

Supplementary EIS
Guthalungra Aquaculture Project



1 Executive Summary

1.1 Benefits of the project

The Guthalungra Aquaculture Project Draft EIS was made available for comment by the public and advisory agencies from 22 October to 4 December 2003. This document meets the obligations of the proponent to consider the submissions made on the Draft EIS and prepare a supplementary report providing further advice on how the issues raised will be addressed.

The project has been declared to be a significant project pursuant to the *State Development and Public Works and Organisation Act 1971*. The Queensland Government has recognised the opportunity that aquaculture provides for economic diversification and employment creation, particularly in regional areas. Queensland aquaculture production was lower in 2003/04 than in 2001/02 reflecting 1) the difficult operating environment of aquaculture and 2) the difficulty of attracting new investment to the industry. The present proposal has the potential to add over \$29 million in value per annum or 40% of the state's 2003/04 aquaculture production.

In achieving this significant economic outcome, the project will impact on the environment. It is expected that there will be a small increase in nitrogen and phosphorus loading in the Great Barrier Reef Lagoon and there will be some impacts on particular habitats of regional and national significance.

However, in terms of economic return for environmental cost, the project will provide substantially increased returns per tonne of sediment (260x), nitrogen (5.55x) and phosphorus (1.27x) over current land uses.

The economic return will provide an additional \$29 million in turnover, support an additional 118 direct and indirect full-time equivalent jobs and provide a Gross State Product of \$16 million. Significant social and community benefit will also flow to the Bowen Shire from this development as previously described in the Guthalungra Aquaculture Project Draft EIS.

1.2 Modified aspects of the proposal

Responses to the Draft EIS raised a number of issues regarding the operation of the project.

Pacific Reef Fisheries has a strong commitment to utilising world's best practice and technological advances in its prawn farming operations. It conducts in house and collaborative research and development and has joined a program sponsored by the Australian Prawn Farmers Association to achieve ISO 14001 accreditation for its farming operations.

Outcomes of the research and development undertaken at the proponent's farm at Alva Beach have allowed the proponent to further refine aspects of the design and operation of the project to specifically reduce the impact of the project on the environment. The major modifications are:

- utilising an off-shore pumping station. This substantially reduces the impact upon the marine, dune and wetland ecosystems by reducing the area of footprint that the intake and discharge pipelines and pumping station will occupy and reducing the land based access systems (roads, tracks etc.) required for the operation in these sensitive ecosystems. This innovative technology for Australian aquaculture will require final proving at the detailed design stage.
- co-location of intake and discharge pipelines thereby removing any pipeline structures from areas of seagrass in Abbot Bay.

- addition of sand filter technology developed by Pacific Reef Fisheries at the Alva Beach Farm with the aid of the Qld Department of State Development, Trade and Innovation. This technology will significantly reduce the nutrient level in the discharge thereby minimising the impact of the project on water quality in Abbot Bay and providing a real means by which water quality objectives in the Great Barrier Reef Water Quality Action Plan can be met in the Don River Catchment.
- development of a property management plan for predator control. Pacific Reef Fisheries is the first Queensland prawn farming company to develop such a management plan and stands as an example to the industry.

A variety of additional small but significant modifications and improvements to the proposed operation are also included and described in Section 6 Project Description – design, construction and operational considerations

1.3 Responses to public comment

In general, there were relatively few responses for a project of this magnitude. There were only seven responses by the public, five from organisations and 2 from individuals. Responses from the public and advisory agencies covered a range of topics. However, respondents commonly asked questions regarding water quality and impacts on the Great Barrier Reef World Heritage Area.

These issues have been addressed in detail throughout the document. Additional water quality data is discussed in Section 5.1 Water quality, and the impact of the project on environmental water quality is discussed further in Sections 7.1 Environmental values.

Environmental values determined through consultation with the community were described in Section 7.2.6, GAPFR, 2003.

The beneficial uses to be managed are:

- The protection of aquatic ecosystems and in particular seagrass meadows, which are important grazing grounds for dugongs and turtles, and coral reefs;
- Maintenance of recreational values; and
- Maintenance of aesthetic values.

Additional environmental values relate to the presence of the World Heritage Area of the Great Barrier Reef. These are discussed in more depth in Section 7.14 World Heritage Values. However, the water quality objectives for protecting these environmental values are encompassed by water quality objectives for the values listed above.

