

Lot 1 in DP 227034 is to be included in 'Lot and Reserves', which are the subject of the Statement of Environmental Effects, where referenced within the document.

STATEMENT OF ENVIRONMENTAL EFFECTS

PROPOSED AQUACULTURE DEVELOPMENT & WATER SUPPLY WORKS

at

Lots 706,708,709,710 in DP 1000580; Lot 1 in DP 267742; and Lot 1 in DP 578962;
No.355 Cudgen Road, Cudgen, NSW.
Crown Reserve 1001008; Council Lot 128 in DP 1039348 and Lot 32 in DP 847319; Council
Public Reserves of Marine Parade, Beach Street, Elrond Drive, Chinderah Road, Crescent
Street; and Un-named roads/pipeline.

Prepared for

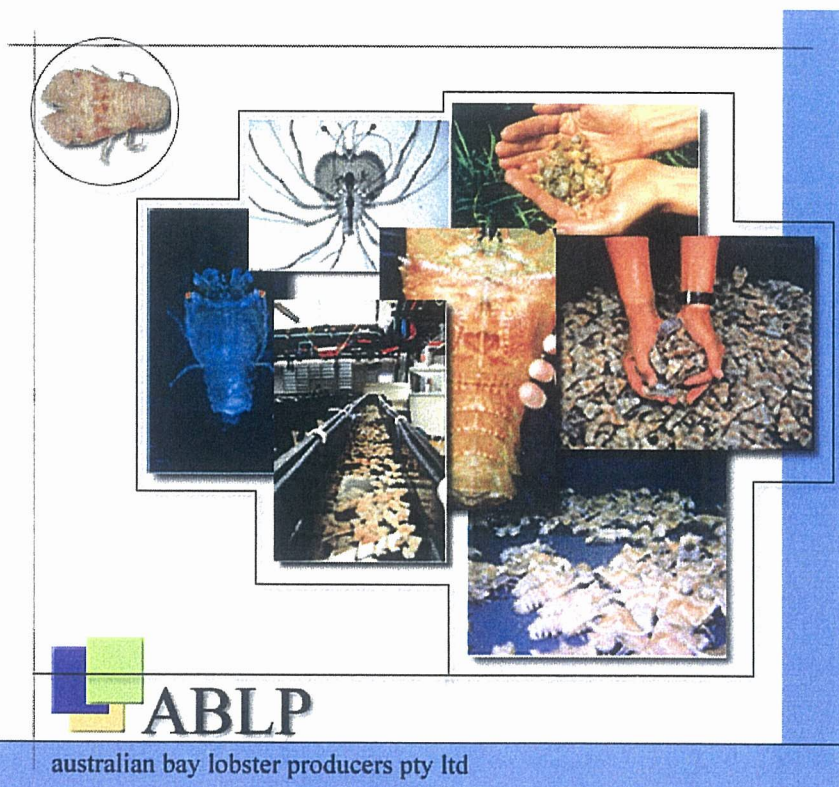
AUSTRALIAN BAY LOBSTER PRODUCERS PTY LTD

By

AUSTRALIAN FRESH RESEARCH & DEVELOPMENT CORPORATION PTY LTD

In association with

PLANIT CONSULTING PTY LTD





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Form

Submission of Statement of Environmental Effects (SEE)

Prepared under the *Environment Planning and Assessment Act 1979* No 203

Part 4 of Division 5, Section 92

SEE prepared by

Name Australian Fresh Research & Development Corporation Pty Ltd
Address 42 Campbell Street Bowen Hills Qld 4006

in association with

Name Planit Consulting Pty Ltd
Address PO Box 1623 Kingscliff NSW 2487

In respect of Proposed Bay Lobster Aquaculture Project

Proponents Name Australian Bay Lobster Producers Pty Ltd

Proponents Address PO Box 224 Toowong Qld 4066

Land on which development is to be carried out Lots 706 to 710 in DP 1000580; Lot 1 in DP267742; and Lot 1 in DP578962 Parish of Cudgen, 355 Cudgen Road, Cudgen, NSW. Crown Reserve 1001008; Council Lot 128 in DP 1039348 and Lot 32 in DP 847319; Council Public Reserves of Marine Parade, Beach Street, Elrond Drive, Chinderah Road, Crescent Street; and Un-named roads/pipeline.

Proposed development Construction and operation of a Bay Lobster Aquaculture Facility. The proposal includes mitigation measures for both the construction and operation phases and water supply and treatment works.

Statement of Environment Effects
A Statement of Environment Effects (SEE) is attached.

Certificate

I certify that the contents of this Statement of Environmental Effects have been prepared to the best of our knowledge.

It is pursuant to Part 1 of Schedule 1, Clause 2(4) of the *Environmental Planning and Assessment Regulation 2000*; and

It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.


Name Michael Dalton
Title Managing Director
Australian Fresh Research &
Development Corporation Pty Ltd

Date 20th October 2004


Name Adam Smith
Title Director
Planit Consulting

Date 20th October 2004



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Planit Consulting declares that it does not have, nor expect to have, a beneficial interest in the subject project.



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2.0 EXECUTIVE SUMMARY

2.1 INTRODUCTION

This Statement of Environmental Effects assesses the environmental impacts of a project to construct and operate a large-scale staged Aquaculture development upon the subject site.

The proposed development is significant in scale and will ultimately employ around 200 people at the local level. The proposal seeks to relocate an existing aquaculture operation based at Bribie Island north of Brisbane, to the area. At the same time, the operations will be expanded so as to increase production and employment over that currently facilitated.

The proposed development, which will be owned and operated by Australian Bay Lobster Producers Pty Ltd (ABLP) will incorporate the development of an aquaculture facility for the production of the Bay Lobster (*Thenus spp.*) known locally as Moreton Bay Bugs. The facility will be based on recirculation aquaculture technology inside horticultural type structures with animals housed in raceways. The yearly production of Bay Lobster in Stage 1 will be 1076 tonnes and this will require a standing stock of approximately 400 tonnes of animals. Stage 1 of the project will occupy an area of 15 hectares on a parcel of land of approximately 148.5 hectares in the Tweed Valley for combined hatchery, growout and processing facilities. It is anticipated that the project will expand to a total of three stages producing 3228 tonnes of product a year and occupying 45 hectares of land.

The project has been designed to produce two products; a live, hard shell animal of a nominal 218g and a soft shell animal (frozen or fresh chilled) of a nominal 45g.

The proposed development also incorporates the pumping of clean seawater from Dreamtime Beach Kingscliff to the site, via a relatively simple system of pipes laid within public reserves and private property. Treated seawater generated will be conveyed back to Council's Sewage Treatment Plant at West Kingscliff, where it will join existing discharges from the plant. All treated seawater generated will be of a quality consistent with the licensing requirements for Council's new Sewage Treatment Plant due to be commissioned in September 2006.

The proposed development is identified as integrated development requiring the grant of a permit pursuant to the Fisheries Management Act, 1994, Licences to pump water pursuant to the Water Act, 1912 and consent from the RTA pursuant to the Roads Act. Likewise, the proposed development, which will employ more than 20 people and is affected by the provisions of State Environmental Planning Policy No.62, is identified as State Significant Development and will subsequently require the consent of the Minister in order to proceed. In addition a licence from the Department of Lands over the portion of Crown Reserve 1001008 in which the intake structure/pipeline is to be located.

In preparation of this application key stakeholders were consulted including the Tweed Shire Council, Tweed Byron Local Aboriginal Land Council, the Departments of Environment & Conservation, Infrastructure Planning & Natural Resources, Department of Lands and Department of Primary Industries.

Issues raised by the above bodies have been addressed within the SEE inclusive of attached detail reports.

