not be impacted by the project. There remains some uncertainty around the impact of withholding water from Forsyth Dam in the future on other smaller ephemeral wetland habitats favoured by this species. Providing the ephemeral dynamics of the wetland system are generally retained across the floodplain (as discussed further below) then the Flora and Fauna Division support the proponent's assessment that the project poses a low risk to this species.

Waterbirds – risks and mitigation

The major sources of potential impact on waterbird habitat are modification of surface flows by project infrastructure, proposed cessation of water release from Forsyth Dam and changes to water quality from farm discharge. Water quality changes are more likely to impact on shorebirds and are therefore discussed in the shorebird section below.

The current wetland dynamics on parts of the Legune Coastal Floodplain are highly modified and controlled by the land manager, through bunding infrastructure to control water movement between paddocks, damming of Forsyth Creek and flood irrigating paddocks in the dry season. The bunds separate the upstream freshwater part of the system from the estuarine downstream area, effectively increasing the amount of freshwater habitat compared to pre-bund configuration. Modelling described in the EIS suggests that the current management of surface water flow, compared with pre-modification regimes, results in an increase in flood depth and extent in Alligator Creek and a decrease in flood extent in the Forsyth Creek floodplain in the wet season. The release of water from Forsyth Dam during the dry season considerably increases habitat available for waterbirds in both the Alligator and Forsyth Creek areas, and this was reflected during the 2015 surveys in a large increase in numbers of waterbirds, particularly Magpie Goose and Plumed Whistling Duck, following water release. The freshwater wetlands of the Alligator Creek system consistently supported the highest waterbird density and species richness across the site.

Upgrading the site access road for all weather conditions is the major infrastructure development with potential to impact on wet season waterbird habitat. The road could cause blockages on the upper floodplains, generally increasing upstream flood extent and depth. The proponent has proposed a series of under road culverts to improve water flow under the road. Water modelling appears to show that the culvert system will greatly reduce the impact of road blockages, leaving only highly localised changes to water depth, even under 100 year flood events. On the basis of this modelling, the Flora and Fauna Division accept the conclusion in the EIS that the culverts would minimise changes to wet season surface flows, to the extent that impacts from upgrading the access road pose a low risk to waterbird habitat values.

During the dry season, discontinuing the annual release of Forsyth Dam will result in a decrease in the extent of surface water, generally reducing available habitat for waterbirds, particularly in the Alligator Creek floodplain. The impact of this change on the key ecological value of the Legune site as a whole is difficult to assess with any confidence. Available data that predates the introduction of bund infrastructure, Forsyth Dam and dry season water release information showed that the site supported significant aggregations of waterbirds with "natural" dry season water regimes. Some important parts of the wetland complex (notably Osmans Lake and vicinity) are not affected by dry season water release, and there is no direct pathway for impact from the proposed development on these areas. The large increase in total waterbird numbers observed

in August 2015 following water release (Vol 2, Ch 6, Table 4) was heavily leveraged by two highly mobile species – Magpie Goose and Plumed Whistling-Duck. Nevertheless, maintenance of larger areas of suitable waterbird habitat in the mid to late dry season may be important in maintaining local and regional populations of a larger number of waterbird species, and may be particularly important in increasing resilience of waterbird populations to highly variable rainfall and inundation conditions across years.

The EIS states that ceasing water release from Forsyth Dam has the effect of "delaying" the availability of waterbird habitat by 4-8 weeks and implies that this is relatively trivial. It is not clear how this figure is derived - if water is typically released in August and substantial rainfall to replenish wetlands does not reliably occur until December, then the "delay" is closer to 12-16 weeks. "Natural" environmental flows to the Forsyth Creek floodplains will also remain restricted by the Forsyth Dam, without any compensatory dry season water release.

Uncertainty about the potential impact of the proposed development on waterbird habitat, particularly arising from changes in floodplain hydrology and inundation regimes, means that a monitoring program that can robustly track changes in waterbird composition, abundance and habitat usage over medium timeframes is essential. This is not adequately addressed in the Draft EIS and is discussed further below.

The 2015/16 surveys demonstrated that the area in the vicinity of the proposed prawn ponds is of relatively low importance for waterbirds (or shorebirds), so that vegetation clearing and excavation of the ponds is likely to pose a low risk to the key ecological values of the site.

The Draft EIS provides only limited detail on the management of prawn predation by birds, and some trials are proposed on the use of drones or helicopters to deter predators, while minimising impacts on resident waterbirds. More explicit detail is required (drawing from literature and the proponent's experience of bird predation on other prawn farms), including information on the likely predator species, current knowledge of the distribution and abundance of these predator species in the broader Legune region (or the ability for such birds to arrive), the current options for management, and a detailed assessment of how would these options could impact on the waterbird values of the wetland. It should be noted that any future proposed "pest mitigation" of native predatory birds would require a permit under the Territory Parks and Wildlife Conservation Act, and it is highly desirable that other mitigation measures make this unnecessary.

Noise, dust and visual disturbance associated with construction may have localised impacts on waterbirds. Some mitigation measures are proposed to reduce disturbance during construction, including temporary noise barriers. Details in the Environmental Management Plan are limited, but avifauna monitoring needs to be adequately designed so mitigation measures can be adapted in response to any observed significant disturbance. The proposal to investigate the viability of establishing a 150m band of trees and shrubs as permanent screening on either side of Alligator Creek infrastructure corridor seems impractical (there's a reason why trees don't grow on floodplains), but may also have perverse outcomes if it reduces habitat quality for waterbirds. Strictly enforced speed limits and possibly restrictions on the daily timing of traffic are likely to be more effective mitigation measures.

Other potential impact pathways of the proposed development include potential overflows of aquaculture ponds due to extreme rainfall events and marine intake through Forsyth Creek. These have a low likelihood of significant impact on waterbird habitat and are discussed further under the marine section below.

Shorebirds – values

Legune Coastal Floodplain provides at least nationally significant habitat for migratory shorebirds. The EPBC Act criteria (Policy Statement 3.21) for nationally important habitat for migratory shorebirds are: regularly supports 0.1% of the flyway population of a single species of migratory shorebird; or regularly supports 2,000 migratory shorebirds; or regularly supports 15 migratory shorebird species. These thresholds are all met for the Legune Coastal Floodplain, particularly the Turtle Point area.

The proponent undertook surveys for shorebirds using the site, over a one year period in 2015/16, and these surveys were well-designed and adequately comprehensive. During 2015/16 surveys, one shorebird species (Greater Sand Plover *Charadrius leschenaultii*) was recorded at levels of international significance (RAMSAR Criterion 6) and fifteen other species were recorded at levels of national significance (Table 2). Previous surveys in the region identified internationally significant numbers for Terek Sandpiper *Xenus cinereus* (Chatto 2003).

Comments made under the waterbird section in relation to cautious interpretation of data from a single year apply equally to shorebirds.

Twenty-one species of migratory shorebird species were recorded at Legune Coastal Floodplain by the proponent, including seven listed as threated under either the EPBC Act or TPWC Act (Table 2), slightly less than reported by Chatto from surveys in the 1990s (25 species; Chatto 2003). The Flora and Fauna Division generally agree with the significant impact assessments for these species presented in the Draft EIS. The discussion below applies to all of the threatened shorebird species unless specified otherwise, as most species use the same habitat and are subject to the same potential impacts.

Table 2: Shorebird Species listed as threatened and/or recorded at national and internationally significant numbers at Legune Station.

Name	Species	Nationally Significant	Internationally significant	EPBC Status	TWPC Status
Greater Sand Plover	*Charadrius leschenaultii*		X	Vulnerable	Vulnerable
Marsh Sandpiper	*Tringa stagnatilis*	X			
Red-necked Stint	*Calidris ruficollis*	X			
Sharp-tailed Sandpiper	*Calidris acuminata*	X			
Curlew Sandpiper	*Calidris ferruginea*	X		Critically Endangered	Vulnerable
Little Curlew	*Numenius minutus*	X			
Whimbrel	*Numenius phaeopsis*	X			
Eastern Curlew	*Numenius madagascariensis*	X		Critically Endangered	Vulnerable
Black-tailed Godwit	*Limosa limosa*	X			
Bar-tailed Godwit	*Limosa lapponica*	X		*L. l. baueri* Vulnerable *L. l. menzbieri* Critically Endangered*	Vulnerable
Common Greenshank	*Tringa nebularia*	X			
Lesser Sand Plover	*Charadrius mongolus*	X		Endangered	Vulnerable
Terek Sandpiper	*Xenus cinereus*	X			
Grey-tailed Tattler	*Tringa brevipes*	X			
Ruddy Turnstone	*Arenaria interpres*	X			
Great Knot	*Calidris tenuirostris*			Critically Endangered	Vulnerable

Red Knot	*Calidris canutus*				Vulnerable

**Legune includes the known distribution both subspecies of Bar-tailed Godwit*

Shorebirds – Potential Impact
The risk to shorebirds and shorebird habitats from the project appears to be low. The most important habitat areas for migratory shorebirds within the Legune Coastal Floodplain are Turtle Point and the Keep River intertidal flats, with additional feeding habitat available on the intertidal banks of Forsyth and Alligator Creeks. Many species were also recorded in freshwater habitats in small numbers, but this is not important habitat for most species. Curlew Sandpipers were also recorded in significant numbers in the Osmans Lake complex and in the lower and central sections of the Alligator Creek wetland system. Osmans Lake is outside the footprint of the project and no direct or indirect impact on this system is anticipated. Potential impacts to the Alligator Creek freshwater wetlands are discussed under the waterbird section above.

Turtle Point is located approximately 24km from the prawn farm site. The main potential impact pathway on this habitat is through increased nutrient load from the farm discharge at Alligator Creek. However, modelling of the prawn farm discharge presented in the EIS appears to adequately demonstrate that when the proposed volume of discharge (420ML) is released on every ebb tide, levels of P, N and chlorophyll a will be virtually undetectable in the Keep River system at the mouth of Alligator Creek. Given this, the risk of significant ecological impact downstream at Turtle Point and within the broader Keep intertidal flats appears to be very low.

There is some uncertainty in relation to the habitat value for shorebirds of the intertidal banks of Forsyth and Alligator Creeks. The EIS downplayed the potential value of these areas due to the low abundance of benthic invertebrates. However, there is no evidence presented to demonstrate that a low number of benthic macro-invertebrates at the sampling intensity undertaken relates to "poor habitat", and extensive comparison to other studies would be required to support this conclusion. For example, the mean abundance of benthic invertebrates in the sampling undertaken for the EIS did not appear to be significantly higher at Turtle Point, although this supports higher numbers of shorebirds (Fig 7.2 Ch 5 App 9). It is also noted that Eastern Curlew (Critically Endangered, EPBC Act) was recorded (presumably feeding) just as frequently on the intertidal banks of the Alligator and Forsyth creeks as they were in the channels to the north.

Marine Species – values
The Draft EIS correctly assesses that there are nine threatened marine species with a moderate or high likelihood of occurrence in the Legune area (Table 3). The Flora and Fauna Division agree with the assessment in the Draft EIS that an additional six threatened marine species have nil to low likelihood of occurrence as they are only vagrant or very occasional visitors to the Northern Territory (Table 5, Vol 2, Ch 7). The Flora and Fauna Division also agree with the assessment in the Draft EIS that there are seven marine and migratory species with a moderate or high likelihood of occurrence (Table 3), including three marine turtles that are also listed as threatened.

Areas of high habitat value in the marine and littoral environment bordering Legune include a significant nesting area for Flatback Turtle at Turtle Point. Keep River and Victoria River are likely to be important areas for sawfish due to the current low levels of human disturbance.

Table 3: Marine threatened and/or migratory species likely to occur in the waters around Legune station.

Name	Species	Likelihood of occurrence	EPBC Act	TWPC Act	Migratory
Glyphis garricki	Northern River Shark	High	Endangered	Endangered	
Glyphis glyphis	Speartooth Shark	High	Critically Endangered	Vulnerable	
Pristis clavata	Dwarf Sawfish	High	Vulnerable	Vulnerable	

Pristis zijsron	Green Sawfish	High	Vulnerable	Vulnerable	
Pristis pristis	Large Sawtooth Shark	High	Vulnerable	Vulnerable	
Chelonia mydas	Green Turtle	Moderate	Vulnerable	Near Threatened	yes
Eretmochelys imbricata	Hawksbill Turtle	Moderate	Vulnerable	Vulnerable	
Lepidochelys olivacea	Olive Ridley Turtle	High	Endangered	Vulnerable	yes
Narator depressus	Flatback Turtle	High	Vulnerable		yes
Crocodylus porosus	Estuarine Crocodile	High			yes
Orcaella heinsohni	Australian Snubfin Dolphin	High			yes
Sousa sahulensis	Australian Humpback Dolphin	High			yes
Dugong dugon	Dugong	Moderate			yes

Marine Species – Potential Impact
The major pathways for potential impact on marine vertebrate species are disturbance from noise and vibration during construction, entrainment or impingement by the seawater intake pump and changes in water quality due to farm discharge or overflow.

Increased noise and vibration from construction activities such as pile driving may have localised impacts on cetacean species, it is not clear how long these impacts persist after construction. Some measures are described in the Draft EIS to minimise potential impacts to marine fauna, and the Flora and Fauna Division also recommend undertaking pile driving activities at low tide to minimise the sound and vibration footprint through the marine environment.

The seawater intake pump station in Forsyth Creek may entrain or impinge marine fauna. The proposed measures to mitigate impacts on marine species include appropriate placement of the intake pipe, maximum velocity set within the speed of tidal movements so that most marine species can swim against the current within 1.25m of the intake point, and restricting intake to the mid to high tide period. These measures appear to be sufficient to reduce risks to an acceptable level. The information provided in the Draft EIS is sufficient to demonstrate that the intake pump provides a low risk to juvenile sawfish. The intake pump could potentially entrap hatchling flatback turtles, but the likelihood of hatchling turtles being present in the region of intake is low.

The water modelling in the EIS sufficiently demonstrates that, outside of a localised mixing zone, water quality changes as a result of farm discharge will be minimal or barely detectable in the broader marine environment, including Turtle Point and upstream of the Keep River. Elevated nutrient levels will occur in a mixing zone 200m upstream and downstream from the outlet within Alligator Creek, but this is not considered critical habitat for any marine species.

Increased human access to the site may result in increased recreational fishing with a potential negative impact on threatened sawfish species, as incidental bycatch and mortality is a common threat to these species. This risk could be reduced by induction material for new staff including education on how to identify and safely release sawfish.

As identified in the Draft EIS, boat strikes on marine megafauna or injured or stranded animals should be reported through the NT Government's Marine Wildwatch hotline or web portal.

Terrestrial Fauna Species
Eleven terrestrial species listed as threatened occur or may occur on the site. In general, the Flora and Fauna Division agree with the assessment of likelihood of occurrence (Vol 2, Ch 6, Table 10) and significant impact assessment (Vol 2, Ch 6, Tables 14, 20, 21, 23-28) for terrestrial fauna species presented in the Draft EIS, with some additional details below.

Threatened Species recorded on site

Bare-rumped Sheath-tailed Bat *Saccolaimus saccolaimus* (Critically Endangered EPBC Act), was detected by consultants by aural sampling. There remains some doubt around the ability to differentiate the calls of this species from *Saccolaimus flaviventris*, although the consultants have devoted significant effort to validate this. However, assuming that the species is present, the Flora and Fauna Division agree with the proponent that the project poses a low risk to the Bare-rumped Sheath-tailed Bat, due to very limited pathways for impact. Roosting sites were not found in the area to be cleared despite reasonable search efforts. This species forages over large areas, therefore the loss from clearing of a small proportion of potential foraging habitat lost is not likely to result in a significant impact.

Ghost Bat *Macroderma gigas* (Vulnerable EPBC Act), was detected on site by the proponent, in an area outside the project footprint. The species has only recently been listed and a significant impact assessment was not presented in the Draft EIS, although it was discussed in the Terrestrial Fauna Appendix (Vol 5 Appendix 15). Suitable habitat for roost sites was not present within the project footprint. The detection of a Ghost Bat suggests that there may be a roost site in the rocky ranges to the south of Forsyth Dam and/or Lindens Range.

Gouldian Finch *Erythrura gouldiae* (Endangered EPBC Act; Vulnerable TPWC Act) was detected on site by the proponent. The Flora and Fauna Division agree with their assessment that the project will not result in a significant impact on this species, as no potential breeding habitat exists within the project footprint. There is a small area of potential wet season foraging habitat that will be impacted by widening of the access road but this is a very small proportion of available habitat in the local area.

Grey Falcon *Falco hypoleucos* (Vulnerable TWPC Act): One sub-adult Grey Falcon was recorded during 2015/16 surveys. The Flora and Fauna Division agree with the assessment that the project will not result in a significant impact on this species due to its highly mobile nature and the area to be cleared being a very small proportion of the widely available habitat.