Water quality is discussed at length and Sections 7.2 Water quality, 7.3 Discharge Water Quality Objectives - current and 7.4 Water Quality Objectives – Future clearly state the expected impact and the water quality objectives which the proponent expects to achieve in the immediate and long-term future.

2 Contents

2.1 Table of Contents

1	Executive Summary	2
1.1	Benefits of the project	2
1.2	Modified aspects of the proposal	2
1.3	Responses to public comment	3
2	Contents.....	4
2.1	Table of Contents	4
2.2	Table of Figures	10
2.3	Table of Tables.....	12
3	General Introduction	13
3.1	Role of the Supplementary EIS.....	13
3.2	Structure of the supplementary EIS	13
3.3	Description of project, Map and photograph of project	13
3.4	Comparison with other projects and evaluation of degree of impacts	17
3.5	Economic benefit.....	18
3.6	Consultation process	18
3.7	Evaluation of positive and negative impacts.....	18
3.8	Relationship to Regional Planning process.....	19
3.8.1	Whitsunday, Hinterland and Mackay Regional Plan	19
3.8.2	Bowen Shire Strategic Planning Processes	19
3.9	Relationship with State Coastal Management Plan – Queensland’ Coastal Policy .	19
3.9.1	Significant Project for the State	20
3.9.2	Economic benefit to state	20
3.9.3	Regional development.....	21
3.9.4	Environmental impact	21
3.9.5	Net benefit.....	23
3.10	Process for completion of the approval.....	23
3.11	List of Acts applying.....	25
3.11.1	Queensland Legislation	25
3.11.2	Australian Government Legislation	26
3.12	Additional Referral Agencies.....	26
4	Proponent	27
4.1	Structure of the proponent.....	27

4.1.1	The Proponent	27
4.1.2	Intellectual property and know-how	27
5	Description of the Existing Environment.....	28
5.1	Water quality	28
5.1.1	Climate	28
5.1.2	Total Phosphorus.....	30
5.1.3	Total Nitrogen	31
5.1.4	Total Suspended Solids (TSS).....	32
5.1.5	Total Chlorophyll <i>a</i>	32
5.1.6	pH.....	34
5.1.7	Dissolved Oxygen	35
5.1.8	Salinity	35
5.1.9	Comparison with ANZECC (2002) values	35
5.1.10	Relationship between parameters.....	36
5.2	Groundwater.....	37
6	Project Description – design, construction and operational considerations.....	38
6.1	Revised Seawater Intake and Discharge Arrangements.....	38
6.2	Location of Pipelines and Diffuser.....	38
6.3	Design Concept	38
6.4	Construction Approach	46
6.5	System Maintenance	46
6.5.1	Inspection of Pumps and Fittings.....	47
6.5.2	Regular Maintenance.....	47
6.5.3	Pipeline Pigging	47
6.5.4	Operational Risks and Mitigation Measures	47
6.6	Settlement ponds and discharge water quality	49
6.6.1	Pond Release Water Treatment System proposed for Guthalungra.....	49
6.6.2	Alternative Treatment Options.....	52
6.6.3	Conclusions in Relation to Wastewater Quality Management Options.....	55
6.7	Roll-in of current hatchery structures to new developments.....	55
6.8	Pond construction and groundwater protection.....	56
6.8.1	Clay lining of ponded areas.....	56
6.8.2	Dispersion of clays	56
6.8.3	Erosion control	57
6.9	Acid Sulphate Soils	58

6.10	Stormwater management and storm surge	59
6.10.1	Stormwater flooding and Bund Heights.....	59
6.10.2	Storm Surge.....	59
6.10.3	Stormwater management for capture and re-use.....	60
6.11	Operational matters	61
6.11.1	Feed management.....	61
6.11.2	Water management.....	62
6.11.3	Source of seedstock.....	62
6.11.4	Disease Control	63
6.11.5	Bloom Management	63
6.11.6	Problem Species Management	63
6.11.7	Pond Sediment Wastes	64
6.11.8	Pond bottom drying	65
6.11.9	Trapping of wild fisheries resources	65
6.12	Potable water supply	66
6.13	Wastewater treatment.....	66
6.13.1	Processing wastewater.....	66
6.13.2	Domestic wastewater.....	66
7	The adverse and beneficial impacts of the project	68
7.1	Environmental values.....	68
7.2	Water quality	68
7.2.1	Water quality objectives.....	68
7.3	Discharge Water Quality Objectives - current	69
7.3.1	Objectives for concentration of nutrients	69
7.3.2	Objectives for dilution of nutrients	69
7.3.3	Objectives for total load	70
7.3.4	Comparison with industry standards.....	70
7.3.5	Other Parameters that may be considered	70
7.3.6	Economic implications of the current water quality objectives	70
7.3.7	Modelling of water quality impacts – Predicted outcomes of the proposed discharge 71	
7.3.8	Nutrient sources into Abbot Bay	74
7.3.9	Risk of cross-contamination.....	75
7.4	Water Quality Objectives – Future.....	75
7.4.1	Comparison of Don River and Elliot River Catchments.....	75