2.2 NEED FOR THE PROJECT

The proposed development, by its very nature, requires specific conditions in which to operate. In this regard, extensive assessment and consideration has occurred before



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selecting the subject site. The criteria within which selection was based, primarily focused on the availability of clean seawater that is unaffected by variations in quality, land area available and proximity to air transport. Whilst alternative locations have been explored, there is no other like sites available for the proposal.

The proposal has been initiated by the proponents of the development, with assistance from the Department of State & Regional Development. This assistance has been borne out of recognition that the proposal will generate significant direct and indirect employment opportunities, during both the construction and operational phases. The estimated employment generation (directly associated with the proposed development) associated with the proposal equates to 70 staff during stage 1 and around 200 staff at the completion of stage 3.

2.3 ENVIRONMENTAL IMPACTS

The proposed development seeks to engage in the 'clean' production of Bay Lobster for distribution and export to overseas and local markets.

Environmental impacts associated with the proposed development have been examined in the context of the following: -

- Waste Generation;
- Fauna & Flora Impacts;
- Flooding Impacts;
- Geotechnical Impacts;
- Cultural Heritage Impacts;
- Socio Economic Impacts;
- Noise Impacts;
- Visual Impacts;
- Traffic Impacts; and
- Statutory Impacts.

It can be concluded from the investigations carried out, that the proposed development will not result in any unwarranted or unnecessary adverse impacts upon the local environment.



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3.0 INTRODUCTION

3.1 BRIEF

Planit Consulting has been engaged by Australian Bay Lobster Producers Pty Ltd to assist in the preparation of this Statement of Environmental Effects for submission to the Minister of the Department of Infrastructure, Planning & Natural Resources.

3.2 SITE & LOCALITY INTRODUCTION

The proposed development incorporates works within a number of different properties and surrounding public lands. In this regard, we make reference to the following: -

- The Crown Reserve (No.1001008) adjacent to Marine Parade in Kingscliff. This reserve is under Council control as the trustee for the crown reserve;
- Marine Parade Road Reserve;
- Beach Street Road Reserve;
- Elrond Drive Road Reserve;
- West across Lot 128 in DP 1039348 and the site of the existing Kingscliff Sewage Treatment Plant (believed to be Lot 32 in DP 847319);
- Chinderah Road Reserve;
- Crescent Street Road Reserve; and
- East - West Road Reserve running off Crescent Street.

Please refer to the attached cadastral summary diagram for greater detail in this regard (Appendix A).

Those lands within private ownership and relevant to this development application are described as follows: -

- Lots 706-710 in Deposited Plan 1000580;
- Lot 1 in Deposited Plan 267742; and
- Lot 1 in Deposited Plan 578962.

Please refer to the attached Deposited Plans for greater detail in this regard (Appendix A).

The site will be accessible from both the Pacific Motorway immediately to the west of the site and also through Council road reserves linking the site with Crescent Street to the east.

The site is relatively low lying and incorporates levels varying across the site between 0.4m AHD and 1.4m AHD. Survey details are attached for review (Appendix J).

The site, which has previously been utilised for the purposes of cane cultivation, is in the process of being converted to cattle farming (grazing). Photo plates attached to this submission confirm the existing use (Appendix H).

3.3 BACKGROUND

The proponent of the proposed development has an extensive history in the aquaculture industry and currently operates an export-oriented operation incorporating a collaborative research and production facility on Bribie Island in Queensland.



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Due to advances in technology and a marked increase in demand and efficiencies, this operation is no longer viable out of this location and therefore an alternative site has been sought.

The proponents of the development have been liaising with the NSW Department of State & Regional Development and the Tweed Shire Council over a number of years, with a view to ensuring that the site selected was suitable and sustainable and that no adverse impacts were created on surrounding properties.

3.4 THE PROPOSAL IN SUMMARY

Australian Bay Lobster Producers Pty Ltd (ABLP) is proposing to develop an aquaculture facility for the production of the Bay Lobster (*Thenus spp.*) known locally as Moreton Bay Bugs. The facility will be based on recirculation aquaculture technology inside horticultural type structures with animals housed in raceways.

The yearly production of Bay Lobster in Stage 1 will be 1076 tonnes and this will require a standing stock of approximately 400 tonnes of animals. Stage 1 of the project occupies an area of 15 hectares on a parcel of land of approximately 150 hectares in the Tweed Valley for combined hatchery, growout and processing facilities. It is anticipated that the project will expand to a total of three stages producing 3228 tonnes of product a year and occupying approximately 45 hectares of land.

The project has been designed to produce two products; a live, hard shell animal of a nominal 218g and a soft shell animal (frozen or fresh chilled) of a nominal 45g.

Seawater for the proposed aquaculture facility will be sought from the Pacific Ocean. A pump station will be located within the site of the existing toilet block or car park adjacent to the Kingscliff Police Station (see attached photo Appendix C). The intake pipeline will be directionally drilled through the rock bed situated under the beach and draw water through filter heads sited under the sand, below the low water mark. No external facilities will be visible either at grade or within the ocean.

The seawater collected from the ocean will be routed to the site of the aquaculture facility by way of return pipelines (150mm plastic) within the road reserves of Marine Parade, Beach Street, Elrond Drive, an easement within the current Kingscliff STP, Chinderah Road, Crescent Road and unnamed public roads running through to the site.

As the proposal runs on recirculation technology, treated seawater will be returned to the existing Kingscliff STP before being transported to the existing identified outfall within the Tweed River at Chinderah. ABLP's seawater return would, when Stage 3 is in full production, represent approximately 3% of the maximum-modelled discharge flow of the new Kingscliff WWTP.

3.5 PLANNING FRAMEWORK

The proposed development is to be carried out within the following statutory zones: -

- check
- 1(a) General Rural;
 - 1(b2) Agricultural Protection; and
 - 6(a) Open Space.

The proposed development is defined as follows: -

'Animal Establishment'



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An animal establishment is permissible with consent in both the 1(a) and 1(b2) zones, however it is identified as a prohibited use pursuant to the table of permissible development in the 6(a) zone. The provisions of SEPP 62 are noted; inclusive of it's over riding powers over prohibitions in certain zones.

The consent authority for the proposed development is identified as the Minister of the Department of Infrastructure Planning & Natural Resources. The latter is enforced by way of a declaration made by the Minister dated 3 September 1999, in which Aquaculture developments that will employ more than 20 people are deemed to be State Significant Development. The latter is also consistent with the employment generating provisions of State Environmental Planning Policy No.34. Accordingly, the Department is identified as the consent authority for this particular application.

The proposal is also identified as being 'Integrated Development', with approvals required in relation to the NSW Fisheries Management Act, 1994, the Roads Act 1993, the Rivers & Foreshores Improvement Act, 1948, the Water Act, 1912 and the Protection of the Environment Operations Act, 1997.

The proposal is identified as being relevant to the provisions of State Environmental Planning Policy No.62 - Aquaculture.

The proposed development includes the installation of a pump house and associated pipes in Crown Reserve 1001008 and if this activity is not consistent with the reserve purpose a licence may be required from the Department of Lands.

The works to be required within the road reserve would generally require consent under the Roads Act, 1993 only. In this regard however a portion of the proposed pipeline route is identified as travelling through Class 2 Acid Sulfate Soils. Accordingly, the consent of Council would normally be required pursuant to Clause 35 of the Tweed Local Environmental Plan.