Threatened Species which may occur on site

Northern Quoll *Dasyurus hallucatus* (Endangered EPBC Act; Critically Endangered TPWC Act): The survey effort for Northern Quoll described in the Draft EIS was not sufficient to reliably detect the species at the low densities at which it now occurs on the NT mainland. However, the Flora and Fauna Division agree that the likelihood of occurrence of the Northern Quoll in the project area is low to moderate and that the project is not likely to result in a significant impact on this species. The majority of the project footprint occurs in marginal habitat for quoll and the extent of higher quality habitat to be cleared is small (<1% of woodland). Cane toads are already well established across the site and the risk of fire regimes being modified by this project to the further detriment of this species is low.

Red Goshawk *Erythriorchis radiatus* (Vulnerable EPBC Act and TPWC Act): the Flora and Fauna Division agree that the likelihood of occurrence of the Red Goshawk is low to moderate and that the project is not likely to result in a significant impact on this species. The majority of the potential habitat for this species is outside the project footprint.

VRD Blacksoil Ctenotus *Ctenotus rimicola camptris* (Vulnerable TWPC Act): While this species occurs on black soil floodplains to the south and east of Legune, adequate targeted survey by the proponent demonstrated that it is unlikely to occur within the project footprint. The Draft EIS also describes some analysis of soil mapping in relation to the known distribution of the species, which supports its absence from the site.

Water Mouse *Xeromys myoides* (Vulnerable EPBC Act) is not likely to occur on site (Legune is well outside the species known distribution, the nearest record being c. 220km to the northeast). Potentially suitable habitat for the species (mangrove and intertidal grass, sedge and forb-lands) on Legune is not likely to be significantly impacted by the proposed development.

None of the three Varanus species, Merten's Water Monitor *Varanus mertensi*, Mitchell's Water Monitor *Varanus mitchelli* and Yellow Spotted Monitor *Varanus panoptes* (all Vulnerable TWPC

Act) was detected on site, despite adequate survey effort. While these species would be expected to occur on the site based on their distribution and habitat preference, the observed absence may reflect major local decline attributable to cane toad invasion. Riparian habitats in the upper Alligator Creek wetland system and Alligator Springs should provide habitat for Mitchell's Water Monitor and Merten's Water Monitor, and the project is not likely to have a significant impact on these habitats. Habitat for the Yellow-spotted Monitor is widespread on the site and up to 7% of this habitat will be cleared for the project.

Species not detected or with low likelihood of occurrence

The following seven species were assessed by the proponent as having unlikely or highly unlikely potential occurrence: Masked Owl (Northern) *Tyto novaehollandiae kimberli* (Vulnerable EPBC Act and TWPC Act), Pale Field-rat *Rattus tunneyi* (Vulnerable TPWC Act), Partridge Pigeon *Geophaps smithii* (Vulnerable EPBC Act and TWPC Act), Purple-crowned Fairy-wren (western) *Malurus coronatus coronatus* (Vulnerable EPBC Act and TWPC Act), Brush-tailed Rabbit-rat *Conilurus penicillatus* (Vulnerable EPBC Act; Endangered TWPC Act), Plains Death Adder *Acanthophis hawkei* (Vulnerable EPBC Act and TWPC Act), Northern Crested Shrike-tit *Falcunculus frontalus whitei* (Vulnerable EPBC Act and TPWC Act) and Night Parrot *Pezoporus occidentalis* (Endangered EPBC Act; Critically Endangered TPWC Act).

The Flora and Fauna Division agree with this assessment, and in some cases adequate survey was undertaken to confirm that the species was absent (Masked Owl, Purple-crowned Fairy-wren and Partridge Pigeon).

Terrestrial Systems – potential impacts

The project will result in only minor disturbance and destruction of habitat for terrestrial threatened species likely to occur in the project area. The major potential pathway for impact from the proposed development on terrestrial fauna (and flora) is through facilitating the introduction and spread of environmental weeds and feral animals. Species of particular concern include Gamba Grass, Mimosa and Black Rat (*Rattus rattus*). The treatment of introduced species in the Draft EIS (Vol 2, Ch 6, section 5.5) needs to be reconsidered to focus effort on biosecurity and surveillance and management of high priority species. Cane toads are well established in the Legune area and localised control of toads is likely to be token, rather than have real biodiversity benefits. Similarly, broad-scale control of feral cats is ineffective while populations adjacent to the site remain unmanaged. More critically, cats should not be able access potential food sources such as rubbish dumps and bins around the project site.

Vegetation and Significant Flora Species

The Draft EIS correctly identifies the terrestrial flora value of the site. Surveys by the proponent were adequate to confirm the absence of threatened plant species from the project footprint. Four data deficient species were identified within Legune Station, which are also outside the proposed project footprint. Clearing and disturbance of native vegetation for the development represents very small proportions of the local and regional extent of these communities and the vegetation management strategy appears adequate to ensure a low risk to biodiversity.

Monitoring

Limited detail is provided in the Draft EIS of any monitoring of biodiversity that may be potentially impacted by the project, and proposed fauna and flora monitoring is generally limited to the construction period (Vol 2, Ch 6, section 5; Vol 4, Ch 3 C6). As described above, the key ecological value of the site is the internationally significant aggregation of waterbirds, and there remains some uncertainty about the impacts of the development on this value, particular in relation to any changes in the hydrology and inundation regimes of the freshwater wetlands. It is therefore important that a monitoring framework is developed that can robustly track waterbird composition, abundance and habitat usage over medium timeframes, and potentially allow for an adaptive response in site management if negative impacts are observed. This requirement is likely to become increasingly important if future stages of the development proceed. In addition to monitoring waterbirds directly, the monitoring framework may also consider indicators of habitat quality, but the former is an essential component. The draft EIS and EMP should address this issue in much greater detail.

References

Chatto R. (2003). The distribution and Status of Shorebirds around the coast and coastal wetlands of the Northern Territory. Northern Territory Parks and Wildlife Commission Technical Report **73**, Darwin Northern Territory.

Chatto R. (2006). The distribution and Status of Waterbirds around the coast and coastal wetlands of the Northern Territory. Northern Territory Parks and Wildlife Commission Technical Report **76**, Darwin Northern Territory.

Harrison L, McGuire L, Ward S, Fisher A, Pavey C, Fegan M and Lynch B (2009). An inventory of sites of international and national significance for biodiversity values in the Northern Territory. Department of Natural Resources, Environment, the Arts and Sport, Darwin, NT.

Wetlands International (2012). Waterbird Population Estimates, Fifth Edition. Summary Report. Wetlands International, Wageningen, The Netherlands.

14 COMMONWEALTH DEPARTMENT OF ENVIRONMENT AND ENERGY

Attachment A: Department of the Environment and Energy comments on the *Project Sea Dragon Stage 1 Legune Grow-Out Facility Draft Environmental Impact Statement (EIS)*

Section/Page	Issue	Comment
Volume 1 – Project Overview Chapter 3 – Project Description		
Section 5.1 Site Establishment p. 3-28	Construction will occur during the dry season when wetland habitat naturally retracts.	1. Care should be taken to minimise the clearing of mangrove habitat when construction activity occurs at the intake and outfall structures. Any innovations or solutions to minimise the area of cleared mangrove forest are encouraged so that potential impacts on this important habitat for dwarf and green sawfish (*Pristis clavata* and *Pristis zijsron*) will be minimised.
Section 8.4.1 Solid Waste Management p. 3-86	Farm pond and channel waste is to be used for multiple purposes in a range of environments both onsite and offsite.	2. Please characterise this waste material and describe the likely impacts to water quality in areas it may be used.
Table 1 Terms of Reference Section 2.2	Table 1 states that 'barge landing' is a component of the proposed action. However, there is no further information provided on the construction of a barge landing or use of a barge during construction or operation.	3. Please describe the use of barges and likely impacts to MNES if they are to be used during the construction or operation of the proposed action.
Volume 1 – Project Overview Chapter 5 – Water Balance		
Figure 12 – Water Released into Alligator Creek p. 5-17	The inter-annual variability in discharge volumes into Alligator Creek is not shown.	4. Please provide a comparison of the proposed discharge volumes and velocities against the prevailing tidal conditions within Alligator Creek at the time of discharge.

Section 4.4 Reliability of Freshwater Supply p. 5-18	Freshwater demand modelling indicates that there is a 2 per cent chance that in a five-year interval the dam volume may fall below the 10 GL threshold.	5. Contemplating this as a 'worst-case' scenario, please discuss the likely impacts of this with regard to habitat contraction for migratory birds.
Volume 1 – Project Overview Chapter 6 – Approvals, Conditions and Agreements		
Section 3.3 Northern Territory Policies and Guidelines p. 6-14	This section outlines the relevant guidelines and policies relevant to the legislation implemented by the NT EPA.	6. Please outline the relevant EPBC Act policies and guidelines relevant to the proposal.
Volume 2 – Environmental Assessment Chapter 1- Geology, Geomorphology and Soils		
Section 4.2.5 Soil Salinity and Sodicity p. 1-35	Ponds and channels will only be lined with surface water soils. The suitability of the local topsoil for pond lining is unclear as no formal seepage analysis or permeability testing was reported and the thickness of the proposed liner is unclear.	7. Provide evidence that surface soils are impermeable to the saline water that will be utilised in ponds and channels and will safely prevent that salinization of soils and groundwater.
Volume 2 – Environmental Assessment Chapter 3 - Freshwater		
Section 4.1.1 Changes in Floodplain Hydrology – Flood Events p. 3-27	In rainfall events greater than a 50 year ARI, the capacity of swales may be exceeded, resulting in the uncontrolled release of pond water into biosecurity zones to be discharged into the tidal floodplain.	8. Please describe the likely impacts of an unplanned release.
Section 4.2.1.2 Cessation of Forsyth Creek Dam Release p. 3-31	The Department also considers that reduced groundwater recharge may occur as a result of the cessation of the Forsyth Dam release.	9. Please discuss the likely impacts to MNES as a result of reduced groundwater recharge.
	Shorebirds recorded foraging in Alligator Creek would be utilising tidal areas and as such the impacts of ceasing the release of freshwater from	10. It is recommended that further long-term monitoring of the site is undertaken to assess whether there is a downward trend in bird numbers or spatial variation

	Forsyth Creek Dam are unlikely to impact these species. It is also noted that glossy ibis (*Plegadis falcinellus*; EPBC Act listed migratory) were recorded in high numbers. This species is nomadic, following seasonally inundated wetlands for breeding and foraging.	in habitat use as a result of the proposed action. If modelled impacts are exceeded, revision of management measures is required to avoid ongoing impacts on birds and habitat use.
	The cessation of the Forsyth Dam release will lead to a 'return to natural dry season conditions' in the Forsyth and Alligator Creek catchments. It is unclear what 'natural dry season conditions' are for the Forsyth Creek and Alligator creek catchments given that natural flows are impeded by the dam.	11. Please describe the predicted changes to wetlands and waterholes in these catchments once dry season releases are suspended and likely impacts to sawfish species, which are known to move onto inundated floodplains during the wet season and use waterholes as refuges during the dry season. Please note, it is considered that dry season refuge habitat may be lost as a result of the proposed action, which may impact on sawfish individuals occurring in floodplains of upper Forsyth Creek and upper Alligator Creek which receive water from the Forsyth Dam.
Volume 2 – Environmental Assessment Chapter 7 – Marine and Estuarine Ecology		
Section 4.1.7 Spread of Diseases and/or Pathogens p. 7-34	In the case of a disease being identified, steps will be taken to contain the disease to the pond(s) in which it has been identified, which will prevent any water being released from the ponds.	12. Please describe how contaminated water will be disposed of in the case of a disease outbreak.
Section 4.1.9 Increased Light p. 7-35	Increased illumination has the potential to impact nesting turtles and hatchlings.	13. It is noted that the proposed action area is a significant distance from known turtle resting areas. However, please describe the design and level of

		lighting that will be used on-site and the expected distance that light glow could be visible.
Table 11 Significant Impact Assessment – Largetooth Sawfish p. 7-43	The draft EIS states that the largetooth sawfish is unlikely to occur in the vicinity of the seawater intake at Forsyth Creek and the discharge point at Alligator Creek as 'freshwater sawfish occur in rivers and upper estuarine areas'.	14. This statement is unfounded as the species is not limited to upper estuaries or the upper reaches of rivers and has been recorded in habitat similar to that within the proposed action area. Please provide an assessment of impacts on the largetooth sawfish, taking the above information into consideration.
Section 5.1.6 Mitigation and Monitoring – Increased Noise p. 7-56	The proponent states that if, after works have commenced, marine fauna are observed within 100 m of the noise emitting source, pile driving will cease until the animal has passed.	15. Please provide evidence and justification for this distance as a mitigation measure to assist in the assessment of whether 100 m is a sufficient distance to mitigate impacts. Alternatively, in accordance with previous EPBC approvals with potential impacts to a similar suite of marine megafauna, a 500 m exclusion zone should be established.
Section 5.1.8 Mitigation and Monitoring – Increased Access p. 7-57	The proponent states that visitor access to the proposed action area will be managed. It is noted that there will be a large construction population present for up to two years and both construction and operation workers may want to participate in recreational activities such as fishing.	16. Please discuss potential impacts resulting from recreational activities and any relevant mitigation measures. This should include the management of access to all important roosting and foraging areas for shorebirds.
		17. Recreational fishing may increase the risk of capture of sawfish and river shark species. Please provide details of any relevant mitigation measures, which may include educational materials and signage on the property about the protected status of the

		sawfish and river shark species or prohibiting recreational fishing.
Volume 2 – Environmental Assessment Chapter 13 – Noise and Vibration		
Table 3 Construction Equipment Noise Levels p. 13-5	Table 3 states that noise levels associated with pile driving can be recorded at 133 dBA. However, pile driving is not mentioned again in this chapter and the noise contour figures (Figures 2–4) do not show any values greater than 80 dBA.	18. Please provide additional information on the noise impacts of piling on MNES, including noise modelling that will inform caution and shutdown zones if required.
Volume 5 – Appendices Chapter 8 – Coastal Assessment and Hydrodynamic Modelling		
Executive Summary	While the draft EIS states that under the preferred release option (only during ebb tide) potential for impacts to migratory shore birds as a result of the discharge release into Alligator Creek is minimal, it is important to note that this is only based on modelling.	19. Long-term monitoring of migratory shorebird populations is required to assess whether a downward trend in bird numbers or spatial variation in habitat use as a result of the proposed discharge into Alligator Creek. If modelled impacts are exceeded, revision of management measures is required to avoid ongoing impacts on birds and habitat use.
Section 2.4.5 Local Currents	Estimated current velocities in the proposed action area are based solely on modelling.	20. Please provide measurements of current velocities in the proposed action area to validate model predictions.
	The estimated flow rate in the northern channel of Alligator Creek during neap tide conditions is expected to be less than 50 m^3/s. However, the discharge rate at this time, due to the limited discharge window during some ebb flows, may	21. Please provide further discussion of changes in flow volumes in the northern channel due to discharges from the proposed action and an analysis of how this could affect erosion, scour and channel migration. The effects of the island upstream of the discharge point and its effect on flow characteristics and the

	exceed 60 m^3/s in order to achieve the long-term average daily discharge rate of 420 ML.	variation in erosion rates depending on the overall movement of the sub-channels should be included in this discussion, as well as consideration of a variable volume discharge regime in which the volume discharged is proportionate to the tidal volume in the relevant sub-channel.
Figure 3-20 Varying Discharge Rate – model tracer p. 166	Results of numerical modelling of solute transport identified a discharge regime with discharge occurring on every ebb tide as giving the best water quality outcomes for the receiving environments of Alligator Creek and Keep River.	22. It is noted that discharge in this model is stopped before the base of the tide, however it was unclear what timeframe was selected. Please provide clarification.
Figure 3-34 Varying Discharge Rate – nutrient levels p. 170	Diagrams of probable concentrations of nitrogen, phosphorous and chlorophyll *a* are based on a discharge concentration equivalent to the mean licence condition concentration. The proponent states that the model inputs shown in Table 3-3 account for a range of tidal cycles and model dry season conditions to provide an estimate of the 'worst-case scenario'.	23. To demonstrate an accurate 'worst-case scenario', please re-run the model using the maximum proposed discharge concentrations (i.e. the maximum licence conditions as outlined in Table 3-2).
Volume 5 – Appendices Chapter 9 – Estuarine and Marine Quality and Ecology		
Section 17.1 Water Quality p. 220	Baseline water quality data is temporally limited, however the proponent has committed to continuing collection until two years' worth of data is available, then calculating final site specific water quality guidelines.	24. Water quality sampling should occur in the Environmental Protection Zone (EPZ) in addition to the proposed monitoring sites to ensure water quality objectives are met.