7.4.2	Current vs Future Status of the Don River Catchment and the contribution of the proposed farm discharge	76
7.4.3	Future Objectives for total load.....	77
7.5	Seagrasses.....	77
7.5.1	Impact of light reduction by algae and particulate matter on seagrass.....	78
7.5.2	Impacts on the periphery of seagrass distribution in Abbot Bay	78
7.6	Marine animals.....	79
7.6.1	Errata to tables.....	79
7.6.2	Impact on fishery.....	79
7.7	Birds and other wildlife.....	79
7.7.1	Errata to Tables	79
7.7.2	Re-evaluation of likelihood of presence of certain species.....	80
7.7.3	Methodology of study	80
7.8	Ocean Intake and Discharge Pipelines Construction (Beach and Marine Sections) 81	
7.8.1	Trench Excavation.....	81
7.8.2	Directional Drilling	82
7.9	Dune system	83
7.9.1	NHT study: Priorities for remnant vegetation protection – Dryland Component 83	
7.9.2	Disturbance to the dune system.....	83
7.10	Wetland	84
7.10.1	Wetlands present or affected by the project	84
7.10.2	NHT study: Priorities for remnant vegetation protection - Wetland Component 84	
7.10.3	Wetland hydrology	84
7.10.4	Backfill of pipe trench.....	85
7.10.5	Compliance with Coastal Management Plan – Queensland’s Coastal Policy .	85
7.11	Salt pan.....	86
7.11.1	Trench Excavation.....	86
7.12	Main Site	87
7.12.1	NHT study: Priorities for remnant vegetation protection – Dryland Component 87	
7.13	Marine Parks	87
7.14	World Heritage Values.....	87
7.14.1	World Heritage Values and Attributes	87
7.14.2	Great Barrier Reef Marine Park Values	88

7.14.3	Criterion iv, Habitats for species of conservation significance.....	89
7.14.4	An area of RE 11.3.13 occurs in the main site. This Ecosystem occurs as small patches. The total impacted area is discussed in Section 7.11.1 Trench Excavation.....	90
7.14.5	Criterion iii, Superlative natural phenomenon	91
7.14.6	Criterion ii, The diversity of Flora and Fauna.....	93
7.15	Cultural Heritage.....	93
7.15.1	Cultural Heritage Protection.....	93
7.15.2	Dispute Resolution	93
7.15.3	Employment	94
7.16	Other Social Impacts.....	94
7.16.1	Housing	94
7.17	Groundwater.....	96
7.18	Mitigation.....	97
8	Environmental Management Plans.....	103
8.1	Acid Sulphate management plan.....	103
8.2	Weed and pest management plan	106
8.3	Mosquito management plan	108
9	Glossary.....	109
10	References	111
11	Appendices	113
11.1	Appendix 1. Summary of responses to comments received during public consultation	113
11.2	Appendix 2 Letter of support from Bowen Shire Council	125
11.3	Appendix 3. Calculation of daily loads in discharge waters	126
11.4	Appendix 4. Appendix to Appendix E, GAPDE, 2003.....	128
11.5	Appendix 5. Figures omitted from Appendix K, GAPDE, 2003.	129
11.6	Appendix 6. Property Management Plan for Managing Wildlife Impacts	130
11.7	Appendix 7. Response from Qld Department of Primary Industries Regarding enquiries in respect to impacts of the project on seagrass.....	131
11.8	Appendix 8. Modelling report from Sinclair Knight Mertz on groundwater effects of ponds at Alva Beach.....	132
11.9	Appendix 9. Water quality data collected from Abbot Bay.....	133