Further details in this regard are provided under the heading of Statutory Assessment (Section 9.0)

3.6 THE PROJECT TEAM

The following people / firms have been involved in the preparation of this development application and accompanying documentation:

- | | |
|--------------------------|---|
| 1. Geotechnical & Soils: | Douglas & Partners |
| 2. Fauna & Flora: | Peter Parker Environmental Consultants P/L |
| 3. Flooding Assessment: | WBM Oceanics |
| 4. Project Management: | Australian Fresh Research & Development Corporation P/L & David Mcphee & Associates |
| 5. Cultural Heritage: | Davies Heritage Consultants |
| 6. Acoustic Assessment: | Richard Heggie & Associates |
| 7. Town Planning: | Planit Consulting P/L |
| 8. Traffic Planning: | Traffic Planning Services (Qld) P/L |

3.7 AUTHORITY CONSULTATION

Discussions were held with key stakeholders during the preparation of this SEE. The key issues raised by these groups are shown in *Table 1.0*.

Table 1.0 – Stakeholder Consultation



Stakeholder	Action Undertaken	Section Addressed
Department of Environment & Conservation	See letter of consultation attached (Appendix Q). Issues raised summarised as follows: -	
	Any proposed wastewater discharge into the Tweed River will require detailed information and modelling to assess the potential impact on aquatic ecosystems and current recreational uses of the river.	Sections 7.8.10 - 7.8.13 Appendix L
	If ponds are to be constructed by dredging or if dredging soil is to be used for building foundations an assessment of Potential Acid Sulfate Soils should be undertaken.	Section 7.7 Appendix J
	Noise from seawater transfer pumps (especially at night) needs to be addressed in accordance with the NSW <i>Industrial Noise Policy</i> .	Section 7.4 Appendix G
	Detailed explanation of how the water cycle systems work, infrastructure, backup, contingency plans, nutrient monitoring etc.	Section 5.1.6 - 5.3.1
	Details of reuse, recycling and disposal of water, effluent and solid waste.	Sections 7.8.2 and 7.8.7
	Preparation of an 8 Part Test in accord with Section 5A of the EP&A Act, 1979.	Sections 7.1 Appendix M
	Specific details of any pollutant from discharge of wastewaters, drainage and/or flooding, entering and contaminating the Tweed River system, should be addressed to determine the likely impacts on native aquatic flora and fauna.	See sections 7.8.10-7.8.13 Appendix L
	Preparation of a Cultural Heritage Assessment.	Section 7.2 Appendix E
	See letter of consultation attached. Issues raised summarised as follows:	Appendix Q
Department of Infrastructure, Planning & Natural Resources	Water cycle management, including water consumption, recycling and impact of any water release from the site.	Sections 7.8.10 - 7.8.13
	Transport impacts and traffic generation.	Section 7.3 Appendix F



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Noise impacts, particularly in relation to sensitive noise receptors.	Section 7.4 Appendix G
Potential hazards and risk implications of the proposed development should be considered, particularly with regards to flooding, sugar cane fires, and disease management and predator control.	Sections 5.3.2, 5.1.4, 5.1.5, 7.11, 7.12.1 Appendix N
Soil management; particularly in relation to any soil contamination, potential or actual Acid Sulfate Soils and any fill requirements.	Sections 5.4.5, 7.7 Appendix J
The Applicant shall consult with the community that is likely to be affected by the proposal. A report on who was consulted must be submitted with the DA, describing how the affected community was identified, consultation methods, and key issues raised by the community.	Refer this table Appendix R
Under Section 91 of the <i>Environmental Planning and Assessment Act 1979</i> , development is "integrated development" if it requires certain approvals from other bodies in addition to the consent authority before it may be carried out.	Section 9.2.4
You should be aware that under the <i>Coastal Protection Act 1979</i> and the <i>Coastal Protection Regulation 2004</i> (due to commence 1 September 2004), the concurrence of the Minister for Natural Resources is required to carry out development within the coastal zone that is below the mean high water mark, excluding any estuary.	Section 9.2.1
NSW Fisheries (Now Primary Industries)	See letter of consultation attached. Summarised as follows: -
The location and construction techniques used to place the intake and out-take pipes. Information about the likely	Sections 5.6 - 5.7 Appendix C



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frequency and extent of maintenance of these facilities and how these actions are to be undertaken.

The number and type of waterway crossings including agricultural drains traversed by the pipeline route and how they are to be 'crossed (under boring is generally preferable to trenching).

Discharge volumes and information on the variability of discharge (quality and quantity) including daily peaks and seasonal changes associated with different stages of lobster grow-out.

How public safety will be assured at the intake and discharge points and possibilities for maintaining public access particularly for recreational fishers along the foreshore.

Section 5.6

Sections 7.8.5 - 7.8.7

7.8.10 - 7.8.13

Appendix L

Section 5.6 - 5.7

Tweed Shire Council

Numerous consultative meetings in relation to works within road reserve, carrying out of route works within Council owned land and within Council managed recreation reserve.

Section 7.0, 9.0

Minutes of the meeting with the Council's Development Assessment Panel are attached within Appendix R.

Community Consultation

Presentations made:

1. 19 July 2004: NSW Government - Planning Focus Meeting [DIPNR, DSRD, NPWS, Lands, DPI, DEC & TSC]

2. 10 August 2004: Executives of the Kingscliff Progress Association and Chamber of Commerce

3. 11 August 2004: Tweed Shire Council

4. 4 October 2004: Kingscliff residents (Chamber and Progress Assoc)



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5. 5 October 2004:
Chinderah residents
(Chamber) together with
Cudgen residents overlooking
the site (letter box drop by 1
October inviting Cudgen)

Additional Correspondence,
outlining the project in some
detail together with an
invitation to meet and answer
any questions, have been
sent to:

Immediate neighbours
including the NSW Sugar
Milling Cooperative, Cudgen
residents overlooking the site
and the Tweed Byron Local
Aboriginal Land Council.



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4.0 THE NEED FOR THE PROJECT

The environmental and economic benefits of aquaculture operations has been widely documented and acknowledged. In this regard, the proposal seeks to provide for a sustainable and beneficial alternative to wild harvesting, which over time places unnecessary strain on natural resources.

Governments and industry alike have acknowledged the benefits of alternative primary production, such as that proposed within this development. The NSW Government and the Tweed Shire Council has played an active role in the facilitation of this development and through the provision of assistance relating to site selection and authority consultation. This assistance is not only directed at promoting employment generating development such as that proposed, but it is also borne out of recognition that development such as this can provide for long term viable and sustainable positives in terms of the triple bottom line - *Environmental, Social and Economic*.

5.0 DESCRIPTION OF THE PROJECT

5.1 INTRODUCTION

5.1.1 Objectives of the proposal

Australian Bay Lobster Producers Pty Ltd (ABLP) is proposing to develop an aquaculture facility for the production of the Bay Lobster (*Thenus spp.*) known locally as Moreton Bay Bugs. The facility will be based on recirculation aquaculture technology inside horticultural type structures with animals housed in raceways.

The yearly production of Bay Lobster will be 1076 tonnes in Stage 1 and this will require a standing stock of approximately 400 tonnes of animals. Stage 1 of the project occupies an area of 15 hectares on a parcel of land of approximately 148.5 hectares in the Tweed Valley for combined hatchery, growout and processing facilities. It is anticipated that the project will expand to a total of three stages producing 3228 tonnes of product a year and occupying 45 hectares of land.

The project has been designed to produce two products; a live, hard shell animal of a nominal 218g and a soft shell animal (frozen or fresh chilled) of a nominal 45g.