	The proponent has stated that water quality sampling will occur only outside the wet season and on neap tides and that sampling will occur approximately fortnightly on the lowest tide.	25. Water quality sampling should occur year-round when it can be undertaken safety. While the proposed sampling regime may be appropriate, initial weekly sampling would assist in characterising the discharge environment and informing management. Sampling should occur soon after discharge commences in order to capture actual discharge conditions.
Volume 5 – Appendices Chapter 13 – Groundwater Data		
Table 3 Summary of Groundwater Data from Bore Logs1 p. 24	The data presented on groundwater quality is limited both spatially and temporally as recent data is only shown for RN038543 (May 2014), located on the western edge of Farm 3.	26. Please provide further observations to confirm the conceptual model in the area of the grow out ponds. 27. Please note, the EC units in Table 3 are incorrect. They should be µS/cm not dS/m (1 dS/m = 1000 µS/cm), otherwise salinity would be extremely high.
Volume 5 – Appendices Chapter 16 – Biosecurity Assessment		
Section 4.1.1 Development of domesticated prawn stocks, free of all major diseases of concern p. 8	The proponent plans to develop stocks of Specific Pathogen Free prawns.	28. Please discuss whether antibiotics will be used at any stage of the production process, including those not included in the stage of development subject to this assessment. If antibiotics will be used, please discuss the potential impacts that the release of treated water or escapees may have on MNES as a result of entering the food chain.

15 ANONYMOUS PUBLIC COMMENT

I make refference to the Northern Territory Enviroment Protection Authority ***Terms or Reference for the preparation of an Enviromental Impact Statement*** document and Sea Farms subsiquent ***Draft Enviromental Impact Statement*** in response to it.

I refer to various headings in the Terms of Reference document that I make comments on.

2 Description of the proposed action

2.1 General information

The EIS should identify all the processes and activities intended for the Project and associated ancillary activities, during the life of the Project. The EIS should provide a brief background and context to the Project, including:

- *the title of the Project*
- *the full name, contact details and postal address of the Proponent*
- *the current status of the Project*
- *the location of the Project in the region and its proximity to:*
  - *landmark features*
  - *sites of cultural significance*
  - *sites of social significance*
  - *regional community centres*
  - *areas on the National Reserve System*
  - *sensitive environments, such as major waterways, significant groundwater resources, significant natural features and conservation reserves*
- *the location of all infrastructure (both existing and proposed) relating to any aspect of the construction, operation and decommissioning/rehabilitation of the action*

I make the following Comment:

Under section 2.8.6 of Sea Farms Draft Environmental Impact Statement, Sea Farms do not layout the overall map on what the future stages will potentially look like. This makes it difficult for the public(especially those that cannot read) to get a understanding on the immense size of this proposed Prawn Farm. It is my understanding that a large portion (percentage wise) of the Cracking black soil plan will be effected by the future stages of the project. This will have significate impacts on the fresh water layers in the water table and consequently, the large percentage of the fresh water flora and fauna that rely on this fresh water to support their habitat will be effected.

My current understanding is that the Black Cracking clay soil will be infiltrated with high contents of salt water that would limit any further fresh water fauna growth and kill off what is in existence currently. This would have consequential effects on the fauna and Flora that rely on a natural fresh water environment to survive. As it is well known the Legune Floodplain is a Freshwater Wetland of International significance that needs to be preserved.
I'll discuss these effects in later comments in more detail.

- *the background to the development of the Project, including discussion of previous or other environmental impact assessment*
- *how the Project relates to any other proposals or actions, of which the Proponent should reasonably be aware, that have been or are being taken, or that have been approved in the region (e.g. Ord Stage 3, expansion of the Keep River National Park)*

• lease requirements, land tenure, acquisition requirements (permits, rezoning and Native Title (e.g. Legune Area Claim No. 188)), and the tenures under which the Project would be held, including details of relevant legislative processes required to grant proposed tenure
• identification of areas proposed for future expansion, or any other potential future activities being planned

I make the following Comment:

I cannot find any reference to Mapped areas identified for future expansion except for generalities regarding size in written text. This does not well inform all people especially those that cannot read.

• National, State and/or Territory standards, codes of practice and guidelines relevant to the Project.

2.2.3 Decommissioning and rehabilitation

The EIS should discuss the expected life of the Project and plan for decommissioning and closure, including unexpected closure. At a minimum, the EIS should:

• identify options for decommissioning of all components of the Project and rehabilitation of the site

I will only make comment on the potential issues with the rehabiltation of the Deltaic Estuarine Plain which is classified as a area of International Conservation significance as I feel this will be the most effected by the proposed devopment.

I make the following comment:

Under Volume 1, chapter 3, section 11 of Sea Farms Draft EIS it is mentioned by Sea Farms that the project will be an ongoing sustainable venture and there is no real need/plans for a rehabilitation plan. For an area recognised as a conservation site of international importance, this is certainly an unacceptable line of thinking and not in the best interest of the environment.

Sea farms propose to construct most of their earthen structures using the black cracking clay including the topsoil. The top 300mm of this clay (which is what is being used) makes up the topsoil that supports the existing fresh water ecosystem that are present on the Deltaic Estuarine Plain. The question needs to be asked:
How do Sea Farms propose to rehabilitate the site when the topsoil will be destroyed in the bank building process and the subsequent filling of those bank structures with Sea Water that will ultimately saturate the topsoil with salt water?
Currently in Australia, all mining operations need to conserve topsoil for later rehabilitation processes. Given that Sea Farms are using this topsoil in their banks this will be difficult if not impossible to do. There is mention in the EIS that topsoil would be stockpiled for later use but in the Rehabilitation process in the EIS document, the method proposed does not mention the use of any stock piles of topsoil.
If Sea Farms are serious about being able to rehabilitate the site, they should be made to demonstrate the rehab process with Trials before the approval is given to disturb the site.

• discuss relevant aspects of closure planning and decommissioning such as waste management, pollution control, land stabilisation, erosion and sediment control, revegetation and avoidance of breeding sites for biting insects

I make the following comment:

The EIS fails to mention that the fully developed Venture will cover a large portion of the Estuarine Deltaic Plain, that will highly likely effect all this area environmentally. The area covered by Stage one is said to be 3239Ha.The rehabilitation Plan should show how Sea Farms would be rehabilitating the entire 40,000Ha of plain that surrounds all stages of the proposed Farm in this event. It is highly likely that the surrounding estuarine plain will be detrimentally effected by water with higher than naturally occurring concentrates of salt. The consequences to the area of International Conservation Significance would be dramatic. A rise in water table that contains higher concentrates of salt will cause a loss in surrounding vegetation that would lead to increased erosion from wet season flooding events on the topsoil. This would allow high tides to flow further into the Deltaic Plain leading to further degradation of the fresh water environment.

• propose environmental objectives and completion criteria against which the progress of decommissioning and rehabilitation can be measured.

2.6 Ecologically Sustainable Development.

When considering the matters to be addressed in the EIS, the NT EPA is required under the Northern Territory Environment Protection Authority Act to:
(a) promote ecologically sustainable development (ESD)
(b) protect the environment, having regard to the need to enable ESD.

Accordingly, the Project, its potential impacts (positive and negative) and the management measures used to enhance positive and reduce negative impacts will be assessed in the context of ESD principles, consistent with the National Strategy for Ecologically Sustainable Development. 1 Therefore, it is essential that the Proponent demonstrate how it complies with and contributes to the principles and objectives of ESD in the relevant section(s) of the EIS.

I make the following comment:

Sea Farms need to address how their development at Legune Station is ecologically sustainable.They do not address how a change in ground water hydrology (from their salt water ponds) is going to be addressed. A change in Ground water salt content is going to dramatically change the existing fresh water ecosystems that form part of the land that the Grow-Out Ponds are situated as well as the surroundig areas as these will be effected by rising salt water tables. In Sea Farms EIS in volume 1 chapter 7, they discuss how they will comply with ASC Shrimp standards which list a number of objectives, none of which however, are specific to the site at Legune.
I do not see anywhere in this chapter that shows how Sea Farms will minimise the change in the existing ecosystems at the Legune Station site that need to be conserved.

3 Existing environment

Studies used to describe the existing environment of the Project and its surrounds should be of a scope and standard sufficient to serve as a benchmark (or baseline) against which the impacts of the Project over time may be assessed. The level of detail in the EIS should reflect the scale and nature of the studies required to clearly define the potential for impacts from the Project.

3.1 Physical and biological

Existing aspects to be discussed must include:

• climate and local meteorology in the context of project environmental management, including rainfall patterns and intensity, temperature, evaporation, wind, and the predicted frequency and severity of extreme weather events, such as storms and cyclones for the 2, 10 and 100 year average recurrence intervals (ARI)
• regional topography and geomorphology
• regional geology
• soil types and land unit(s)

I make the following comment:

The deltaic Plain consist of a dark black cracking clay of various thickness (300mm to 700mm) that is relatively impervious to water. It is underlayed by 3 to 4 m of sandy silty clay which is not impervious to water, and this is underlayed by estuarine clay which is again impervious to water. The sandy silty clay is very dispersive when exposed to fresh water.

The water table sits within the middle layer of pervious silt and moves up and down in direct relation to the recharge from either overland flow/rainfall or by nearby streams and or water capturing landforms which are connected to the Estuarine plain. After an average wet season the water table is at the surface and slowly drops as the dry season develops to around 1.5 to 2 m below the surface. The water table consists of saline water with the water with the least salt content (< than 7 parts per thousand) sitting above the saltier water (up to 35 parts per thousand). Most of the grasses that are present on the black soil plains access this fresh water for their growth and survival. The volume of low salt content water as a percentage in the water table goes up after wetter years and likewise is the opposite (less fresh water) in dryer years.

The concern I have is this:
Turkey Nest's constructed at legune over the last 30 years have the borrow pits (where the construction dirt is accessed) situated outside of the water holding structure. This is because the layer of impervious black clay needs to be maintained to stop the structure from leaking its water into the pervious clayey silt in the lower soil layers.To check this one needs to access Google earth to confirm this. Any turkey nest (and there are some) which have been constructed with the borrow pits on the inside at Legune do not hold water (fact). The water leaks down into the lower layers of soil and eventually the Turkey Nest is dry within a few months. This would indicate that if the construction methodology on the Prawn Farms was to use most of the Black cracking clay then the result would ultimately be that water (and in this case very salty) would leach into the water table below. This would raise the water table on the Estuarine Deltaic plain exposing the surrounding Fresh water reliant grasses to saltier water than what they can tolerate. The result would be large areas of grass lands would cease to exist and the subsequent topsoil that these grasses grew would be highly exposed to wet season erosion. The grasses on the floodplain hold the black cracking clay together in flood events.
The grass is the densest during the wet season and act to not only slow the movement of water across the floodplain, by removing the energy from the water, they also act to shield the soil as the grasses lay over and protect the soil from the water turbulence when the water is flowing across the plain towards the ocean during flooding events. This flooding happens in most years.

If this was to happen, the erosion would be irreversible as the wet season flooding at Legune Station is extreme in wet years. If erosion started, small channels would be formed within weeks and they would rapidly form into creeks and eventually (3 or 4 weeks) a large channel is formed. The silty sandy clay is extremely dispersant when exposed to fresh water.

The result would be a large channel that would link the ocean to where the erosion started. This would in turn let the sea water under high tide scenario to run further into the freshwater wet land further adding to the problem. This is of real concern and needs to be addressed.
Flooding at Legune is extreme and mitigation measures to stop erosion during wet season flooding on country that has no grass cover is all but impossible. Any earthworks that are exposed to floodwaters will experience erosion if the structures are not grassed or protected.

Sea Farms should be made to trial this leakage by constructing a pond with the same dimensions to that, which would be used during operation and filled with fresh water to simulate the same static head that would be present during operations. Trials should measure the amount of leakage into the subgrade to prove that the structures would hold water. If the Structure does not hold water, then the Construction Methodology should be altered with Engineering practices and retrial the structure to prove that it does.

This consequential harm to the environment from leakage of Sea Water into the ground water would be catastrophic.

• details of any limiting properties of soil and substrate types and land units in the Project footprint
• surface water features in and adjacent to the proposed action, including:
  o major and minor rivers and drainage lines (permanent and ephemeral)
  o catchment boundaries and sizes
  o surface water flow directions
  o water reservoirs (natural and artificial)
  o wetlands
  o areas of periodic inundation
  o beneficial uses.
• groundwater aquifers and hydrogeological properties, including:
  o surface connections via springs or recharge zones
  o local and regional aquifers and bores
  o depth to water tables
  o groundwater quality.

I make the following comment:

As above, the local water table surrounding the Grow- Out Ponds would possibly be effected by the increased inflow of salt water. If this was to happen, it would have far reaching consequences.

• estuarine and marine water quality including existing temporal variations in suspended solids, nutrient levels and algal blooms
• hydrodynamics of the receiving waters for waste discharge, including local tides and current patterns
• air quality, noise and vibration (e.g. receptors sensitive to air quality, dust, noise and vibration adjacent to the proposed Project site, typical background noise levels, etc.). The EIS should describe fauna, flora and vegetation communities of the Project area and local region. The EIS should include survey/program timing, locations and methodology, to demonstrate appropriate and statistically adequate survey designs. At a minimum, surveys should be in accordance with the Northern Territory2 and Australian Government3,4 Guidelines. The EIS should describe and map, where relevant:

• any areas within the Project footprint that have previously been subject to clearing activities or disturbance

I make the following comment:

Legune Station has never been cleared of any trees to any degree. Apart from very minor clearing on a few fence lines this activity has never occurred at this property. The Estuarine plain is naturally open plain grasslands

• significant or sensitive vegetation types and/or ecosystems
• aquatic ecosystems or groundwater dependent ecosystems likely to be affected by the Project

See above comments

• the presence or likely presence of listed threatened and/or migratory species under the EPBC Act and/or the TPWC Act (within the Project area or adjacent areas that may be impacted). A list of species to be considered is attached (Appendix B). For the listed species:
o discuss the quality and quantity of available habitat
o discuss the local population's size and its distribution, including at different life cycle stages, for example, when the population is breeding, foraging, resting and/or migrating o include maps showing the local population's range, important habitat areas and migratory pathways
o discuss the importance of the local population in a local, regional, NT, national and international context
• the regional context for habitat types found within the Project area
• the presence, or likely occurrence, of introduced and invasive species (both flora and fauna) within and adjacent to the Project area, and regionally, including weed species declared under the Weeds Management Act. Explain the basis for statements made in response to the above, that is, whether the Proponent:
• is identifying and relying upon existing literature or previous surveys
• has conducted its own surveys specifically for this purpose.

4 Risk assessment

4.1 Risk assessment approach

The EIS should be undertaken with specific emphasis on the identification, analysis and mitigation of potential impacts through a whole-of-project risk assessment. Through this process, the EIS will:
• identify and discuss the full range of risks presented by the Project • identify relevant potential direct and indirect impacts

I make the following comment:

Regarding the risk assessment in Volume 1 chapter 8 in Sea Farms EIS

The issues with ground water being filled with high concentrates of salt result in a ***High*** to ***Very High*** Consequence category across several fronts. Given that what we know about Turkey Nest's at Legune Station discussed above and the similar static head that ponding water within these structures produces (both prawn farm grow out ponds and Turkey Nest Ponds), this is almost certain to happen. This puts a Risk Ranking on several fronts in the ***High*** to ***Extreme*** classification.

I do not agree with the risk ranking in the EIS put forward for this reason

• quantify and rank risks so that the reasons for proposed management responses are clear
• identify levels of uncertainty about estimates of risk and the effectiveness of risk controls in mitigating risk
• explicitly identify those members of the community expected to accept residual risks and their consequences, providing better understanding of equity issues
• demonstrate that the Project represents best practicable technology.
A number of key risks have been identified through a preliminary assessment of the Project. Each of the identified risks should be addressed by the Proponent in the risk assessment and management process. It is expected that further risks will be identified through the comprehensive risk assessment process required for the EIS. These should be addressed and appropriate management initiatives developed to demonstrate that the:
• Proponent is fully aware of risks associated with all predictable aspects of the Project
• prevention and mitigation of risks are properly addressed in the design specifications
• risks can and will be managed effectively during the construction, operation, decommissioning, closure and post-closure phase of the Project.
Information provided should permit the general reader to understand the likelihood and potential severity of each risk presented by the Project, and any uncertainty around these risks, as well as any uncertainty about the effectiveness of controls. Levels of uncertainty that preclude robust quantification of risk should be clearly acknowledged.
Risk rankings assigned should be fully justified. Where a risk score associated with the likelihood or consequence of an impact is reduced as a result of proposed mitigation measures, clear justification should be provided for the reduction in score. The adequacy and feasibility of mitigation measures must be demonstrable.
Sufficient quantitative analysis should be provided to indicate whether risks are likely to be acceptable or tolerable. A comparison can be made with similar ventures in Australia and internationally. Assumptions used in the analyses should be explained.
The risk assessment should be based on international best practice. The NT EPA recommends the use of processes for risk management that are formalised in Standards Australia / Standards New Zealand (e.g. AS/NZS ISO 31000:2009; HB 436:2004; HB 203:2006; HB 158:2010).