2.2 Table of Figures

Figure 3.1. Composite aerial photograph (1:50,000) of the proposed site and adjacent regions showing the development area and relevant aquatic habitat areas identified as a result of this study.	15
Figure 3.2. Map of the development showing the location of the ponds, treatment areas and pipelines relative to Lots 8 and 370 and the road reserves.....	16
Figure 3.3 Flow chart of process for approval prior to development.....	25
Figure 5.1 Difference in January rainfall 2005 over 2004. Source: Australian Bureau of Meteorology.	29
Figure 5.2 Difference in February rainfall 2005 over 2004. Source: Australian Bureau of Meteorology.	30
Figure 5.3. Total Phosphorus measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The purple line shows the 80 th percentile value.	31
Figure 5.4. Total Nitrogen measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The purple line shows the 80 th percentile value.	32
Figure 5.5. Total Suspended Solids measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The purple line shows the 80 th percentile value.	33
Figure 5.6. Total Chlorophyll <i>a</i> measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The purple line shows the 80 th percentile value.	33
Figure 5.7. Water pH measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The upper (purple) line shows the 80 th percentile of the data and the lower (brown) line shows the 20 th percentile of data.....	34
Figure 5.8. Water DO measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The upper (purple) line shows the 80 th percentile of the data and the lower (brown) line shows the 20 th percentile of data.	34
Figure 5.9. Water salinity measured at the Ocean outfall site over a discontinuous 40 month period from January, 2002 to May 2005. The upper (purple) line shows the 80 th percentile of the data and the lower (brown) line shows the 20 th percentile of data.	35
Figure 5.10 Depth to water in 8 monitoring bores at Guthalungra.	37
Figure 6.1. Seawater pump station arrangement concept drawing	41
Figure 6.2. Pipeline, pump station and pipeline locations	42
Figure 6.3. Longitudinal section - Intake pipeline	43
Figure 6.4. Longitudinal sections - Intake pipeline causeway typical cross-sections.....	44
Figure 6.5. Longitudinal sections – Discharge pipeline.....	45
Figure 6.6. Generalised installation cross-section for the intake and discharge pipelines.....	46
Figure 7.1. Value of building approvals in the Bowen Shire from 1999 to 2004. Source: Bowen Shire Council.	95

Figure 7.2. General degradation of the terrestrial environment by grazing of cattle	98
Figure 7.3. View of a freshwater marsh/farm dam (Figure 3.1) showing erosion and denuding of succulents by grazing	99
Figure 7.4. Cattle paths and eroded areas in the oxbow lake	99
Figure 7.5. Cattle paths and erosion at the edge of the salt marsh	99
Figure 7.6. Cattle paths and erosion at the upper edge of the inundation of the salt marsh...	100
Figure 7.7. Grazed areas of the riparian zone of the Elliot River.	100
Figure 7.8. Comparison of grazed (left of fence) and ungrazed (right of fence) areas of mangrove and saltpan. Note the differences in vegetation on either side of the fence in the fore and middle ground.	101
Figure 7.9. Grazing and erosion of denuded ground in and around the farm dam.	101

2.3 Table of Tables

Table 5.1 Comparison of water quality values listed in ANZECC, 2000, for tropical marine habitats with those measured at the ocean outfall site proposed for the Guthalungra project by Pacific Reef Fisheries.....	36
Table 5.2 Values for the correlations between various water quality parameters in water sampled from Abbot Bay.	36
Table 5.3 Values for the correlations between water quality parameters in water discharged from a prawn farm at Alva Beach.	37
Table 6.1 Storm Tide Levels for Elliot River (Harper, 2001).....	60
Table 6.2. Nutrient composition of pond wastes removed from a pond on completion of the production cycle at Pacific Reef Fisheries Alva Beach farm.....	64
Table 7.1. Derived water quality objectives for Abbot Bay after the development of Pacific Reef Fisheries Guthalungra Prawn Farm.	69
Table 7.2. F values for the comparison of 2002/03 and 2004/05 water quality data from Abbot Bay.	74
Table 7.3 Discharge of sediment, nitrogen and phosphorus from the proposed prawn farm in comparison with the current and target loads in the Don River Catchment.	76
Table 7.4 World Heritage values of the proposed site	88