5.1.2 Information on the species

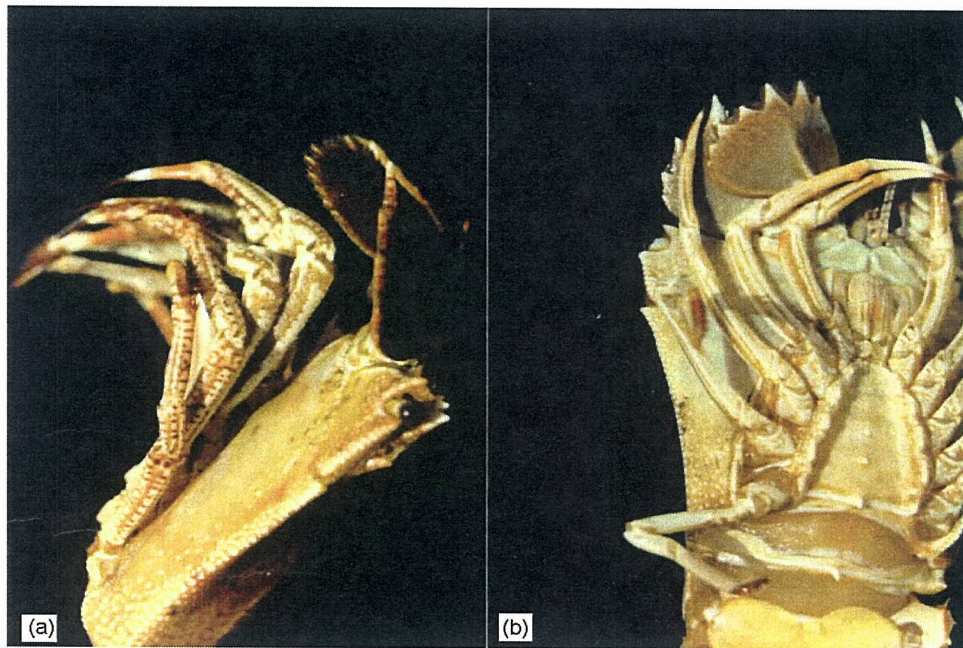


Fig. 5.1 Photos of (a) Sand Bug *Thenus orientalis*, indicating spots on walking legs and (b) Mud Bug *Thenus indicus* indicating brown stripes on walking legs.

ABLP proposes to produce *Thenus orientalis* and *T. indicus*, commonly known as Moreton Bay Bugs, Slipper Lobsters and Bay Lobsters. Because the recognised international name of these animals is Bay Lobsters (FAO), ABLP will use this name for the two *Thenus* species. In Australia, Bay Lobster are found along the entire northern coast of Australia from Shark Bay in Western Australia to Coffs Harbour in northern New South Wales.

Fishers commonly call *T. orientalis* the Sand Bug and *T. indicus* the Mud Bug. Mud Bugs prefer a bottom of fine mud, and are typically trawled from inshore coastal waters of 10 to



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30 meters depth. Sand Bugs tend to prefer sediments with a larger, coarser particle size, and are usually trawled from a depth of 30 to 60 meters in the coastal shelf and offshore areas. Mud Bugs are brown overall and have brown stripes on their walking legs, while Sand Bugs are speckled overall and have spots on their walking legs (Figure 5.1).

Because these species are indigenous to New South Wales they are consistent with the NSW fisheries translocation policy.

5.1.3 Broodstock Supply

check, do not permit indefinite? Berried female Bay Lobster are to be collected from Queensland waters under a permit previously obtained from the Queensland Fisheries Service (Queensland Department of Primary Industries and Fisheries, Permit number PRM04459H Appendix R). This permit allows the collection of 1100 berried female broodstock per year, by specified T1 vessels operating in the East Coast Trawl Fishery.

5.1.4 Quarantine

The broodstock are to be transported to the Cudgen Road facility where they will be inspected for external indications of parasites or disease, undergo a prophylactic treatment via dipping, and placed into a quarantine room containing a raceway biologically separated from the broodstock facility. Water entering the quarantine room comes via its own supply line after being filtered, heated and sterilised. Water passing out of the quarantine room goes straight to the seawater treatment plant and does not contact any other systems or animals. Transport water also passes directly to the treatment plant.

All seawater released from the treatment plant is also sterilised by contact with ozone before leaving the site.

There will be no genetic modification of any animal on the ABLP Cudgen Road site. It is planned to domesticate Bay Lobster produced within the facility to close the life cycle and improve desirable traits in the stock. This, however, will be conducted using traditional stock improvement techniques such as line breeding and cross breeding. In the first instance this will be to reduce reliance on wild caught broodstock as these animals are of unknown history and hence may eventually lead to the introduction of disease. This has been the experience of other aquaculture industry sectors that produce crustaceans, for example, prawn farms. By learning from the historical mistakes of these other sectors ABLP plans to avoid or minimise the impact of disease on the production facility.

The production of pure bred lines that are then crossed to give rise to the production stock would be done to develop an animal that is more suited to the ABLP production environment and protect genetic gains made in selection. The selection for traits more suited for the ABLP facility could tend to make the Bay Lobster less fit to survive in nature. If a release should occur, it would most likely be due to a flood event (though the site will be filled and banded to the 100 year flood level of 3.3m AHD plus 400mm). Bay Lobster have a very low tolerance for brackish or freshwater and the freshwater input required to flood the site would ensure the demise of any Bay Lobster exposed to the freshwater. Raceway and treatment plant outlets are screened to prevent escape of stock, however, in the unlikely event of an escape any Bay Lobster released from the facility would not survive to travel to the ocean.

5.1.5 Health status of Stock

ABLP and Australian Fresh Research and Development Corporation Pty Ltd (AFR&DC) have been conducting research and pilot scale production of *Thenus spp.* over the past 11 years. During the early period of research bacterial disease of larvae was the identified cause of mortalities experienced. Modifications to the larval production system and methodology



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have dramatically reduced the incidence of bacteria related mortality. After the larvae metamorphose to nisto and then become juveniles, they become much more robust and no disease agents have been identified as causing mortality of juveniles or adults.

The bacteria that have been observed to infect Bay Lobster larvae are those always present in any body of seawater. These bacteria opportunistically attack any organism that is in a weakened state, for example a larva that is in a poor state of health due to suboptimal water quality. There are no specialised species of disease causing organisms, of which ABLP are aware, that may pose a disease risk to any other native species.

Bay Lobster's are monitored for the occurrence of disease through visual examinations by staff in the particular production areas, through sampling of product at harvest and through measurement of feed consumption (a reduction in feed intake is often the first indication of disease).

The systems in each area (broodstock, larval rearing, nursery and growout) are modular so a loss of stock through disease in one system does not mean that animals in other systems are also lost. In all cases if stock does need to be destroyed they are euthanased and sent to an approved landfill and the rearing facilities disinfected and dried out before being restocked.

As an additional environmental safeguard, all treated seawater leaving the ABLP production facility will be contacted with ozone at a dose sufficient to ensure sterilisation of the seawater.

dead to landfill. staff to fill.

Waste / man disposal
mammal place
reg'd - eg
refrigeration

5.1.6 System operation

ABLP's Bay Lobster facility will be constructed and operated using experience developed over more than eleven years of research and development and pilot scale production. The facility will be state-of-the-art in terms of the level of monitoring and control that can be exercised over the production units. In all production areas there are modular systems which are biologically separate from other systems within that area. This reduces the impact of any disease that does enter a production area and enables treatment to occur, if appropriate, without affecting animals in another system.

5.1.7 Equipment control

The filtration equipment on each system is under the local control of programmable logic controllers (PLC) which communicate with a central computer (SCADA). This SCADA system generates alarms and informs personnel should any of the variables being monitored go out of range. A repair technician is available 24 hours a day in case of equipment failure. Because the SCADA system also logs the performance of the system there is also a historical record of the systems performance which can remind personnel of scheduled maintenance and indicate trends for improvement of system operation.

5.1.8 Filtration units

The filtration utilised in the recirculation systems within the production areas is based on the most recent research on recirculation aquaculture and the experience generated from 4 years of pilot scale production of Bay Lobster in similar systems. Water overflowing the individual raceways enters foam fractionators, passes to the solids filter before entering the biofilter and finally another foam fractionator to remove organics/sterilise the water prior to it re-entering the raceways.