4.4 Water

4.4.1 Environmental objectives

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

4.4.2 Assessment of risks

The EIS should include an assessment of risks to surface water (marine and fresh) and groundwater at an appropriate spatial scale as a result of the Project. In particular, the EIS should identify and assess the risks:
• to existing surface and/or groundwater quality and quantity, with specific reference to the Project components

• of planned discharges, and potential uncontrolled release or passive discharge of contaminants, such as hydrocarbons or nutrients, or pathogens to surface and/or groundwater

• associated with the new infrastructure or disturbance of soils altering the hydrology and rates of erosion and sedimentation of waterways, and disturbing potential acid sulfate soils
• of any additional impacts to surface water and/or groundwater resulting from the Project given the large volumes of both seawater and fresh water that will be required for the life of the Project.

I make the following comment:

As discussed above, it is likely that the Salt levels in the ground water will be changed considerably resulting in major environmental damage and or change. Additionally, given that the topsoil will be destroyed in the proposed bank building methodology, rehabilitation of the area would be almost impossible to achieve without careful planning and trailing ways to achieve an acceptable methodology that would result in an acceptable outcome.

16 DEPARTMENT OF TREASURY AND FINANCE

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Our Ref: Doc2016/8122

Ms Sally Strohmayr
A/Manager Environmental Assessment
Northern Territory Environment Protection Authority
Level 1, Arnhemica House
16 Parap Road
PARAP NT 0820

Dear Ms Strohmayr

RE: SEA DRAGON PROJECT STAGE 1 LEGUNE GROW-OUT FACILITY

I refer to the draft Environmental Impact Statement (EIS) for the Project Sea Dragon Stage 1 Legune Grow-out Facility (the Project). The Department of Treasury and Finance (DTF) would like to comment on the economic aspects of the draft EIS.

The Economic Impact Assessment (EIA) has been prepared by ACIL Allen Consulting, a reputable and well credentialed economic consulting firm.

It appears that ACIL Allen has taken a rigorous approach and used relatively conservative assumptions. The computable general equilibrium (CGE) model that has been used is a widely accepted methodology for undertaking economic impact analysis.

The EIA anticipates an increase in the Territory's real gross state product (GSP) by a cumulative total (to 2032) of $502 million, which is equivalent to about 1.5 per cent of the Territory's GSP. In addition, the modelling projects an increase in the average annual employment for the Territory of around 161 full time equivalent jobs. This is a significant positive impact on the Territory economy.

In DTF's view, the Project has the potential to provide significant economic benefits for the Territory and northern Australia.

Yours sincerely

DAVID BRAINES-MEAD
A/Under Treasurer

29 November 2016

17 DEPARTMENT OF TRADE, BUSINESS AND INNOVATION

NORTHERN TERRITORY GOVERNMENT

DEPARTMENT OF
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File Ref: DOB2016/11716-0008

Sally Strohmayr
Environmental Protection Agency
GPO Box 3675
Darwin NT 0801

Dear Ms Strohmayr

Re: Draft Environmental Impact Statement (EIS) for Comment – Project Sea Dragon Pty Ltd –Stage 1 Legune Grow-out Facility

Thank you for your email dated 5 October 2015 and the opportunity to review the EIS for Project Sea Dragon – Stage 1 Legune Grow-out Facility.

The Department of Trade, Business and Innovation (DTBI) does not have any major issues in relation to the draft EIS.

The economic impact modelling shows the valuable potential socio-economic contributions of this project to the Northern Territory economy. The economic modelling approach is appropriate and given the current project assumptions and the potential risks, provides a realistic estimation of the net benefits (direct and the flow-on impacts) of the project on the region as well as the broader Territory economy.

The project proponent's community and stakeholder engagement pathways are suitable and are considered important particularly with respect to potential community effects and employment opportunities.

DTBI notes that the Project Sea Dragon will be implemented in stages and the socio-economic benefits will build up as various stages are constructed and become operational.

The agency contact officer for this matter, Mr Shiw Murti, Principal Economist, can be contacted on 8999 5139.

Yours sincerely

Michael Tennant
Chief Executive Officer
17 November 2106

18 NORTHERN LAND COUNCIL

Northern Land Council

ABN 56 327 515 336

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2 December 2016

Dr Paul Vogel
Chair
Northern Territory Environment Protection Authority
GPO Box 3765
DARWIN NT 0801

By email: paul.vogel@nt.gov.au

Dear Dr Vogel

COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT – PROJECT SEADRAGON STAGE 1, LEGUNE GROW-OUT FACILITY

The Northern Land Council (**NLC**) is an independent statutory authority established under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) (**ALRA**) which has functions in respect of the claim and management of Aboriginal land. The NLC also administers and supports the Top End (Default PBC/CLA) Aboriginal Corporation RNTBC (**Top End PBC**). The Top End PBC is the relevant agent prescribed body corporate for the native title holders of the rights and interests that were recognised in *Simon v Northern Territory of Australia* [2011] FCA 575 (**Legune Determination**).

The footprint of the Project Sea Dragon Stage 1 Legune Grow-out Facility (**Project**) falls mainly within the area subject to the Legune Determination, but also includes a small area which is subject to claim under the Legune Land Claim (No 188) and Gregory National Park/ Victoria River Land Claim (No 167).

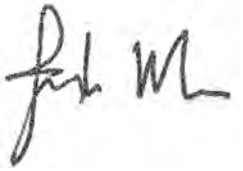
As such, the NLC has consulted with the affected native title holders and Aboriginal land claimants in respect of the comments contained in this letter and makes those comments both on behalf of the Top End PBC and also the NLC. The comments are contained in the attached report at Annexure A. Consistent with those comments, native title holders have requested that the following matters are emphasised:

- concern in respect of monsoon rain inundating the area;
- concern in respect of the reliability of the freshwater source noted (Forsythe Creek Dam), particularly during the dry season;

- concern in respect of the protection of hunting areas in and around the Project and impacts on the flora and fauna that are current food sources (such as turtle, bush turkey, kangaroo);
- a requirement for native title holder engagement in ongoing monitoring and protection of the land (for example through a ranger program); and
- concern in respect of rehabilitation requirements, including that native title holders are consulted in respect of these requirements.

If you have any questions, please do not hesitate to contact me.

Yours faithfully



Joe Morrison
CHIEF EXECUTIVE OFFICER

Introduction

The structure and content of the draft EIS is dictated to a large extent by the terms of reference issued by the NTEPA. It covers in detail all aspects of operations. But some issues are obviously more important than others. These comments do not deal with all issues in equivalent detail but instead identify the most critical matters and builds other comments around them. Those critical matters are:

(1) construction and maintenance of ponds and structures for moving water: how they are built and stabilised and the issues this may create for water management;

(2) water use and management: how much water is used, where the water comes from, where it goes, how it is moved and the effects of use and redistribution through the farms;

(3) wetland function and management: how water use and various structures on the floodplain might affect the floodplain wetlands and the animals that use them;

(4) role of Aboriginal people in site management: including the treatment of offsets for residual damage and risk; and

(5) rehabilitation at project close.

The NTEPA and the proponent have agreed that it is appropriate to consider the environmental effects of Stage 1 alone, as though the Project might cease after Stage 1 only. However, issues raised in considering Stage 1 alone inevitably spill over into important questions about context. That is, what else might be happening on the site or nearby that could affect interpretation of statements made in the EIS and the approach the developers have chosen. This review therefore also considers:

(6) the potential influence of other regional activities on the design of Stage 1 and the wider implications of approving Stage 1 for the region and its people.

Some related comments are also offered on the approach of the NTEPA in setting the Terms of Reference (ToR) for the environmental assessment and the difficulties this creates for sound assessment, delivering benefits for the region's Aboriginal land owners, native title holders and communities, and for the proponent in presenting the project coherently and comprehensively.

Consideration

The broad landscape morphology of the Legune site is well suited to a development of this sort at the scale of Stage 1. Advantages over potentially competing sites include: a substantial existing freshwater dam; widely separated channels for saltwater intake and pond discharge; and slopes sufficient to move water by gravity but not so steep as to create major erosion and related control problems. Nonetheless there remain some important risks, some of which do not appear to have been dealt with clearly and comprehensively in the draft EIS. Many relate in one way or another to the capacity to mobilise and maintain water supplies to meet all reasonably foreseeable demands and the potential effects of increased water use on the environment.

Pond and channel construction

Pond and channel walls are to be lined with surface soils taken from adjacent areas of the floodplain. Stability and reduced permeability are to be achieved by compaction. Issues arising from this approach are:

(1) ambiguity about the dispersivity of these materials: laboratory measures and related statements in the EIS indicate susceptibility[1] but anecdotes around observations in the field suggest stability in field conditions.[2] We further note:

- further testing proposed by the geotechnical consultants to the project do not appear to have been done, or have not been reported;
- the manner in which existing structures were created (source of materials, compaction etc) and the conditions to which they were exposed (water quality, flow rates, traffic over structures) are unknown or at least unreported; and
- patchiness of soil quality and depth of the most suitable soils is acknowledged,[3] but how risks of incorporation of less favourable soils in or underlying key structures is to managed is not explained in detail, indeed it is argued that stockpiling and transport of favourable soils will not be required.

(2) related ambiguity about stability under operating conditions. We further note:

- very large ponds with consequently greater than usual turbulence on pond walls;
- frequent on-embankment traffic (multiple daily traverses) for food delivery;
- regular, albeit less frequent, over-embankment traffic associated with harvest and removal of large volumes of waste from the centre of emptied ponds; and
- approaches to restoration of traffic-affected areas, especially if done under unfavourable conditions (incomplete drying, unanticipated (e.g. unseasonal) rains).

(3) related ambiguity about likely frequency of chronic leaks or more severe failure. We note:

- frequent references to monitoring for leaks and evidence of greater than anticipated seepage (through groundwater observations) acknowledge the risks,[4] but this awareness is not reflected in convincing treatment of risks for other aspects of operations (like water management).

(4) related ambiguity about permeability generally: We note:

- no hard data (direct measurements) of permeability and its variance have been reported;
- a small scale trial construction undertaken in June 2016 and reported to the ASX in August 2016[5] emphasises workability of soils with light equipment but offers no hard data on permeability or trafficability in wet season conditions; and
- acknowledgement of risks and related assurances about quality of construction supervision are not reflected in formal quantitative treatments of risks.

Given the fundamental importance of structural stability, the proponent can be presumed to have a high level of confidence. However, the arguments presented are not convincing because they

1 p. 1.28 Volume 2, Chapter 1 of EIS: "Soils across the farm area appear to be generally sodic, with the potential to disperse when wet".

2 p. 1.36 Volume 2, Chapter 1: "Some potentially dispersive and reactive soils to be used for embankments implies a potential issue in their long term stability, however, inspection of the currently existing numerous channels and farm dams in the area constructed of similar soils showed no signs of dispersion".

3 e.g. p. 1.26 "Sampling also indicates that some soils are potentially dispersive, though this is not widespread, and is also relatively patchy".

4 see Appendix C2 Land and Soils Strategy and C8 Groundwater Management Strategy Vol 4 Chapter 3 (EMP).

5 Seafarms Group Limited (2016) Media Release. Successful earthworks trial completed for Project Sea Dragon grow-out farms at Legune Station, Northern Territory. 4 pp.

are not backed by hard evidence. And because these concerns affect probability of unmanaged water losses and capacity to correct them, they obviously flow through to concerns about water budgets.

Water use and management

The health of the farms' prawn population and production outcomes depend on skilled management of seawater and freshwater to maintain favourable conditions. Large inputs of water are required to manage salinity, temperature, and concentrations of nitrogenous and other wastes within relatively narrow bands. Understanding total water demands and the mix of water sources required are critical factors in successful operation.

The water balance presented for the project indicates steady-state intakes of 575 ML/day of seawater from Forsyth Creek, 35 ML/day fresh water from Forsyth Dam during the dry season (7-10 GL/yr), with 410 ML/day of waters from ponds discharged to Alligator Creek.[6] Most of the difference between inputs and discharge is due to evaporation and seepage, after taking account of unmanaged inputs from rainfall.

Obviously such an operation — responding to variation in climatic conditions, rapid discharge of water at time of harvest or other un-programmed losses — is never at a steady state. Inputs from managed water sources may vary from zero to many times average rates. Whilst the highly dynamic nature of such operations complicates presentation of water use, both the robustness and presentation of information should be improved. In particular, better analysis and presentation should include, in addition to simulation of influences of climatic variation:

(1) permeability parameters based on measurements and simulation encompassing variance in values on predicted seepage losses;

(2) allowance for other unmanaged losses through chronic leaks and more severe failures, again in a probabilistic way;

(3) inclusion of simulations of un-programmed water releases required by, for example:

- drainage to repair leaks or other failures; and
- accelerated harvest to avoid problems associated with equipment failure, meet maintenance needs or deal with disease emergence on one or more of the farms;

(4) all of the above under unconstrained water movement capabilities and separately within anticipated design constraints;

(5) clarification of the influence, if any, of water temperature management on scale and timing of water inputs;

(6) model runs long enough to allow confident predictions of maximum plausible daily and longer term demand; and

(7) as well as measures of central tendency, variance and range, presentation of all model outputs in plots of relative frequency of daily demands from both marine and freshwater sources, perhaps broken into at least wet season and dry season or production schedules.

The goal would be to allow the reader to see the full range of variation in total demands and assess their implications for impacts on both supply and discharges under plausible operating conditions. And then to see how outputs have been reflected in treatment of all "downstream"

6 See page 3.21 of Volume 4, Chapter 3 of EIS. To further illustrate the scale of use, the city of Darwin and Palmerston use about 45 GL of reticulated water annually or an average of 123 ML/day, obviously higher in the dry.

issues in related parts of the EIS, including contingency management.[7] Such an approach would be much closer to quantitative risk assessment of the sort mentioned in the Terms of Reference for the EIS.

Better presentation would permit useful interrogation of the appropriateness of some design decisions, like movement of freshwater in many km of open channel rather than through pipes, given that all such water use represents a diversion from the Legune floodplain wetlands, which have high conservation, cultural and utilitarian value for the region's Aboriginal interests.

The EIS argues that demands on water use can be managed by reducing production. However, such decisions are obviously commercially difficult. Reliance on willingness and capacity to underutilise a major capital investment rather than specify other responses to acute demand makes for a fragile environmental management platform.

Wetland function and management

Management of fresh water is a critical issue for both the project and the landscapes in which it is sited. The EIS deals in considerable detail with the formally-recognised values associated with both the direct footprint of the Stage 1 development and direct and indirect effects on coastal marine wetlands. At this level, conclusions that matters of national environmental significance (**MNES**) such as threatened and migratory species are unlikely to be directly and substantially impacted by Stage 1 appear, in general, robust.

The integrity of this site, recognised as regionally (Northern Territory),[8] nationally,[9] and internationally significant is considerably less clear. Whether values not directly taken into account in these formal assignments of standing, but important for Aboriginal land interests, will be sustained is also unclear. As noted in the preamble to the document nominating the Legune wetlands as nationally important, such places are most usefully viewed as networks of sites. In the aggregate they reliably sustain large regional populations of wetland flora and fauna. Smaller individual components may be important seasonally and then for relatively short periods and also vary in significance from year to year. Snapshots of the sort inevitably generated by the time-constrained EIS process are of limited utility for assigning significance.

Nonetheless, data presented in the EIS illustrate this point nicely. Aerial surveys show how very large numbers of waterbirds—the great majority of those counted over the whole of the wetlands—aggregated briefly in areas flooded by waters released from the Forsyth Creek Dam. These aggregations included large numbers of Magpie Geese,[10] which make particularly important contributions to the customary economies of the region's Aboriginal people who focus much of their hunting effort on wetlands.[11]

With diversion of water that would otherwise reach the floodplain, values of the local network certainly change: and species most affected will include those of particular Aboriginal interest. Long-necked turtle that, while not observed in EIS surveys, are known to be hunted by local people[12] are also most abundant in seasonal wetlands. They have evolved nesting behaviours that include laying eggs underwater, with embryonic development being delayed until the water

7 Appendix E, Volume 4, Chapter 3 of EIS.

8 Harrison L, McGuire L, Ward S, Fisher A, Pavey C, Fegan M & Lynch B (2009) An inventory of sites of international and national significance for biodiversity values in the Northern Territory. *Department of Natural Resources, Environment, the Arts and Sport, Darwin.*

9 Whitehead PJ & Chatto R (1996) Northern Territory. Pp 119-176 in *A directory of important wetlands in Australia, Australian Nature Conservation Agency, Canberra.*

10 See page 6.31, Table 4, Vol 2, Chapter 6 of EIS.

11 Jackson S, Finn M & Featherston P (2012) Aquatic Resource Use by Indigenous Australians in Two Tropical River Catchments: the Fitzroy River and Daly River. *Human Ecology,* 40, 893-908.

12 Simon Watkinson, personal communication October 2016

above the nest dries and hatchlings escaping from the nest following rewetting.[13] Obviously such adaptations are ill-matched to large, arbitrarily timed releases of water to the floodplains. Neither present pastoral practice nor the complete withdrawal of waters favours persistence of this species in affected areas.

The EIS acknowledges risks of damaging change,[14] and outside the footprint of major structures like the ponds, steps are taken in layout of roads and channels and placement of culverts to minimise additional impacts on patterns of flow and inundation. However, there are no corrective actions proposed to compensate for loss of water from the floodplain and changes in distribution and abundance of resources important to Aboriginal people. In this Stage 1 proposal, there are no simple solutions to the diversion of freshwaters to prawn production, and suggestions that additional local dams may be built[15] if the project expands obviously creates concerns.

Aboriginal values in site management

The EIS argues that treatment of many aspects of Aboriginal values will be dealt with through an Indigenous Land Use agreement (ILUA) to be made under the Native Title Act.[16] At this time this is speculative as no agreement has been finalised and so the content of such an agreement has not yet been determined. This opinion in the EIS therefore cannot be supported. In any event this does not justify failure to deal with the perspectives of Aboriginal people on all impacts and their management. To do so is akin to assuming that the views of the Territory's non-Indigenous society will be captured by delegating the task of identifying and protecting values at risk to non-Indigenous pastoralists or other landowners. Agreements with Aboriginal landowners should not be assumed to capture the interests of all Aboriginal residents of the Territory. Effort should be made to deal with the legitimate and reasonably anticipatable interests and concerns of all sectors of society in framing an EIS. Supplementing the enormous literature on mainstream concerns, there is a growing literature on Aboriginal perspectives to help meet this obligation.[17] Taking this responsibility seriously will create opportunity to access valuable local and situational knowledge for management.[18]

Unfortunately a narrow approach is encouraged by the NTEPA, which has issued guidelines that urge treatment of concerns about residual environmental damage as a social rather than biophysical issue. This deliberate confounding of environmental obligations with social benefits[19] is unique to the NT and inconsistent with best practice recognised by numerous industry bodies and most governments in regard to offsets for residual damage. An independent

13 Fordham D, Georges A & Corey B (2006) Compensation for inundation-induced embryonic diapause in a freshwater turtle: achieving predictability in the face of environmental stochasticity. *Functional Ecology,* 20, 670-677.

14 see Volume 2, Chapter 8, pages 8.25-8.26

15 Volume 5, Appendix 17, page 2.

16 page 1, Volume 1, Chapter 8

17 Stoeckl N, Jackson S, Pantus F, Finn M, Kennard M & Pusey B (2013) An integrated assessment of financial, hydrological, ecological and social impacts of 'development' on Indigenous and non-Indigenous people in northern Australia. *Biological Conservation,* 159, 214-221. Finn M & Jackson S (2011) Protecting indigenous values in water management: a challenge to conventional environmental flow assessments. *Ecosystems,* 14, 1232-1248. Barber M (2013) Indigenous water values, rights and interests in the Flinders and Gilbert catchments *CSIRO: Water for a Healthy Country National Research Flagship, Darwin.* 211 pp. Robinson C, James G & Whitehead PJ (2016) Negotiating Indigenous benefits from payment from ecosystem (PES) schemes. *Global Environmental Change,* 28, 21-2.

18 Tengo M, Brondizio E, Elmqvist T, Malmer P & Spierenburg M (2014) Connecting Diverse Knowledge Systems for Enhanced Ecosystem Governance: The Multiple Evidence Base Approach. *Ambio, 43*, 579-591

19 NTEPA (2013) Guidelines on environmental offsets and associated approval conditions. Version 2.0. November 2013. *Northern Territory Environment Protection Authority, Northern Territory Environment Protection Authority, Darwin.* 6 pp.

review recommended corrective action[20] and the previous (Giles) government agreed to restore requirements for offsets with a view to directing delivery to Aboriginal people wherever possible.[21]

It is unreasonable to expect the proponent to have proposed offsets for identified residual damage and risks when urged to do otherwise. Indeed, the EIS rejects an obligation to offer offsets on the reasonable grounds that the Commonwealth Offsets Policy does not apply: because MNES are not significantly affected.[22] Nonetheless, the project offers many opportunities to address, through well-designed offsets, values and impacts of broad public interest as well as the particular interests of Aboriginal people, including those who have no direct connection to the site. Among the most obvious unmitigated (residual) impacts are:

(1) the project's substantial greenhouse gas (**GHG**) emissions during construction and subsequent operations:

- over the life of the project, GHG emissions of > 2 million tonnes CO_2-e could be offset by improved fire management and other (carbon sequestration) activity on and off site, and present value of about $25 million is likely to increase;

(2) reduced abundance of wildlife that determine the character and hence amenity of affected landscapes;

(3) reduced abundance of wild resources important in the customary economy,

- given the scale of infrastructure, it may be possible to actively manage some areas (through a mix of supplemented water availability and favourable disturbance regimes) to directly favour culturally and otherwise important species; and
- well managed grazing can be used to maintain wetland values (especially use by waterbirds) and there may be important roles in re-integrating pastoralism into a modified environment that demands more intensive management;[23]

(4) reduced amenity through an obligation to share access to a smaller area with more visitors:

- the EIS is ambiguous about approaches to visitor management, on the one hand emphasising exclusion for biosecurity reasons[24] and on the other promoting the idea of a Recreational Fishery Access Policy;[25]

(5) an effectively permanent change in the status of Alligator Creek which may make it less attractive as a site for recreation or food for people

- a role in monitoring may be important to familiarise local people with the extent and significance or otherwise of change;

(6) damage to a regionally unique vegetation association (Wild Plum low open woodland);

(7) acceptance of high risk of additional exotic plant invasions with additional disturbance of many areas:

20 Hawke A (2015) Review of the Northern Territory Environmental Assessment and Approval Processes. May 2015. Northe*rn Territory Government, Darwin.* 38 pp.

21 Northern Territory Government (2015) Territory Government Response to the Review of the Northern Territory Environmental Assessment and Approval Processes. November 2015. 13 pp.

22 See Volume 2, Chapter 5, page 51 of the EIS.

23 Statements at page 28 Volume 3, Chapter 1 promote the idea of Aboriginal employment in pastoral operations, which would be separate from this environmental management role.

24 See Volume 3, Chapter 3, page 15

25 See Volume 3, Chapter 1, page 47

- many damaging weed species are already present and there is an acute risk of increased spread and abundance, which will require active management during construction and beyond;

(8) greatly increased vehicle traffic within the site;

(9) considerably reduced amenity due to regular presence of helicopters and drones over the ponds and their surrounds:

- a level of disturbance capable of displacing feeding birds is likely also annoy human observers and impact on traditional uses of the land; and

(10) acceptance of the considerable risk of further reduction of use options and cultural value as the project grows (see Section **Error! Reference source not found.** below).

In combination with other land and resource management activities like crocodile and fire management, working to offset this suite of damages and risks would address many of the commitments made in the EIS documents by placing them in the hands of a suitably trained and equipped Aboriginal ranger group. The project is large enough and will run long enough to make establishment and consolidation of the necessary structures and workforce a realistic target.

Ideally commitments to an offset program would be incorporated in conditions of approval under the various applicable laws. However, given the instructions issued to the proponent, in this case it may be necessary to rely on private agreement between the proponent and relevant traditional owners.

Rehabilitation and restoration

A site decommissioning and rehabilitation plan is to be prepared after project approval. Presumably this would be done under the remedial plan provisions of the *Pastoral Lands Act* or possibly within the terms of a future ILUA, which raises questions about power to require bonds or other guarantees. More significantly from the perspective of Aboriginal interests, the EIS mentions potential to re-use structures as ponded pastures or, if rehabilitation for pastoralism proves impossible, environmental purposes.

These propositions create both risks and opportunities for protection of Aboriginal values and interests. Ponded pastures and the invasive pasture grasses they favour simplify wetlands so that they do not offer the mix of resources needed for diverse wildlife assemblages,[26] or even for single species like Magpie Geese.[27] Use for environmental purposes may create options for Aboriginal management in partnership with government or NGOs, but benefits would obviously depend on the particular arrangements.

At worst, premature failure of the venture could leave Aboriginal interests with a grossly degraded site placed on a low return, high environmental cost pastoral development pathway that would not have been possible without a major injection of capital for constructing great lengths of embankments and other infrastructure. It will be important that the roles of native title holders in determining future use are clearly established in pastoral lease conditions or other binding agreement. Ideally, capacity of Aboriginal interests to influence future protection of environmental and cultural values should be a condition set by the Minister for approval of non-pastoral use.

26 Clarkson J (1995) Ponded pastures: a threat to wetland biodiversity. Pp 206-211 in C Finlayson (ed) *Wetland research in the wet-dry tropics of Australia. Environmental Research Institute of the Supervising Scientist, Jabiru.*

27 Whitehead PJ & Dawson (2000) Let them eat grass. *Nature Australia, Summer 2000*, 46-55.

It is likely that development beyond Stage 1 would raise questions about pastoralism as the dominant use and perhaps trigger a necessary change of tenure. This should be considered in framing options to protect Aboriginal influence over protection of environmental and cultural values over the longer term.

Regional context

Despite the decision to restrict considerations to Stage 1, the EIS floats options for additional water supply, including access to water brought to the region through the proposed Ord Stage 3.[28] The Northern Territory Government has proposed that it may "if required, provide a land corridor to enable a water supply channel for proposed developments on the Legune Pastoral Lease".[29] However, the progress of the Ord Stage 3 project is entirely unclear without further public comment from the Northern Territory Government since the Request for Proposal registration date closed on Friday 27 May 2016.[30]

If the project is to access water brought to the region through Ord Stage 3 (which has been opposed by local Indigenous interests to date) then there is clearly potential to restore freshwater flows to the wetlands and to avoid risks of further diversions through additional local dams, as mooted in the EIS. But the footprint of another 800+ 10 ha ponds and supporting infrastructure may render such options irrelevant. It may be reasonable to seek agreement to a cap on the pace of development—including a lengthy pause after Stage 1—to allow proper consideration of the full implications at a regional scale.

Clearly it is impossible to abstract consideration of Stage 1 from options for expansion and connected decisions. The absurdity of the attempt is illustrated by the NTEPA request for a cumulative impact assessment accounting for "reasonably foreseeable future development", while apparently disregarding that full implementation of Project Sea Dragon is unforeseeable or irrelevant. The bureaucratic drivers of such a contradictory approach are perhaps understandable, but effectively avoid serious land use planning, which was also recognised as essential in the Hawke review.

All EISs should facilitate public understanding of the implications of a proposed development. That task is more complex when genuinely informed consent is sought from Aboriginal people who may have no previous exposure to such issues and may infrequently use written or even spoken English for routine communications. We note that the proponent has sought to engage with the NLC in respect of facilitating some of this communication with Aboriginal stakeholders. However, better Government coordination of the various regulatory approvals, including in particular recommending obtaining of an authority certificate pursuant to the *Northern Territory Sacred Sites Act* and consultations with Aboriginal stakeholders as an *intial* or even *preliminary* step in any development proposal would result in better outcomes for indigenous stakeholders.

Even briefly removing the blinkers raises obvious questions for traditional owners and other Aboriginal interests: will agreement on Project Sea Dragon increase pressure to agree to Ord Stage 3 (should it still be a live proposal), even though the area proposed for development is less than optimal for agriculture[31] and traditional owners regard the Stage 3 sites as unsuitable for

28 See, for example Volume 5, Appendix 17, page 2 "As the project expands, additional water from either an additional dam which could be sustained on the property or accessed via the adjacent ORIA".

29 Northern Territory Government & Northern Territory Land Corporation (2016) Ord Stage 3 Expansion: Request for Proposal (April 2016) 6 pp.

30 Ord Stage 3 Expansion - Spirit Hills, https://nt.gov.au/industry/major-projects-in-NT/ord-stage-3-expansion-spirit-hills, visited on 29 November 2016.

31 Petheram, C. et al. (2014) Northern rivers and dams: a preliminary assessment of surface water storage potential for northern Australia. Technical Report. CSIRO Land and Water Flagship Technical Report. 5 December 2014. *CSIRO Land and Water Flagship, CSIRO, Canberra*, 79 pp.

broad-scale development on cultural grounds?[32] Obviously the business case for investment in water infrastructure for Ord Stage 3 will be greatly improved if a major user is already in place near the terminus of that canal.

The next obvious question, which the EIS has not sought to address, is about cumulative effects on environmental, social and cultural values delivered by both developments in tandem?

How should the prospects of such synergies influence conditions of approval and related agreements about compensating benefits for the region's Aboriginal people?

Other issues

A complex project of this scale raises many issues for environmental protection and management. This review focuses on a few of the most serious. However, a few additional matters of some significance are briefly discussed here to illustrate the array of issues that might be developed in greater detail.

Disease in prawns

Because turnover of large volumes of water is required to manage high evaporation rates in the dry and dilution in the wet, it is not clear how pond water would be managed without release to the environment immediately after a "notifiable" disease was detected. The issues go beyond the disposal of the great mass of prawns (up to 5,000 tonnes) to be destroyed in the event of a serious disease.

Commitments are made to avoid use of toxicants or antibiotics that may enter discharge, but it is not clear how this could be maintained if treatment for a (say) bacterial or fungal disease was required, given the size of the facility.

Given the presence of disease in wild prawn populations and the large intakes of seawater and other pathways for entry of disease organisms (e.g. in birds' excreta) significant disease issues are likely to arise during the life of the project. Their implications for all aspects of management and impacts on the environment should be thoroughly documented and meaningful responses put in the EIS.

Contingency management

There is little information presented on capacity to restore operations in the event of loss or damage to fixed and mobile equipment through major cyclones or other storms.

Project alternatives

Treatment is mostly about the proceed/don't proceed binary rather than issues in design like the decision to use open unlined channels for water management rather than pipes.

Optimal use of water

The ToR for the EIS require "options for minimising water use" (page 16). It is questionable whether the decision to use very long open channels for delivery of freshwater meet this requirement, given that delivery to the floodplain of water excess to farm demands (because not lost to evaporation) could be used to maintain some important values at at least some sites.

Roadkill

Wildlife mortalities and injury on roads is treated primarily as an issue for the maintenance of populations. More attention should be given to related animal welfare issues.

32 Warchivker, I. et al. (2012) Victoria River District Economic Development Opportunities. STAGE 1: Scoping Study Report for Northern Land Council. December 2012. *TopEndFarm for Centrefarm Aboriginal Horticulture PL, Alice Springs.* 76 pp.

Fire management

Fire issues are treated primarily as avoidance of wildfire and impacts on infrastructure. Although obviously critical, these objectives will be better secured within a landscape managed intensively to reduce risk and support good environmental outcomes. This potential for Aboriginal people to offer this service should be recognised in any agreements with the proponents.

Conclusions

The principal conclusions are that:

- impacts on the highly specified values represented by lists of threatened and migratory species and the like are relatively minor because their habitats are mostly distant from the development footprint and off-site effects through farm effluent appear largely confined to Alligator Creek;
- better (harder) data on stability and permeability of floodplain soils are required to justify assumptions made about durability of structures;
- patterns of water use are presented opaquely, making variations in peak demands for both freshwater and saltwater and rates of effluent discharge and their implications hard to understand;
- damage to less readily specifiable values like the integrity of wetland systems and their resilience[33] is acknowledged but convincing remedies are not offered;
- the proponent has chosen to deal with Aboriginal peoples' concerns mostly outside the EIS process through negotiations on an ILUA, and the success of this process should be demonstrated before it can be accepted;
- no interest is shown in offering environmental offsets (for biophysical values) even though there is considerable scope to do so: in the absence of such commitments it will be important to ensure that they are picked up effectively in any future ILUA;
- conclusions about limited impacts of Stage 1 are unlikely to hold if there is to be significant expansion, especially if local capture of freshwater is proposed;
- given statements in the EIS and from government about access to Ord Stage 3 water, it may be that the approach to the EIS has been influenced by expectations that this project will also be agreed and which cannot be assumed; and
- some of the difficulties with the EIS are a product of questionable instructions and foci from the NTEPA (e.g. in specifying variables to be considered in the water balance, agreeing or requiring that Stage 1 be considered in isolation) and these concerns might also be communicated to government outside the EIS process.