Foam fractionators

The foam fractionators are designed for a two-minute residence time and have ozone injected to enhance the removal of organic matter. The foam fractionators are placed



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before the solids filters (contrary to the experience of operators of recirculating fish aquaculture systems). AFR&DC has found that using a fresh diet such as squid leads to a high level of dissolved organics in the raceways after feeding. Bacteria utilising this food source then cause the solids filters to become blinded with bacterial 'slime', reducing their ability to process the required volumes of water. The primary fractionation step prevents this from happening. The second fractionation step is used to remove bacterial biomass generated by the biofilter and to 'sterilise' water prior to its return to the raceway.

Solids filters

The flow rate in the 24 growout systems is around 100l/sec and because the filtration plant is designed for a minimal head loss, rotating drum filters are used for primary filtration. Experience has shown that a 50µm screen will maintain high water quality within the raceways.

Biofilter

The biofilter design chosen is a submerged biofilter using structured media. AFR&DC has found that, in general, Bay Lobster are relatively sensitive to nitrogen compounds; particularly nitrite and high efficiencies of removal per pass are required to maintain the concentration of these compounds below the toxic level. No other biofilter configuration was consistent with the low head available and the high removal efficiency required. This biofilter material is available in large blocks and so is easily removable for cleaning, should this be necessary.

5.2 SYSTEM PERFORMANCE MONITORING AND REDUNDANCY

5.2.1 Complete facility

In the case of the facility as a whole, the biggest threat to the operation is a power failure, especially if it occurs after feeding. The operation of the pumps is essential to supply oxygen to the Bay Lobster with a window of several hours to restore water flow before mortalities start to occur.

For this reason the ABLP facility will be equipped with dual backup generators, either one of which is capable of running the essential equipment until mains power is restored.

There is risk to animals also if a major piece of equipment should fail (eg growout return pumps), so all major plant items are either part of a redundant system (eg backup plant is permanently in place and shares duty) or is on a quick-change coupling with spares available on site to replace the faulty unit.

note redundancy

5.2.2 Production areas

Due to the policy of continual stocking and harvesting there comes a point where the standing stock of a production area changes only little. For this reason it is important that the filtration systems function well 100% of the time. As mentioned above, equipment breakdown is monitored electronically; unfortunately, current technology does not allow this to be done for water quality.

Because of the sensitivity of Bay Lobster to nitrogenous compounds, these must be closely monitored. Every day, all production systems are sampled for ammonia, nitrite and nitrate and the concentrations relayed back to the operators as a graph so that any upward trend in concentration can be rapidly identified and remedial action taken.



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5.2.3 Seawater treatment plant

There are two main areas where failure may occur in the seawater treatment plant, the process itself and the equipment.

A straightforward hardware failure can be detected by the programmable logic controller (PLC) which controls the operation of the process equipment. As above, spares of all major items will be held on site to enable timely replacement to be carried out. When a failure of the plant is detected, all water en route to the treatment plant is diverted into the emergency holding pond until repairs are completed and then enters the treatment plant.

The failure of the process, unlike a hardware failure, is a chronic rather than an acute problem. Biological systems tend to deteriorate gradually and then fail, there are generally warning signs that the system is headed for failure. To monitor the 'health' of the treatment plant, samples of water are taken every day from within the plant and at the discharge point (return well). The concentration of nutrients (organic N, total ammonia nitrogen (TAN), nitrite, nitrate and total P) and physical properties (salinity, pH, temperature etc) of these samples are then determined.

These data are logged and water quality trends produced. This enables ABLP to firstly, determine compliance with the EPA discharge licence on a daily basis and secondly, develop a daily 'snapshot' of how the treatment process is performing. In this way, deterioration in performance is identified for remedial action before it leads to a breach in discharge licence conditions.

5.3 CULTIVATION PRACTICES

5.3.1 Production areas

Broodstock

Oval shaped raceways consisting of 1100mm wide FRP raceway sections (same sections as used in the growout section). There are four raceways, with each housed in a separate temperature controlled room for control of egg incubation time. The water volume in each raceway is 3500 litres with a freeboard of 100mm. A float valve controls water level and each raceway is fitted with an overflow and a drain valve.

Each raceway has its own filtration system (both mechanical and biological) and utilises the recirculation principle. Ozone is used to oxidise dissolved organic material.

Larval Rearing

Oval shaped raceways consisting of dogbone shaped 600mm wide FRP raceway sections. There are 8 systems with each system consisting of 24 raceways. Every system has its own water treatment equipment for remediating the recirculated water. Each raceway contains 2400 litres of water with 100mm freeboard and has its own drain valve and overflow to the filtration system. Ozone is utilised in each system.

Nursery

Oval shaped raceways consisting of 1100mm FRP raceway sections (as per growout). There is a primary nursery system which consists of single raceways of 15 000 litres each with their own filtration equipment (eight systems in all) and ten secondary nursery systems which have two raceways each containing 15000 litres. Freeboard in each is 100mm and all races are fitted with drain valves. Ozone is utilised in each system.



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Growout

Oval shaped raceways consisting of 1100mm FRP raceway sections. Raceways are stacked four high on spun concrete posts and beams. Each growout system has eight 'stacks' of four races and there are 24 growout systems. Each race holds 16 500 litres with a freeboard of 100mm and has its own drain valve and overflow to the filtration system. Ozone is used to control dissolved organic material.

Each batch of larvae is in larval rearing for 30 days, nursery for 47 days and in growout for either 116 days (softshell) or 323 days (hardshell).

5.3.2 Predation Control

There are no systems to control or discourage predators as all cultivation is done under cover within a controlled environment.

5.3.3 Feed Source

The feed sources used for Bay Lobster are bivalves at the larval rearing stage and squid at the nursery and growout stage. ABLP aims to eventually replace these feeds with compounded diets made in-house and to this end has already conducted trials on such feeds with juvenile Bay Lobster. While these diets were successful in terms of their acceptance to the animal, there are problems with the available binders and trials continue.

5.3.4 Feed Management

Feed conversion ratio is a productivity measure that can easily increase if feed management is not effective. High feed conversion ratios result in poor performance in terms of water quality and economics. In this project feed is processed in a central facility and transported to the relevant raceway at the correct batch weight. Prior to the application of the next batch of feed, the feed remaining in the raceway is quantified and used to adjust the amount of feed to be applied, either up, down or the same. This simple procedure ensures that animals are fed enough to maximise growth but not to waste feed.

5.3.5 Aquaculture Chemicals

The chemicals used on site are sodium hypochlorite (bleach) as a general disinfectant, sodium bicarbonate (baking soda) to adjust pH in growout and calcium hydroxide (slaked lime) as an alkalinity supplement in growout.

5.3.6 Harvesting

Bay Lobster are housed in raceways which contain 150-200 mm of water and therefore can be harvested by simply netting and placing into baskets which are transported to the processing plant (on site). Soft shell animals are removed from the water immediately after moulting, chilled and sent to the processing plant (on site).

5.4 CONSTRUCTION / STRUCTURAL PARAMETERS

The proposed development requires a number of physical works in order to facilitate the proposal. In this regard, those key works proposed are described as follows: -

5.4.1 Built Form

The proposal incorporates the construction of a processing building, aquaculture holding tanks and associated site works.



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The proposed processing building, which will be the primary traditional structure on site, will incorporate a height of 11.0m and general dimensions of approximately 30m x 43m. Conceptual design plans are attached at Appendix D for further considerations. *materials to be used?*

The proposed production buildings will incorporate an approximate height of 5.80m and will be enclosed by way of a lightweight structure similar to a greenhouse building (galvanised tubing covered by multi layer plastic fabric). The proposed lightweight structures will encompass each of the production raceways, with each greenhouse building providing for an internal layer of black plastic to maintain low light levels and white on the outside in order to reflect excess heat. An outer layer of green shade cloth will cover each of the production buildings in order to stop all glare and protect the plastic fabric from hail damage.