33 Capacity reliably to sustain wildlife populations through seasonal cycles and over the longer term.

19 NT EPA

ntepa Northern Territory Environment Protection Authority

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

PROJECT SEA DRAGON PTY LTD – STAGE 1 LEGUNE GROW-OUT FACILITY

Comments from	Comment
General comments	The Proponent is the largest producer of farmed prawns in Australia and currently operates aquaculture facilities across three locations in north Queensland, including 148 ponds over 160 hectares and producing in excess of 1000 tonnes/annum. The stage 1 Legune Grow-out facility is an order of magnitude larger than the Proponent's current operations consisting of 40 grow-out ponds, internal recycling ponds and channels covering 1080 hectares and producing 14 000 tonnes/annum. The project requires saltwater inputs of 575ML/day from Forsyth Creek, 410ML/day of wastewater discharge into Alligator Creek and on average freshwater inflows of 35ML/day from Forsyth Dam. With such a large-scale project, it is essential that elements such as pond construction, freshwater inputs and wastewater discharge be managed to ensure the environmental values of the Legune wetlands are maintained. The significant issues from review of the draft EIS are: • There is significant uncertainty of the effects of the change from a Dry season water release regime to a water withholding/diversion regime at Forsyth Dam on waterbird populations at Legune, particularly in the Alligator Creek freshwater system. Given the significance of waterbird populations at Legune, a statistically robust avifauna monitoring and management plan is essential to ensure an adaptive response in management of the site if negative impacts are detected. A monitoring and management program developed in consultation with relevant Northern Territory and Australian Government advisory agencies is required in the Supplement to enable the NT EPA to complete its assessment; • There is significant uncertainty about management techniques for predatory birds; both the effectiveness and the potential impacts to non-target bird populations in the area. Given the issue presents an operational risk to the project, a review of contemporary bird predation mitigation methods should be provided, including both literature and experiences from the Proponent and other aquaculture and relevant industries (e.g. agriculture, mining) in Australia and internationally; • A lack of interpretation and synthesis of the geotechnical results does not allow assessment of the material suitability of the soils for project design and pond construction. The results from soil investigations and trial earthworks need to demonstrate the soils will provide sufficient impermeability and long term stability of pond and channel structures; and • There is some uncertainty that the proposed discharge criteria for wastewater into Alligator Creek can be met based on the information provided in the draft EIS.

Comments from	Comment
Volume 1 – Chapter 3	
Section 2.6 Location	The grow-out ponds comprise a major part of the project area and are located above RL 4.5m AHD. The area that is subject to regular tidal influence is nominally between RL 4.5 - 5.0 AHD. Confirm that all ponds are above these regular tidal influences (i.e. above 5.0 AHD). If not, discuss measures that will be used to minimise impact to pond infrastructure from tidal influences and potential storm surge.
Section 2.9.1 Legune Pastoral Operations Cumulative Impact Assessment, Volume 4, chapter 1	*Stage 1 of Project Sea Dragon will remove around 3239 ha areas of estuarine-deltaic plain, which comprises around 50 000 ha of the 178 800 ha pastoral lease, from pastoral activity. In addition, water from Forsyth Creek Dam will be redirected from pastoral irrigation to prawn pond management. The details of how the pastoral and aquaculture operations will be managed will be specified in the Non-Pastoral Use agreement.* This section states that existing pastoral operations on Legune station will continue during the construction and operation of all stages of the project. Cattle grazing can have substantial effects on erosion processes and associated water quality effects which may result in cumulative impacts on water quality unless cattle destocking in the catchments occurs. Provide details on expected changes to stocking rates and pastoral use in and around the footprint area and the potential for rehabilitation of the natural environment that may reduce sediment and nutrient runoff from the site itself.
Section 5.3 Pond, Channel Walls and Berm Construction	*Ponds and channels will not be lined as the surface soils (black clay soils) provide the impermeability needed to retain the water for operations, as shown by both the geotechnical investigations and the on-site trial investigations.* It is recognised that suspended soils and ammonium discharge loads can be reduced by lining banks or entire ponds to reduce or eliminate erosion (Burford *et al.,* 2003)[1]. In addition, there may be potential for dispersion of sodic soils in the upper batters during rainfall events. Clarify whether consideration has been given to improving water quality through lining internal batters to reduce potential erosion. Include the results on the on-site trial investigations that demonstrated the required impermeability had been met.

[1] Burford, M.A., Costanzo, S.D., Dennison, W.C., Jackson, C.J., Jones. A.B., McKinnon, A.D., Preston, N.P., Trott, L.A. (2003) *A synthesis of dominant ecological processes in intensive shrimp ponds and adjacent coastal environments in NE Australia,* Griffith University, Nathan, Queensland.

Comments from	Comment
Section 6.1 Figure 9	Figure 9 does not provide an indication of water recycling from the internal farm recycling pond and should be amended.
Section 6.10 Ponds	*Stop-log designed to allow automatic overflow to the PDC in high intensity storm events, so that the ponds are not overtopped in the minor design level storm event.* *For greater than the major design event, a lined swale will be provided in the berm of the outermost channel for planned release to the environment. In such events, the salinity of the water being released is expected to be very diluted by the rainfall event* *For events greater than the design event , the stormwater will be released to the environment, through controlled release lined swales (or low points in the bund wall)* Provide details on: • how these stop logs would work during high intensity rainfall events when all ponds are approaching maximum capacity; • whether the ponds have a designed spillway to maintain integrity of bund walls; • freeboard height for the ponds; • management of prawn escapes from potential stormwater release; and • whether this planned release into the environment requires licencing.
Section 6.14 Environmental Protection Zone (EPZ) and outfall	The proposed impoundment area referred to as the Environmental Protection Zone (EPZ) appears to be primarily a hydraulic balance structure that would utilise the landform of the estuarine-deltaic plain. The EPZ is not a buffer between the project and the environment, it is an operational requirement for the management of discharge from the site (and it will be modified from its natural state as a function of its purpose) and should therefore be clearly identified as a project component within the project footprint. Adverse impacts have been associated with broad scale development of ponds and channels within floodplains in many areas of Australia. Although acceptable in the past, it is now less acceptable to locate aquaculture pond systems within sensitive environments such as floodplains. Risks associated with the proposed structure, include potential for:

Comments from	Comment
	• impacts on local groundwater hydrology and natural vegetation due to infiltration of saline water, and • episodic release of wastewater with high concentrations of metals, low dissolved oxygen, high oxygen demand, due to potential fluxes in the oxidation state in the water column and sediment. The EIS should detail how such impacts will be prevented and provide details to demonstrate that the EPZ will be designed, monitored and operated to: • prevent stratification and nuisance algal growth • achieve specific objectives for contaminant removal from the wastewater stream • ensure long term impermeability to prevent infiltration of saline water.
Section 8.1.2 Pond Conditioning Section 8.1.4 Pond Water Quality Management	Clearly identify all potential inputs into the farm ponds (e.g. synthetic and natural components of stock feed, including their decay products, fertilizers, conditioners, food grade dyes etc.)
Chapter 3, Section 8.1.13 – Bird Predation Management Strategies	The risks associated with bird predation and proposed mitigation measures need to be assessed in more detail, particularly in relation to: • impacts of predation on the project (i.e. loss of revenue and potentially, overall economic viability); • impacts of proposed mitigation measures on sensitive environmental receptors (particularly waterbird populations) The project is located in an area with extensive wetlands that are recognised for their value to birds and will be a potential existing source of bird predators. The discussion provided in Section 8.1.13 does not demonstrate that this issue can be effectively managed given that: • exclusion (e.g. nets) is one of the only recognised effective methods of managing bird predation, yet this has been ruled out on the basis of cost and operational constraints; • visual and acoustic deterrents are recognised as being limited in effectiveness, or completely ineffective; • there is only '*some evidence*' of the effectiveness of the proposed use of helicopters/drones; and

Comments from	Comment
	• disturbance by patrols on foot or vehicles may have little impact. A series of experimental trials will be undertaken during the 2018/2019 Wet season to assess responses of water birds to bird predation mitigation strategies within wetland habitat adjacent to the farms. Provide information on: • likely bird predator species that may require management • potential issues associated with utilising helicopters as a management issue for bird predation, including unintended impacts (e.g. noise impacts and bird strikes) to non-target birds utilising nearby wetlands. A review of contemporary bird predation mitigation methods should be provided, including both literature and experiences from the Proponent and other aquaculture operations in Australia and internationally. It is recommended that the review consider other industries (e.g. agriculture, mining), in addition to aquaculture.
Volume 1 Chapter 4	
Project Alternatives Section 4.3 – Grow-out Farms	The Proponent states project economics and energy efficiency led to large ten hectare ponds being the preferred option, with reference to successful trends overseas. Provide: • examples of successful prawn farming operations with similar large pond sizes and intensity of the operation and how risks associated with wastewater discharge, erosion/seepage and overtopping are managed; • details on whether larger ponds may result in any operational challenges/risks compared to smaller ponds (e.g. aeration, even distribution of feed, protection from bird predation, pond liners); and • details on how pond size and design meet best practice industry standard. For example, the Australian Prawn Farming manual specifies most grow-out ponds are approximately 1 hectare in area.
Volume 1 Chapter 5	
Water Balance	Table 2 shows the water holding capacity of the system. Provide details on: • the rainfall event that would exceed a freeboard allowance of 10 000 000 m^3 for all farms • the individual freeboard allowance for each grow out pond.

Comments from	Comment
Volume 1 Chapter 7	
Environmental History and Ecologically Sustainable Development	Seafarms currently produces in excess of 1000 tonnes/annum from 160 ha of ponds across three locations in north Queensland and is the largest producer of farmed prawns in Australia. Project Sea Dragon is an order of magnitude larger and more intensive than the proponent's current operations, proposing 14 000 tonnes/annum of produce from 1080 ha of ponds. To put this into perspective, the total Queensland aquaculture production (tonnes) for prawns in 2014-15 was 4951.5 tonnes[2]. Discuss the potential technical challenges associated with significantly up-scaling an aquaculture project of this nature and how environmental values are maintained. The Proponent's farm management practices are based on the Australian Prawn Farmers manual and state that environmental sustainability is based on the Aquaculture Stewardship Council Shrimp Standard and the Environmental Code of Conduct for Australian Prawn Farmers. Management plans for the project should draw on aspects of these codes and standards to ensure environmental sustainability and demonstrate how design and operation of the farm will meet the requirements for accreditation from ASC. Details are required on how the Proponent has managed its existing facilities to protect the environment and meet sustainability objectives in accordance with the relevant codes and standards. In particular, provide discussion on lessons learnt in terms of: • bird predation mitigation measures used by Seafarms in Queensland, comparing the environmental similarities and differences of the sites, and their effectiveness of the measures; • cyclone preparedness and resilience including details of the consequence, lessons learnt and results of any monitoring conducted following an extreme rainfall or cyclone event; and • waste water discharge management and pond construction (e.g. erosion and seepage rates). The EIS should provide more detail on the suite of measures necessary to minimise concentrations and mass loads of contaminants in wastewater discharged to Alligator Creek and the Keep River, with reference to best-practice environmental management principles for prawn farm systems design.

[2] https://publications.qld.gov.au/dataset/3e2c107d-c49e-4b75-9994-63e513280824/resource/faa76a80-3bef-4591-b9f2-490068ee6b5f/download/aquacultureproductionsummary201415.pdf

Comments from	Comment
Volume 1 Chapter 8	
Risk Assessment	In many cases, the risk assessment has reduced the consequence following the implementation of mitigation measures. This is highly unusual as the consequence of a risk event is usually fixed, with controls normally only altering the likelihood of an event occurring.
Traffic movements – mortality or injury of threatened or migratory terrestrial fauna or avifauna species	The risk assessment states the following in relation to potential impacts of road traffic on terrestrial/bird species: *"The majority of threatened and migratory species known to be present on site are avian and unlikely to inhabit road verges."* With proposed upgrades to create all-season road access as part of this project, the potential for interaction between wildlife and traffic may increase substantially. During the Wet season, when much of the project area would be inundated, fauna may congregate on road verges in areas where the roads possibly represent the only dry ground for some distance. The risk and potential impacts to fauna in this context should be discussed in the Supplement. More control strategies are available to manage fauna impacts from traffic e.g. road design, speed limits, limit driving to daylight hours and avoid driving at dusk and dawn. Management strategies, if required, targeting particular at-risk species should be discussed. Outline the response to and management of injured/dead fauna.
Threatened and migratory species	Provide the reference for published data that most fish can swim against a current of 0.4m/s and all fish against currents of 0.1m/s.
Volume 2 - Chapter 1	
Appendix 7 Grow-out ponds	The draft EIS does not provide sufficient interpretation and synthesis of the geotechnical results presented in Volume 5, Appendix 7 to assess the material suitability of the soils for project design and pond construction. Table 4 provides a description of soils however an overall soil map with locations of the soil sampling conducted and properties of the soil over the project footprint should be provided. In particular, locations of soil testing and soil properties for areas that will have water holding bodies (e.g. grow-out ponds, recycling ponds, main discharge channel, EPZ) should be illustrated.

Comments from	Comment
	Clearly demonstrate how the results from preliminary soil investigations and trial earthworks show that the soils are suitable for pond and channel construction. Based on these results, it must be clear the ponds will be stable, effective and the potential for environmental harm is minimised. For example: With regards to the following statements in Volume 1, Chapter 3 section 5.3: "*Ponds will involve the excavation of around 300 mm of the surface clay material to form embankments walls for the ponds and channels*." "*Ponds and channels will not be lined with any other materials, as the surface soils (the black clay soils on the estuarine-deltaic plain) provide the impermeability needed to retain the water for operations, as shown by both the geotechnical investigations (Douglas Partners 2016)*" Review of the preliminary soil investigation test data (Appendix 7) does not appear to indicate that the surface soils are clay but rather are generally described as silt, mostly found to a depth of at least 1 m. Results of falling head permeability tests also show coefficients of permeability in the order of 4×10^{-10} m/sec. Clarify: • using examples of the geotechnical data, that the permeability results for the soils tested show that black clay soils provide the impermeability needed to meet industry standards to prevent potential impacts from seepage to groundwater and to avoid higher than expected volumes of salt and fresh water for pond water make-up • whether the base of the ponds will be tested to ensure adequate compaction for impermeability. *During construction, compaction of berms will be measured to Australian Standards for in-situ density and moisture content, for acceptance or rejection. Earthworks construction procedures should be in accordance with the Australian Standard AS 3798-2007.* The Australian Standard AS 3798-2007 Guidelines on earthworks for commercial and residential developments is not applicable for water retaining structures. Provide details on: • what relevant standards will be used for testing of soils for their suitability for pond construction; and • whether the Guidelines for constructing and maintaining aquaculture containment structures by the Queensland Department of Primary Industries and Fisheries, or other leading best practice standards have been considered to assess the requirements for pond construction and channels.
Soil Sodicity and	The draft EIS identifies risks relating to the use of sodic soil to construct ponds and channels in some areas of

Comments from	Comment
Dispersion	the site. Dispersive soils can lead to wall failure due to erosion and tunnelling, and erosion of pond bottoms when ponds are drained. Soil chemistry data suggests that soil stability may become an issue during dry-out periods for ponds if dispersive soils are exposed to heavy rainfall. The EIS included observations by Douglas Partners of existing pavements, the Forsyth Creek Dam wall, existing rip-rap emplacements, bridging layers along access ways and causeways that the material currently used on site is performing well and is durable, though more frequent maintenance is sometimes required on softer materials (such as siltstones compared to laterites). While these existing structures on site (e.g. turkey nest dams, embankments, roadways and channels) have been noted to have no visual evidence of enhanced erosion and structural decline (Vol 2, Chap1, 1-30), no information has been provided on the similarity of these structures (e.g. height, slope, volume capacity) compared to the pond and channel construction and how soil sodicity and potential for erosion will be managed for a 30 year project life. In addition, these similar structures have not been subject to bank scouring that may occur as a result of tidal movements (if applicable), wind/wave action and water movements that may affect the internal pond walls. It appears the Proponent is expecting some erosion of pond walls and that batter slopes may require some annual re-profiling (section 6.10.2). The mitigation measures proposed for management of saline-sodic and dispersive soils include suitable compaction, using gypsum ameliorant. This seems counterintuitive to the industry standard that advises large earthwork projects should not attempt to correct geotechnical problems with soil amelioration (Volume 5, Appendix 6). Appendix 7 details that further assessment of dispersive characteristics should be undertaken to more accurately define the risk of dispersion and adopt appropriate risk mitigation measures. Provide an indication of when this assessment will be undertaken.
Acid Sulphate Soils Volume 2, Chapter 1 Figure 5 Volume 5, Appendix 7 Appendix E - Drawing 7 – ASS	The inferred (Acid Sulphate Soils) ASS map shows the high risk areas to be: • inlet, settlement pond and maintenance pond in the north • the Main Discharge Channel (MDC) from farms 1 and 2, the Internal Farm Recirculation Pond (IFRP) in Farm 2 and the Environmental Protection Zone (EPZ). Test pits were conducted and two samples indicated medium or high risk along the intake channel and north of farm 1 (Figure 5). PASS was also confirmed at a number of locations at or below 2.5 – 3 m below ground level.