Dimensions associated with each of the proposed buildings on site are provided on the attached Preliminary Site Layout Plan (Appendix D). These dimensions are as follows: -

1. Processing Building: 43000 x 30000
2. Maintenance Workshop: 15000 x 40000;
3. Office & Amenities: Approx 400m²;
4. Growout Structures: 76100 x 116000;
5. Nursery Building: 135000 x 53000;
6. Larval Rearing Building: 105000 x 35000;
7. Race Assembly Building: 20000 x 95000; and
8. Brood Stock & Laboratory: 53000 x 20000.

NB. Buildings 4 to 13 on the attached plan are Greenhouse Style Buildings. *includes 9-12 and 1-3 how built?*

The processing, workshop, amenities and administration buildings will be designed and constructed in accord with the provisions of the Building Code of Australia.

Further works proposed within the vicinity of the site include car parking facilities and extensive landscaping.

5.4.2 Bunding

more info?
The proposed works precinct is proposed to be bunded by an earth bund of approximately 2.7m. This bund will effectively provide flood protection to the facility. Initially, bunding will be limited to the perimeter of stage 1 works, however as stages 2 & 3 are commissioned, further bunding will be provided around the perimeters of these areas also.

Generally it is proposed to raise the ground level within the bunded area. Filling is proposed to be won from site by excavating subsurface materials in the vicinity of the test bores undertaken in the attached Geotechnical Report.

5.4.3 Traffic Works

but 800 RPA
The southbound on-ramp and off-ramp loop intersection with the local road on the eastern side of the interchange would need to be upgraded to provide a separate left turn deceleration lane and taper approximately 100m in length (with left turn island) to cater for development traffic.

5.4.4 Construction Timing

10 wks for Dreamtime Beach
'Earthworks' are likely to occur for approximately 12 weeks with 'construction' to take approximately 48 weeks for Stage 1. Earthworks/construction activities are only proposed Monday to Friday (7am to 6pm) as recommended in the NSW EPA construction guidelines. No work will be conducted on Sundays or Public Holidays.

→ Saturdays?



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5.4.5 Erosion and Siltation

The construction phase will incorporate an extensive application of best practice measures to prevent erosion and the loss of sediment from the work sites (including pipeline route and intake) during construction. To minimise potential impacts, the following sediment and erosion mitigation measures will be undertaken:

- Where necessary runoff will be directed to sediment fences, hay bales and/or gully grate control devices to capture mobilized sediment;
- Where necessary installation of sediment traps along overland flow paths within disturbed areas;
- Siting of stockpiles away from drainage lines;
- Minimising vegetation clearing and site disturbance;
- Storage of fuels and chemicals away from drainage lines and within bunded areas;
- Following completion of the works, the site will be cleared of all debris, spoil and foreign matter

Presumably to sediment traps?

It should be noted that an Erosion and Sediment Control Plan would be developed for all site works, including the pipelines to and from the facility and the intake structure.

consent

5.5 STAGING

The proposed development is to be undertaken in three (3) stages. Stage 1 incorporates the works shown within the attached site layout plan.

Stages 2 & 3, for which consent is sought with this application, will effectively mirror stage 1, with the exception of the processing building, workshop facilities and administration building.

parking, grower, helixing

Additional parking will be provided with the introduction of each stage.

5.6 PIPELINE WORKS

The proposed development incorporates the laying of pipelines within private lands and primarily public road reserves from the beach in Kingscliff to the subject site. This route takes the path as shown within the attached route plan (Appendix B). The depth of the proposed pipe is not yet known, however it is envisaged that the maximum depth of excavation will not exceed 1.0m.

The proposed pipes will measure 50-150mm in diameter and be made of a plastic material.

The route from the aquaculture farm to the ocean traverses Class 3 and Class 2 acid sulphate soils as identified under the Tweed Local Environmental Plan 2000 (see map below). The pipeline will have a maximum depth of less than 1m below ground level through these acid sulphate soils. Therefore the proposal will not impact upon Class 3 acid sulphate soils - that is the works will not be more than a metre below ground level. In terms of the identified Class 2 soils, this area has been substantially filled in recent years with the residential expansion of West Kingscliff. Accordingly, excavations in this area for the pipeline will not extend beneath the depth of the fill.

In conclusion, excavations for the pipeline will not result in acid sulphate soils being exposed.

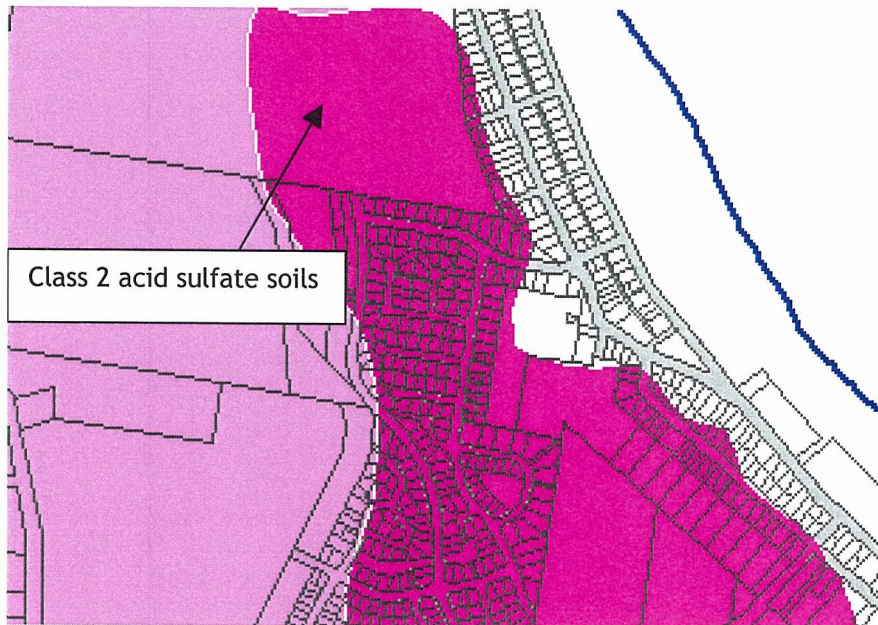
*noise controls
period of excavation?*



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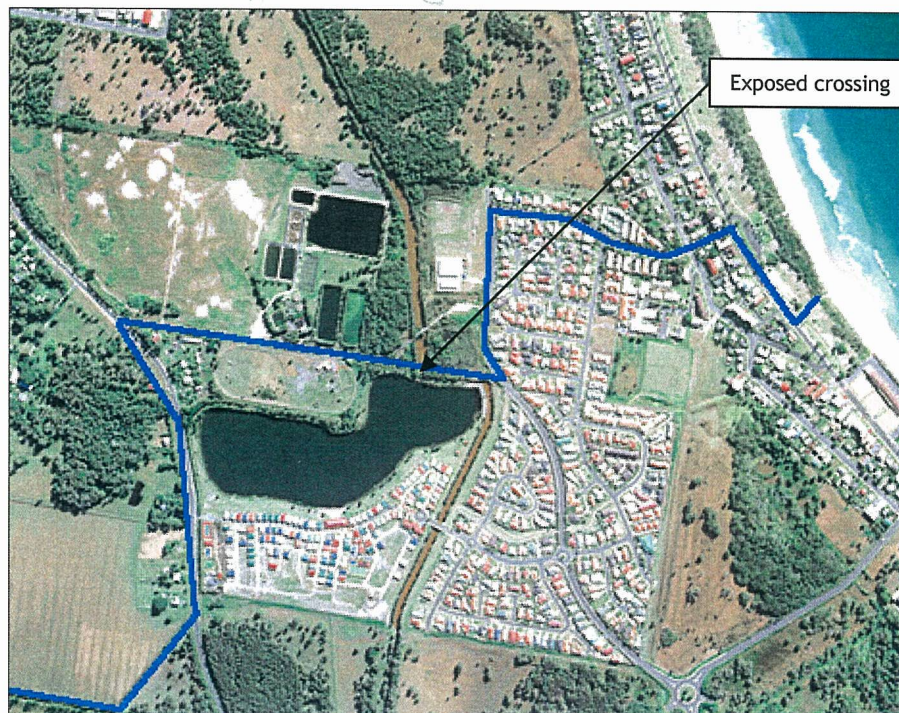
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NB. See also layout plan within Appendix K of this submission.

The proposed pipeline route will take the path of existing cleared and disturbed areas and hence no vegetation will be removed from undisturbed areas during the process of laying the proposed intake and return pipes.

It is pertinent to note that the proposed pipeline route may require the physical attachment of the pipe to existing services crossing over the drain shown in the aerial photograph below. The proposed pipeline may be visible at this point, with the remainder being located beneath the ground surface. There is one other agricultural drain crossing along the pipeline route and where possible pipe laying works will incorporate under boring as the preferred means of laying.



5.7 PUMP FACILITIES / WORKS WITHIN DREAMTIME BEACH

The proposed development incorporates the placement of a pump facility within the existing public toilet site or car park opposite the Kingscliff Police Station. The placement of the pump in this site may result in some structural alterations. If this is the case, a separate development application (where required) will be submitted to Tweed Shire Council. ✓ ?

Approval to carry out geotechnical investigations of the area surrounding the public toilet/car park and adjacent beach has previously been granted by Tweed Shire Council. These investigations have demonstrated the suitability of the site for the placement of a pump well.

The project proposes two (2) 150mm plastic pipelines laid within road reserves for the collection of fresh seawater (Appendix C). The pipelines would follow the route as shown in Appendix B from the Cudgen Road site to the ocean beach at Kingscliff adjacent to the Police Station. The pipes will connect to a concrete caisson placed vertically in the sand (Appendix C). Water supply pipes will extend seawards under the sand from the caisson at a shallow angle so that the ends of the pipes are below low tide level. It is anticipated that the pipes will be placed using directional drilling through the coffee rock that underlies the sand of dreamtime beach. It should be noted that there would be no evidence of any pipe work from above ground. Seawater will migrate under gravity into the caisson and be pumped from the caisson by submersible pumps into the supply pipelines and to the Cudgen Road site. The pumps have a capacity of up to 12 litres/second (Stage 1) to enable catch-up after an interruption of flow and to take advantage of off-peak tariffs for pumping to storage.

The proponent proposes to obtain the supply of required seawater from Kingscliff beach at a rate of 7 litres/second (Stage 1), rising to 21 litres/second when Stage 3 comes on line.

It should be noted that because the intake is below the level of the sand, the water entering the pipe will be essentially free of fouling organisms and it should not be necessary to undertake maintenance of the intake from the ocean end. The ability to backwash the bed from the caisson should be sufficient to maintain flow rates, given the small daily requirement for fresh seawater. Backwashing of the bed would be on an as-needed basis during high tide periods. ✓ 2 pipes = 12 + 12 = max 24 / s.

The placement of the pipeline within coffee rock and the intake under 4m of sand means that neither the pipeline nor intake is visible to the public. As outlined above there should be no need for intake maintenance from the beach end and hence no effect on public access or safety.

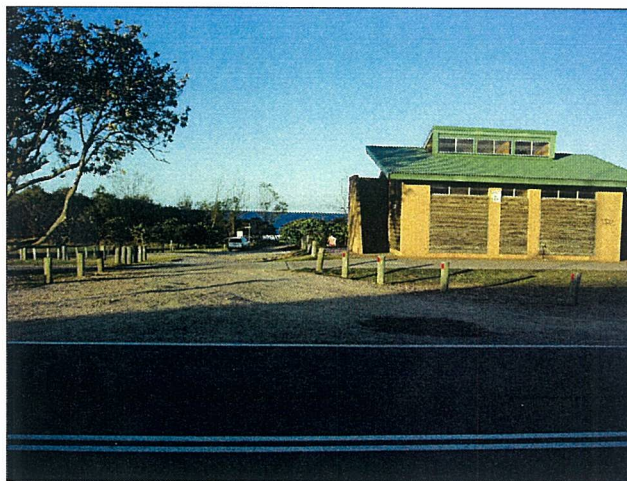


Figure 5.5 View east to existing toilet block/car park to accommodate pump facility



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5.7.1 Treated Seawater return pipeline

Three options for the placement of a pipeline to return treated seawater to the Tweed River were presented at the Focus Planning Meeting. Further research into these options has narrowed the choice down to the option of a pipeline from the proposed site to the existing Kingscliff WWTP where treated seawater will join with treated wastewater and travel to the existing council outfall at Jenners Corner.

The use of an existing outfall means that there are no new issues regarding public access to the foreshore.

5.8 EXCAVATIONS / EARTHWORKS

5.8.1 Borrow Pit

Various alternatives to locate the Aquaculture Development have been explored, and the choices are extremely limited. Land sited near the sea (for access to fresh seawater) on a reasonable transport route, with not too great a distance to an international airport, is virtually unable to be found, except that which is low lying. This means filling is necessary, if flood damage is to be avoided or minimised. The current intense development activity, means prices to import fill to the site are uneconomic. The only feasible solution is to use a 'cut to fill' procedure - that is excavate one portion of the site to fill another - using an on site 'borrow pit'.

It has been determined through consultation with the NSW Department of Planning, Infrastructure and Natural Resources that obtaining fill from on site excavation is permissible as the core land use is aquaculture.

It is thus proposed to excavate a pit in a location adjacent to the site of the project buildings, and associated facilities, and transfer the excavated material to build up a 'bench' plus 'bund wall' to keep out the projected flood(s). Since geotechnical investigations indicate groundwater at a depth of around one metre, in a basic sand bed, a combination of earthmoving and dredging seems the logical way to proceed.

Geotechnical advice also states that whilst the groundwater table may need to be locally drawn down in order to facilitate excavation, "On completion of excavation, due to the sandy nature of the soils, the groundwater would be anticipated to return to equilibrium levels quite quickly."

Excavation procedures were developed, as have other issues been considered, using the Planning NSW EIS guideline 'Extractive Industries, Dredging and Other Extraction in Riparian and Coastal Areas'.

5.8.2 Excavation

The first step will involve clearing plant growth, and associated organic material, and stockpiling it for use in landscaping activities. Excavating a 'pool' and moving the sand up to the bench site will follow this. Water will largely drain back into the pool. Using quantities derived from the geotechnical report, and with a programme of continuous monitoring, lime will be injected, to correct any acid sulphate effects in the fill material. Such application will be in accord with an approved Acid Sulfate Soil Management Plan.

will need
water licence
4 times



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how much?
Imported material will be needed to form a 'water stop' both on the top of the existing ground and vertically in the bund. This is likely to be of clay type material, brought in and spread, rolled and compacted to a suitable density.

5.8.3 Staging

The project is to be progressed in three stages. Stage 1 requires a nominal 230,000 cubic metres of fill, to construct the bench and surrounding bund wall. It is proposed therefore to excavate to an average R. L. minus 2.5 AHD over an area nominally of 92,000m² (equivalent to a square approx 303m to a side). This will expand to an area of around 270,000m² with the construction of Stage 3 (520 m square).