Comments from	Comment
Table 16 (Appendix E)	*In addition, where PASS was located, there appears a good chance that soils will have sufficient ANC to result in no Net Acidity (i.e. no chance for PASS to produce acid leachate or runoff).* The geotechnical consultant indicates that the term ANC should only be used when the soil contains fine (<0.5mm in size) shell fragments or other similar calcium carbonate material. The ANC capacity (e.g. shell material encountered) that may offset ASS can also not be assumed without adequate assessment of the fineness of the ANC material and acid base accounting. Given excavations ranging up to 3 m depth along channel alignments will occur, the risks of ASS occurrence may be high in these areas. Provide: • confirmation on whether any further pre-construction testing around the channel or other areas that have been identified as medium or high risk will occur; and • commitment that if disturbance of ASS are proposed, an acid sulfate soil management plan will need to be prepared by a suitably qualified and experienced professional, in accordance with the Queensland Acid Sulfate Soil Technical Manual: Soil Management Guideline (Dear *et al.,* 2014) or the Western Australian *The Acid Sulfate Soils Guideline Series* (DER 2015).
Section 3.4 Figure 5	Acid sulfate soil mapping - overlay project infrastructure, including the EPZ and location of the trial earthworks program conducted by the Proponent in June 2016 on this figure to link with the discussion of where actual ASS results were encountered. (in Drawing 1 – Vol 5, Appendix 7 shows test pit locations not ASS results) Pg 1-35 –*majority of project footprint is located in areas considered likely to contain Potential Acid Sulfate Soils at depths at or below 2.3m. Majority of earthworks will be confined to the top 2m.* On Figure 5, it appears no soil sampling was undertaken in the ASS high risk mapping zone where the main discharge channel is located (proposed 3m deep by 100 m wide). Provide an indication of whether further ASS testing will be conducted in this area to determine the requirement for the implementation of measures in accordance with an Acid Sulfate Soil Management Plan.
Section 3-8 Earthworks Field Trial	An earthworks field trial consisting of a 2.4 ha trial pond and a 60m wide channel was undertaken. It is not clear where the location and results of this trial earthworks program are included in the draft EIS. Please provide the results of this trial in the Supplement and discuss the implications of this for groundwater quality,

Comments from	Comment
	water supply requirements and landform stability.
Volume 2, Chapter 2 Marine and Estuarine	
Section 2.6 Interim Specific Trigger Values	The Proponent has chosen to classify the receiving environment as a "slightly to moderately impacted ecosystem" as per the AWQG. Provide a clear justification for why a "slightly to moderately impacted ecosystem" classification was adopted given that the National Land and Water Resource Audit (2002) classified the condition of the Keep River estuary as "near-pristine". The draft EIS proposes water quality objectives (Interim WQO) based on local baseline data. The interim WQOs are useful for assessment of likely change to water quality concentrations due to the discharge. However the validity of the interim WQOs is limited in key respects. The primary limitation relates to a lack of standardisation of the sampling strategy with respect to tidal stage and lunar cycles, which fundamentally influence water quality in the receiving environment. The lack of such standardisation compromises the utility of the data as baseline for the purposes of monitoring the impacts of Stage 1 operations, and for developing 'final' WQO for long term operation (including any future potential expansion). Continuation of the current sampling approach is not likely to provide a suitable basis for development of final WQOs. To address this deficiency the EIS should include: • analysis of all data to determine the most suitable method for standardising data collection methods to minimise the confounding effects of natural water quality variation due to tidal variation. Data points that do not meet standardisation criteria should be removed from the WQO datasets; • an amended sampling program reflecting changes to improve the usefulness of future data collection for baseline and impact monitoring purposes; • commitment to continue collection of a baseline dataset to develop final water quality objectives. The draft EIS does not adequately characterise water quality variation in the receiving environment in terms of the upper/lower margins of variation. The EIS should provide water quality data summaries for the receiving environment that include the range, and 5 and 95 percentile values.
Section 2.8 Numerical	A 2-Dimensional model, MIKE21, was used to assess the likely dilution rates of prawn farm effluent on the waters around Legune Station. While MIKE21 is considered an appropriate tool for an exercise such as this, it is

Comments from	Comment
modelling	not considered particularly good at simulating effluent mixing and dilution due to the extreme difficulty in representing turbulent mixing processes in the model formulation. Validation of predictions of effluent dilution is therefore very important. In the draft EIS, validation of the model's ability to simulate dilution rates is restricted to the modelling of the recovery of salinity in Alligator Creek following rainfall events compared with measured salinities during these times. This is a valid approach and is one of the only ways to assess the mixing performance of the model prior to effluent release. However, the comparisons appear cursory and unconvincing. Certainly, the analysis does not include an assessment of the limits of model validity. The Supplement should include an assessment of the reliability of the model to predict effluent dilution using analysis of the recovery of salinity, with the results reported as confidence levels.
Section 4.5 Water quality	The draft EIS assesses the potential for Water Quality Objectives (WQO) to be exceeded by the proposal based on the average likely concentrations of water quality indicators. The draft EIS does not provide adequate information to characterise sustainable loads for key contaminants and the potential for acute water quality events (such as anoxic/anaerobic events) in Alligator Creek during high risk scenarios. The EIS should analyse relevant data relating to: • sustainable loads of key contaminants from the discharge in relation to total loads from the catchment and other sources; • potential biological response to the discharge including consideration of the potential for algal blooms involving benthic intertidal species and species that may bloom in surface layers of the water column; and • likelihood of acute water quality events (algal blooms or hypoxia events) within Alligator Creek involving low background dissolved oxygen and pH in the receiving environment and worst-case scenarios for wastewater discharge, including night time discharges (when pH and dissolved oxygen are likely to be lowest).
Section 4.5 Water quality	The proponent states that the discharge licence requirements will be met through the use of recycling ponds making up 30% of the total pond area. The use of treatment ponds and recycling has been successfully practised by the Australian prawn farming industry for a number of years. This approach is consistent with the published work of Jackson et al. (2003) and industry manuals for an appropriate treatment pond/grow-out pond area ratio.

Comments from	Comment
	However, the Jackson *et al.* research was undertaken when production per hectare was lower. For Project Sea Dragon, the Proponent claims to be able to meet the stringent Great Barrier Reef Marine Park requirements for nitrogen and phosphorus discharge loads despite higher production per hectare. This would entail an improvement in treatment processes to deal with the higher waste loads. It is unclear from the document whether there have been any improvements in treatment methods in more recent years, and there is no information given in the draft EIS on the performance of Seafarm's Cardwell farm to demonstrate this. More specifically, there are no discharge values for TSS, TN and TP given on page 2-62 to substantiate the statement that prawn farms are using a range of waste mitigation strategies. The following details should be included in the Supplement to allow a more informed assessment of how effective the approach used for the Project is likely to be: • data on total nitrogen, total phosphorus and total suspended solids concentrations, and percentage reductions achieved for Seafarms other operations, as a result of treatment pond/s • information on the mechanisms used to maintain treatment ponds to ensure they continue to be effective.
Section 4.5.1 Background and literature review	It appears that information in the Jackson *et al*. (2003) publication referenced in the draft EIS has been quoted incorrectly giving the impression of greater efficiency of nitrogen retention in prawn ponds than has been found to occur. Jackson *et al*. (2003) states that 57% of nitrogen is discharged, not 27% as indicated in Figure 14, and denitrification/volatilisation is given as 3% in Jackson et al (2003), not 30% as shown in the draft EIS. Please check and correct these in the Supplement. Please provide comment on whether these potential overestimates could impact the predicted nutrient concentrations at the point of discharge.
Section 4.5 Water Quality Volume 4, Chapter 3 draft EMP	The Proponent is advised that it will be required to provide additional information on a continual improvement program, which is part of the Proponent's Environmental Management System through the Waste Discharge Licence process. Considerations may include: 1. management goals and objectives, which should reflect that at all times, reasonable and practicable measures will be implemented to minimise concentration and mass loads of contaminants to progressively work towards the objective of ensuring that the average net load of total nitrogen released to waters is zero. This can be achieved by recycling effluent during the whole of the prawn grow-out season; or by ensuring the average net load of total nitrogen released to waters as calculated under the

Comments from	Comment
	environmental authority is zero. 2. design and operation of the pond systems with reference to the waste management hierarchy, including proposed measures to reuse or recycle water and contaminants within the pond systems, and treat wastewater prior to discharge. The following performance indicators should be considered in relation to the standards/benchmarks referenced in point 3: a. discharge volumes including daily maximum, average, minimum; expressed as daily volume, and volume per hectare of production pond b. discharge rates including maximum and average annual rates; expressed as total daily volume, and volume per hectare of production pond c. quality of wastewater discharged to receiving environment; expressed as range and median, for parameters including dissolved oxygen, pH, biochemical oxygen demand, total suspended solids, chlorophyll-*a*, total and dissolved organic carbon, total nitrogen and phosphorous. Diurnal variation of pH and dissolved oxygen in wastewater may be significant, and should be characterised and incorporated in the statistics for pH and dissolved oxygen d. contaminant mass load per hectare of production ponds for parameters including total nitrogen, total phosphorus and total suspended solids. 3. analysis of projected contaminant concentrations and loads with reference to relevant benchmarks for best-practice environmental management, including: a. the operational policy *Licensing wastewater releases from existing marine prawn farms in Queensland* (https://www.ehp.qld.gov.au/assets/documents/regulation/pr-op-wastewater-prawn-farm.pdf b. relevant recirculation and zero-discharge prawn farm technology research and trials. 4. proposed discharge limits relating to mass loads and limits, including limits relating to statistical measures of distribution such as percentiles 5. specific measures considered to trial and develop water quality treatment and recycling strategies 6. improvement targets for reducing the mass load of nitrogen, phosphorus and suspended solids discharged to the receiving environment (such measures may include but not be limited to increased recycling of effluent, additional or more effective effluent treatment, bioremediation ponds, improved food

Comments from	Comment
	conversion ratios and use of lower protein feeds).
Volume 2, Chapter 3 Freshwater	
Section 4.2.1.3 Uncontrolled release Figure 16	Figure 16 shows maximum flood depth for uncontrolled release and overtopping of ponds from farm 1 and 2. Provide discussion on whether a maximum flood depth was modelled for farm 3.
Section 4.3 Water Quality Pg 3-37 Table 5	*Given the existing poor water quality of Legune Station and the implementation of mitigation measures outlined in Section 5, including a Water Quality Monitoring Program, it is concluded that construction and operation of the Project will not further impact the freshwater quality within the Project Area and its surrounds.* Given that many of the sites were sampled in the Dry season and values represent a single data point, this baseline assessment may not be accurate. The basis for a water quality monitoring program for freshwater sites should be provided and include at a minimum: • surface water monitoring locations and monitoring frequency • monitoring extent of freshwater habitat • further commitment to obtaining an appropriate baseline dataset.
Volume 2, Chapter 4 Groundwater	
Groundwater	A site wide groundwater monitoring program to monitor groundwater levels has been proposed as a mitigation strategy to provide early warning of potential impacts from the project. Monitoring is not mitigation. Preventative control strategies should be implemented where indicated, in order to minimise the potential for an impact to occur. In addition, trigger levels and appropriate management responses are required for instances that mitigation has not been effective and monitoring detects an impact.
Section 3.3 Recharge zones	Alligator spring, located next to Alligator Creek, and its associated permanent wetland stretching downstream of its discharge point appears to be an area of fresh shallow groundwater. The location of this spring and wetland and other elevated land forms that may receive large amounts of freshwater recharge needs to be provided in Figure 1 to provide context of their proximity to the Project. *The conceptual model for groundwater on Legune Station is that water generally flows from the ranges towards*

Comments from	Comment
	the coast in sandstone, fractured rock and sand/colluvial deposits, with a corresponding but opposite flow of saline water from coasts back inland, each balanced by the relative hydraulic head. The Terms of Reference listed the EPA guidelines on Conceptual Site Models which include the requirement to provide: • key contaminants and their characteristics • inferred sources and pathways • mechanisms for transport • potential receptors. Provide this conceptual site model of groundwater flows on a figure with the project footprint to contextualise groundwater flows horizontally and vertically. A simple diagrammatic presentation of the main processes that may influence ground water quality should be provided.
Section 4.2 Impact Assessment	*Seepage, spills and overflows at the farm ponds and channels, raising saline groundwater levels in the dry season beyond the natural regime. However, given the proposed compaction and low permeability of soils used in these structures, large leaks are considered highly unlikely and only leaks of a large magnitude would be likely to have any chance of impacting water tables in this manner. As such, impacts would be essentially limited to water table changes rather than salinization of ground waters (which are already saline)* Groundwater data indicated a salinity range of 1.6 – 44 dS/m compared to the upper range of seawater at 50 dS/m that will be used within the farm ponds and channels. Seepage of the ponds and channels has been identified as 6 ML/day. Additional information is required to demonstrate that this seepage will not have detrimental impact on the receiving environment and what long term monitoring will be conducted to identify any pond structure failure. Provide details on: • seepage rates from the ponds/channels and how that may impact groundwater levels and quality (salinity and nutrients); and • impacts of groundwater mounding and maintaining groundwater levels required for embankment stability.
Section 6 Commitments	*Implement procedures for rapid response to identified leaks and other issues identified by the monitoring program.* Provide details on the response and timeframes for rectification in the event that monitoring finds impact to the

Comments from	Comment
	shallow groundwater from excessive nutrients/salinity from the ponds/farm or from on-site waste irrigation areas.
Volume 2, Chapter 6	
Figure 18	To provide a spatial context, provide updated figures of avifauna abundance and richness showing modelled extent of freshwater following dam release compared to freshwater extent without dam releases.
Section 5 Mitigation and Monitoring	Section 4.3.3 of the Terms of Reference for the Project EIS stated: *The EIS should present management plans that include proposed safeguards, mitigation measures and monitoring programs to deal with the relevant impacts to biodiversity from the Project. Proposed management plans should:* • *identify clear environmental outcomes capable of objective measurement and reporting* • *permit timely identification and resolution of problems that arise through the course of a project that may compromise the achievement of the appropriate environmental outcome.* *Specific and detailed descriptions of the proposed measures must be provided and substantiated, based on best available practices and advice from relevant Northern Territory and Australian Government advisory agencies and must include the following elements:* • *a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impact of the Project, including:* o *a description of proposed safeguards and mitigation measures to deal with impacts including mitigation measures proposed to be taken by the Territory government, local government or the Proponent* o *assessment of the expected or predicted effectiveness of the mitigation measures* o *statutory or policy basis for the mitigation measures* • *the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.* *Monitoring programs should identify objectives, clear thresholds and contingency measures in the event that*

Comments from	Comment
	construction and operational activities affect biodiversity. Monitoring programs should be capable of detecting change in a statistically robust manner. Management measures and monitoring programs should be prepared by a suitably qualified expert that has demonstrated experience in the mitigation and monitoring of adverse impacts to biodiversity and threatened species. • There is significant uncertainty with regards to the effects of withholding Forsyth Dam water from Dry season release on waterbird populations at Legune, particularly in the Alligator Creek freshwater system. The draft EIS provided a list of suggested mitigation measures for general impacts to waterbirds and committed to preparing a fauna management plan that includes monitoring and contingencies (not specific to waterbirds). However, management strategies did not consider impacts from withholding Dry season water releases and the monitoring strategies proposed in the draft EMP did not include reference to a monitoring program for avifauna. Given the significance of waterbird populations at Legune, a statistically robust avifauna monitoring and management plan is essential to ensure to ensure an adaptive response in management of the site if negative impacts are detected. A monitoring and management program developed in consultation with relevant Northern Territory and Australian Government advisory agencies is required in the Supplement to enable the NT EPA to complete its assessment.
Chapter 9 - Waste Management	
Section 1.3.4 Waste Management and Pollution Control Act	The activity proposed is regulated under the *Waste Management and Pollution Control Act*. 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." Activities that require a licence include: 1. operating premises for the disposal of waste by burial that service, or are designed to service, the waste disposal requirements of more than 1 000 persons 2. collecting, transporting, storing, re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis, other than in or for the purpose of a sewage treatment plant 3. operating premises, other than a sewage treatment plant, associated with collecting, transporting, storing,

Comments from	Comment
	re-cycling, treating or disposing of a listed waste on a commercial or fee for service basis. The proponent will be required to apply for the following: • an environment protection approval (EPA) for the construction of the project potentially including pond construction, land fill and waste transfer stations • an environment protection licence (EPL) for the ongoing operation of the facility The Proponent should consult with the NT EPA prior to applying for the EPA and EPL regarding providing information on: • land fill design including appropriate leachate design, management and monitoring • construction quality assurance plans • irrigation management plans including monitoring of surface water , groundwater and soils • emergency response plan.
Section 1.3.12	Due to the size and scale of the waste potentially generated on site the Proponent should be referring primarily to "Guidelines for the siting, design and management of solid waste disposal sites in the NT" to promote best practice management rather than "Waste management Guidelines for small communities in the NT". The small communities landfill guidelines were created as part of an improvement plan for existing sites with historical, financial limitations and to assist them to work towards best practice. As this is a new site, the proponent should be referring to "Guidelines for the siting, design and management of solid waste disposal sites in the NT".
Section 1.3.16 Other Legislation and Guidelines	This section should be expanded to include National Environment Protection Measures (NEPM) and any other relevant interstate legislation required for the transportation of waste.
Section 3.6 – Farm Pond and Channel Waste Table 3	Based on the information provided in Table 3, for three farms the annual volume of farm pond waste could be up to 24,000 m^3. Prawn pond sediment and detritus, filtration waste is considered a listed waste under the *Waste Management and Pollution Control (Administration) Regulations.* It is stated that this material will become '*an inert nutrient rich waste on drying'* that will be used for various operational purposes. Clarification needs to be provided in terms of the statement that this nutrient-rich material would be 'inert', as well as an assessment of the risks associated with high concentrations of nutrients and salts potentially being mobilised from farm pond waste into surface and/or groundwater systems.

Comments from	Comment
Table 3 Waste Characterisation	Animal effluent and residues (abattoir effluent, poultry and fish processing waste) is a listed waste under Schedule 2 of the *Waste Management and Pollution Control (Administration) Regulations. The Proponent identifies that "prawn pond sediment and detritus, filtration waste" is produced by the operations. Such a waste is considered a listed waste.*
Table 3 Table 5 – Dead Prawns	Dead prawns have been described as "minimal" in waste types and projected quantities. Provide details on the maximum quantity of prawns in the event of a catastrophic disease outbreak, equipment failure or natural event and how that waste will be managed. In the event of large scale mortality, disposal options need to be provided whether it is burial, incineration, onsite composting and/or offsite disposal. The EIS advises that dead prawn disposal in the event of a disease outbreak will involve the development of a plan with Department of Fisheries and the Proponent. It is recognised that biosecurity and appropriate disposal is essential to not only the farm but wider community and industry, however, the development of a more robust emergency response plan specific to major quantities of dead prawns is required. It is recommended that the proponent identify potential sites and pathways for the appropriate disposal of major quantities of prawn carcasses that reflect common risk and operational practices to the industry. This will ensure that if an event does occur, the advice within the action plan (created with Fisheries and the proponent) can be enacted as quickly as possible while minimising risk to the environment.
Section 4.2.3 Solid Waste Management	*Farm pond and channel waste will be treated by solar drying and aeration in accordance with the Environmental Code of Practice for Australian Prawn Farming. Alternatively this material may be used in selected areas outside the farm to assist with scour erosion or included in the construction of new berms* It is unclear from the information provided if any infrastructure is required, or how any potential contaminants will be managed. A more detailed plan, including location, design and operational practices for the management of this material is required to address any environmental impact to the surrounding environment including groundwater or soil composition through the leaching of salts and other minerals in to the area and how stormwater will be managed.
Table 5 Summary of Waste Management Approach for Waste	Concrete batching will be conducted on site. The management of waste products for concrete batching should be considered in respect of maximisation of reuse and recycling of the water and materials.

Comments from	Comment
Streams	
Chapter 11 – Climate and Local Meteorology	*A detailed review of BoM data indicates that 44 cyclones have been recorded within a 200km radium of the proposed facility since 1906. 15 of these cyclones passed within 50km of Legune.* Cyclones have potential to cause increased wave energy, especially in a 10 ha pond area. Clarify whether this will impact unlined ponds.
Volume 4, Chapter 1 Cumulative Impact Assessment	
Section 4.1.2.1 Nutrients	The effluent dilution modelling should be checked in regards to the volumes of water coming into the Keep River from Ord stage 2. The values appear too low, which leads to questions regarding the veracity of the finding in the draft EIS that the release of contaminants into the Keep River due to leakage from Ord Stage 2 would necessarily have negligible concentrations in Alligator Creek. Such a finding could underestimate the potential for cumulative impacts to occur.
Volume 5 Appendix 7	
	Throughout Appendix 7 various recommendations were provided by the consultant and the proponent needs to clarify how the results of the geotechnical report and recommendations have been incorporated into project commitments, design and management. These include but are not limited to: • *It is considered possible that the surface soft clays may extend for appreciable depth in the northern parts of the site within the coastal plain, especially in close proximity to estuarine creeks, thus detailed investigation is recommended along the intake structure;* • *Careful consideration should be given to excavations which penetrate into the unit 2B very soft to firm clays due to potential for instability;* • *The embankments are proposed to effectively dam water within channels or ponds. No formal seepage analysis or groundwater assessment has been undertaken as part of this investigation….However, compacting the embankments as outlined in this report provides stability and also reduces seepage (ie. permeability of the embankment materials).* • *The use of an engineer designed keyway within the pond embankment foundation would further reduce seepage, but has not been included in this preliminary assessment, however it should be considered in the design stage.*

Comments from	Comment
	• *Embankments (pond, intake/outlet) that are designed to act as dams should include an emergency spillway to prevent overtopping and consequent scour and instability.* • *Steeper cuts adjacent to structures of embankments may need localised engineered stabilisation measures such as sheet piles or culverts (to limit risk of channel excavation instability). All channel batters should be protected from erosion and scour* • *It is suggested that the settlement parameters be confirmed and refined by more detailed investigation, followed by instrumenting trial embankments in the "trial" pond construction and monitoring the settlement.* • *It is recommended that additional ASS investigation should be undertaken for areas in the southern and south-western parts of the site which have not been assessed and where disturbance of soils is proposed.*
Pg 15 Section 9.1 Methods	45 test pits with test locations are shown on drawings 2, 3 and 4, Appendix D. Limited soil sampling has been conducted for farm 3 and the proponent needs to commit to further sampling in this area prior to disturbance.
Volume 5, Chapter 5 Commitments Section 1.1 Geology, Geomorphology and Soils	In addition to supervising construction works and additional sampling, testing and analysis, where required to confirm site conditions, the proponent should commit to preparing a report that confirms the project infrastructure has been built to an appropriate engineering standard and soil testing was conducted in accordance with relevant Australian Standards.
Volume 5, Appendix 9	It is stated that there were diatoms in the estuary system but not chlorophytes or flagellates, but it is possible that the latter two groups did not fix well. It is highly unlikely that they do not occur. It would be safer to say that 'with the fixation methods used, there was no evidence of chlorophytes or flagellates'.

20 WORLD WILDLIFE FUND

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15 December 2016

Sally Strohmayr
Environmental Assessment
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Re: Project Sea Dragon Stage 1 Legune Grow-out Facility Draft Environmental Impact Statement

Dear Ms Strohmayr

Thank you for the opportunity to comment on the Northern Territory Environment Protection Authority (NT EPA) draft Environmental Impact Statement (EIS) for *Project Sea Dragon (PSD) Stage 1 Legune Grow-out Facility* (the Project).

Given the large volume of reports in relation to the draft EIS and the short timeframe provided for comment, WWF Australia (WWF) has directed available resources at the review of a small number of critical components of the draft EIS. Given that, the following comments should not be construed as a comprehensive assessment by WWF. WWF plans to engage a consultant in early 2017 to review the documentation thoroughly in line with the ASC Prawn standard and to identify any further issues not addressed below. The consultant's review will also consider the documents associated with the Draft EIS for the *Project Sea Dragon Core Breeding Centre and Broodstock Maturation Centre*. Outcomes from the consultant's review will be used to inform future discussions with the NT EPA and the PSD proponents.

As indicated in WWF's submission to the EIS's draft Terms of Reference (ToR) (Attachment 1), WWF recommends prawn farms should, at a minimum, ensure their systems and practices are consistent with the Aquaculture Stewardship Council (ASC) Shrimp Standard principles and criteria. Furthermore, the submission to the draft ToR also highlighted the need to include an overview of the cumulative impacts anticipated from the development operating at full capacity to provide stakeholders with a more comprehensive understanding of the scale of project.

WWF supports the planning efforts identified in the EIS documentation to ensure the project will be conducted consistent with the ASC Shrimp Standard and the Environmental Code of Practice for Australian Prawn Farms, with husbandry practices as outlined in the Australian Prawn Farmer's Manual. WWF is however deeply concerned that some of the EIS documentation appears not to be consistent with these documents. In particular, and in light of the emerging outbreak of White Spot Disease south of Brisbane, WWF is strongly critical of farming operations that would not provide sufficient time for the ponds to adequately dry out between crops. As the Australian Prawn Farming Manual states: "*Drying the floor of the pond is a proactive tool to minimise the risk of potential disease outbreaks and improve pond performance for the next crop*." The economic drive to generate three crops per annum should not compromise the health of future stocks on the farm nor the environmental values of the receiving waterways.

The draft EIS documents do not clearly identify the overall scale of the PSD at full production. WWF is concerned large financial commitments from the Australian government for infrastructure like roads will use future economic arguments around maximising returns on public investment to support ongoing farm expansions without due consideration of the impacts these expansions will have on the environment. This issue is particularly important when it comes to water discharge quantity and quality. While it is acknowledged the Stage One of the project is expected to approach 1.4% of the water exchange at "maximum dry season total system volume", discussion is needed to determine the impacts of a tenfold increase in this discharge to represent PSD at full production. This would potentially represent one in every seven litres of water in the system having passed through the PSD farm pond system.

In regards to water quality, WWF is concerned that there does not appear to be adequate details around how waste water will be managed "on farm" without relying on large tidal exchanges to dissipate nutrients within the receiving waters which the EIS reports suggest are limited in Nitrogen – a key waste product from aquaculture systems. Stage One has a single location for a settlement and maintenance pond, individual farm internal farm recycling ponds (IFRP's), and a single Environmental Protection Zone (EPZ). Details on how the nutrient levels will be managed in the IFRP's and the expected assimilative capacity of the EPZ to remove nutrients and solids are required as the area looks visually small compared to the three farms, let alone the full farm capacity. Reliance on the receiving environment to "cope" with discharge of waste water with heavy nutrient and sediment loads is no longer an acceptable practice for developing countries where water quality has led to productivity declines, let alone a developed country like Australia that prides itself for "clean and green" farming products.

While the proponent suggests Stage One will be managed using similar techniques to their farms on the Great Barrier Reef (GBR) Coast, there are major differences between the receiving waters and the farm scales and operations that require further investigation. As indicated in the draft EIS documents, the receiving waters have considerably lower Nitrogen concentrations than GBR waters, and as such, are likely to support ecological communities that are adapted to these nutrient poor and highly physically dynamic environments dominated by extreme tidal variation. WWF is concerned that the release of insufficiently treated waste water from Stage One, and any other future stages, will have the potential to increase primary production and bacterial growth within the receiving waterways through the supply of Nitrogen, Phosphorous and organic matter. These changes could then potentially influence the local ecological community as productivity increases. Furthermore, farm management of three crops per annum in large 10 hectare ponds is not consistent with the east coast practices, and is therefore likely to produce different water quality outcomes to the water quality modelling provided in the draft EIS.

While it is recognised a full two years of water quality information has not been collected to date, WWF would like confirmation that there is a process to incorporate new water quality information into the water quality guidelines for Stage One as the baseline sampling extends over time. Furthermore, WWF expects that the proponents will sufficiently monitor, analyse and model the local environment at the project site to determine site specific peer reviewed water quality targets and limits, and that these figures are made publically available.

The Risk Assessment component of the Draft EIS suggests "Non-predatory birds are unlikely to be affected by the use of helicopters and drones as they are unlikely to be attracted to the grow-out farms". It is well known that there is a high level of interaction between birds and aquaculture farms. In addition, WWF is not convinced that non-predatory birds which may not be attracted to the specific pond area of the farm would not have the potential to be influenced by helicopters and drones. WWF seeks further details on the anticipated impacts on bird species, and confirmation that these impacts will be consistent with the relevant component of the ASC Prawn Standards.

The Risk Assessment also appears to not have considered the impacts of light pollution on turtle hatchlings and nocturnal terrestrial species. Details on the level of impacts increases in lighting

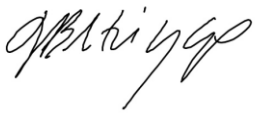
will cause in a remote area with limited light pollution is recommended. WWF seeks further details on this potential impact and its management.

Further details on a crocodile management plan are recommended given the sites proximity to saltwater crocodile habitats, noting this is a protected species which also represents a significant occupational safety issues.

The large scale of the final Project Sea Dragon (PSD) proposal of around 10,000 ponded hectares highlights the need for a measured and incremental approach to the proposed development of this farm site. A full assessment of baseline and operational monitoring information from Stage One should be comprehensively assessed prior to any future farm expansions. This assessment should be incorporated into an EIS and released for a public comment period of appropriate length for the community to adequately assess the relevant documentation. This will ensure the impacts on environmental, social and cultural values of each farm stage are appropriately considered before future expansions occur. As indicated in Attachment 1, the EIS for the Guthalungra[i] farm expansion provide a best practice example of an EIS for a staged aquaculture farm development in terms of water quality targets and how they related to farm expansions.

If you would like to discuss any of the issues raised in this submission in greater details, please contact me directly on 0409 544 158 or by email jhiggs@wwf.org.au

Sincerely,



Jim Higgs
Tropical Fisheries and Aquaculture Manager
WWF Australia

[i] Guthalungra Expansion Information: http://pacificreef.com.au/eis.html

21 ENVIRONMENT CENTRE NT

Submission to the NT Environmental Protection Authority:

Draft EIS for the Sea Dragon Project Stage 1 Legune Grow-out Facility

Proponent: Project Sea Dragon Pty Ltd

December 2016

Environment Centre NT

protecting nature | living sustainably | creating a climate for change

Introduction

Environment Centre NT (Inc) is the Territory's leading community environment group.

The mission of the Environment Centre NT is to

- protect and restore biodiversity, ecosystems and ecological processes,
- foster sustainable living and development, and
- cut greenhouse gas emissions and build renewable energy capacity.

The Environment Centre NT works by

- advocating for the improvement of environmental policies and performance of governments, landholders, business and industry;
- partnering on projects and campaigns with conservation and climate organisations, governments, Indigenous organisations, community groups, businesses, and landholders;
- raising awareness amongst community, government, business and industry about environmental issues and assisting people to reduce their environmental impact;
- supporting community members to participate in decision making processes and action;
- recognising the rights, aspirations, responsibilities and knowledge of the Territory's Indigenous peoples; and,
- acknowledging that environmental issues have a social dimension.

For 35 years, ECNT has positively contributed to the development of environmental laws and policies in the NT, provided a voice for the community on environmental issues, educated community members about how they can reduce their environmental impact and put forward innovative and well-informed projects and policies.

Analysis of the Draft EIS

We are making this submission to register our interest in this proposal and to make preliminary comment.

Because of the amount of documentation for this project and the detail included within it we are unable to fully consider the whole EIS documentation at the level it requires, and meet the deadline for informed comment. We therefore have secured an extension and we propose to provide the following executive summary and then will forward a complete submission on Friday 9th December 2016.

ECNT makes the following preliminary comments on the EIS and proposal:

1. To ensure best environmental and sustainable aquaculture practices, this proposal must comply with *Shrimp Standards* as prescribed by the Aquaculture Stewardship Council (ASC). The Operator must also obtain certification and accreditation by the ASC in accordance with their guidelines. Approval of this proposal should be conditional on the Operator obtaining and maintaining these standards.

2. To ensure transparency and monitor impacts on the environment, a condition of this proposal must be that the Operator of the facility agree to fund a robust and independent monitoring program of the entire operation and its activities at an agreed frequency and at an agreed level of detail.

a. The level of funding required for the independent monitoring program must be sufficient to undertake ongoing monitoring for the life of the project. The funding must be deposited into an independent account prior to any works commencing.

b. The frequency of monitoring and the level of detail of the monitoring must be defined through a public process funded by the Operator.

c. The independent monitoring program should be comprised of recognised experts in their field.

d. The monitoring program will include triggers where the operation will be required to cease work if the agreed levels are exceeded and financial penalties will be imposed if this requirement is not met. The monitoring program should work with the appropriate NT government agencies to ensure compliance.

3. To safeguard against serious environmental damage, a requirement of this proposal should be that the Operator post a bond with the NT government for this facility that will be sufficient to cover any operational failures. This bond should also be sufficient to properly remediate the site to an agreed standard when the operation ceases. This bond should be deposited into an independent account prior to any works commencing.

4. To protect the local biodiversity at the site in question, this proposal must require the Operator to ensure surrounding ecosystems and connectivity between habitats is maintained. This includes restoring any habitat lost as a result of this project such as mangrove forests.

5. To prevent large scale trawling and depletion of wild fish stock, this proposal must minimise the use of wild fish as an ingredient for prawn feed and declare all sources of fishmeal, fish oil and other major ingredients in the feed.

6. In order to prevent contamination and degradation of both water and soil quality, this proposal must ensure that there is licencing and applicable fees applied for the proper and safe disposal of waste materials, including waste water.

7. To ameliorate environmental impacts, consideration must be given to the possibility of licencing for extraction of sea-water for commercial purposes.

Contact

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