5.8.4 Drainage

At no time would the excavation work interfere with the natural stormwater flow, as the 'pool' would connect to existing inflow and outflow drainage. →

Generation of high sediment loads in any outflow waters is not likely to be a problem, as the geotechnical investigation indicates almost total sand as the material to be excavated. Should some deleterious material be encountered a sedimentation basin will be established.



if gw water @ ~ -1.0m
then groundwater interference
is likely →



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6.0 OPTION EVALUATION

6.1 DO NOTHING OPTION

Adopting this option would result in the retention of the existing lands as under utilised cane lands /cattle grazing.

The proponents of the development would continue to seek alternative sites for the operations, thereby resulting in the loss of significant investment, technology and employment opportunities available to the Tweed Shire.

Given the lack of adverse impacts associated with the proposal, no real or quantifiable benefits are evident in relation to this option.

6.2 ALTERNATIVES

Various alternatives to locate the Aquaculture Development have been explored, and the choices are extremely limited. In this regard, land sited near the sea (having regard to sourcing of quality seawater) on a reasonable transport route, with not too great a distance to an international airport, is virtually unable to be found, except that which is low lying and constrained by natural features.

Unlike other sites, the low-lying nature of the subject lands is not considered to be a constraint and therefore does not preclude the development from proceeding.



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7.0 ENVIRONMENTAL ASSESSMENT

7.1 WASTE MANAGEMENT

The ABLP aquaculture facility has a planned annual production of approximately 1076 tonnes in Stage 1 and three times this quantity at the end of Stage 3 ramp up. This level of production requires a correspondingly high level of inputs. It is inevitable that within the production process waste streams will be created and must be dealt with. The identified streams, disposal methods and possible recycling options are detailed below and summarized in Table 7.1.

7.1.1 Construction Waste

Because construction of the ABLP facility will be on going for several years, construction waste will be generated intermittently. Due to the relatively light construction, metal pipe and plastic sheeting will represent the majority of this. The galvanized pipe itself will be recycled into other parts of the construction where possible or sent to metal recyclers but most of the other non-metallic construction waste will be sent to off site landfill as inert waste.

7.1.2 Operational Waste

Office

These areas generate inert wastes of plastic, paper and cardboard from documents and packaging. These materials are stored on site after the separation into recyclable and non-recyclable materials and removed on a weekly basis by waste contractors.

Feed Waste

Feed represents the single largest input to the growing of Bay Lobster, amounting to approximately 7 tonnes per day in Stage 1. For this reason, feed management is one of the most important aspects of animal husbandry; as it impacts on water quality, animal productivity and, obviously, economics.

ABLP has a well-proven system for monitoring feed application to Bay Lobster, which minimizes the amount of leftover feed obtained from each raceway and therefore the disposal issue. However, the leftover food and faeces generated from the consumed food add up to several hundred kilograms of wet waste per day. This material is removed from the raceways in the morning, and stored in a refrigerated closed container for collection by a waste contractor for disposal to an offsite landfill.

Options for recycling feed waste

Because of the relatively large volume of material, the options for the recycling of leftover feed have been examined.

The advantages of the material are:

- squid is high in protein
- squid protein has an excellent amino acid profile

The disadvantages are:

- after being in water for several hours the squid has been well leached



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- bacterial decomposition has begun and the material is breaking down

Because the squid is decaying quite rapidly, the possibility of using it directly as a feed (eg for pigs) was not thought likely (marine materials also tend to flavour the fat of pigs with a disagreeable fishy flavour).

The generation of methane through the anaerobic digestion of the leftover feed was examined as methane could be stored and burned to heat incoming seawater for the production process. However, the high salt water content of the squid means that in a reducing environment sulphate in the seawater would generate sulphuric acid. This entails much more robust digestion and gas scrubbing facilities to prevent corrosion of equipment downstream and the exercise becomes uneconomic. When Stage III is completed the additional material for methane production may generate some economies of scale to make this process more viable.

The combination of the (relatively) high nitrogen content of squid with another material that is high in carbon (eg sawdust) could be used to create garden compost. This has previously been done with fish waste and it appears that the level of salt is not significant in this process. This option is currently being examined and operators who may be interested in the leftover feed are being sought by ABLP.

cond'n → seek waste fertilizer options

Bay Lobster Mortalities

As in any livestock enterprise there will always be some level of mortality in the stock. The ABLP business plan obviously allows for this to occur during normal operation of the facility. Animals that are identified as mortalities are removed from raceways when the leftover feed is collected and are combined with the solid wastes such as leftover feed.

The same disposal issues relate to Bay Lobster mortalities as to leftover feed, and the same options for recycling apply and are being investigated.

Diseased Stock

ABLP has been forward thinking in adopting an aquaculture facility design that tries to eliminate the entry of pathogens and minimises the impact of diseases should they breach the barriers to entry. However, diseases can and do strike all livestock industries, including aquaculture and contingencies must be made for this eventuality.

If a large disease outbreak should occur, although this possibility is minimized by the modular design of the production facilities, the infected animals will be euthanased in ice cold water, placed into strong bags (eg wool packs) within closed storage containers and transported by contractor to specialized off site land fills for disposal.

→ will need to contact Richard

Obviously, standard landfills may not be suitable for infected material as material may be spread via scavenging birds or leachate from the landfill to other aquatic environments. For similar reasons this material should not be recycled. Advice from the Tweed Shire Council is that the Stotts Creek Landfill (Leddies Creek Road, Everon), being a lined landfill, is an appropriate site for the disposal of Bay Lobster in the event of a mass mortality occurring.

Amenities Waste / Canteen

Due to the relatively large number of staff, the shift nature of the work and lack of nearby food outlets, a canteen area for staff is proposed. This will involve food preparation activities and a servery and waste will be generated waste from each. The material will be mainly waste food and scraps from food preparation.

How much?



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The waste will be stored on site in closed containers and be disposed off on a daily basis with the solid wastes such as leftover feed.

Options for Recycling Amenities Waste

This material could presumably be used for animal feed or be used for the generation of methane on site. As it has a high carbon to nitrogen ratio it would be ideal to add to the leftover feed to increase the volume of material for compost production.

Toilets

ABLP will employ approximately 200 staff by the time Stage III is established and the human waste generated must be removed from the site. A rising main from the waste storage tank to the TSC Sewage Treatment Plant is proposed.

Seawater treatment plant sludge

chicken manure

In all of the different production areas (broodstock, larval rearing, nursery and growout), equipment is filtering the water that is continuously recirculating to and from the raceways. The organic material that is filtered from the seawater is collected in a drain system and led to the seawater treatment system. Here it is treated to flocculate and concentrate it, producing sludge of 5-10% solids. Because it is high in organic material and is not produced in particularly large volumes it is stored in a tank for collection by a waste contractor. Lime is added to the sludge to prevent bacterial action that could result in noxious odours.

Options for recycling treatment plant sludge

Being high in organic matter, the sludge would ultimately be of most value if added to the solid wastes and used to generate methane that could be utilized for energy production.

Process Building Wash Water

Can use as fertilizer?

The processing buildings main purpose is related to the preparation of feed for the Bay Lobster. These operations demand a factory that is similar to any other food preparation facility and washing down of equipment and floors at the end of the shift will be required.

It is proposed that this water be added to the blackwater produced on site and sent via a rising main to the TSC Sewage Treatment Plant.

Treated Seawater

This water has been recirculated many times before it arrives at the seawater treatment plant and has accumulated nutrients and suspended solids. The dissolved and suspended materials are removed at the seawater treatment plant and enter the seawater treatment plant as sludge. The seawater, now low in nutrients and solids (<5mg/l total N and <0.3mg/l total P and <15mg/l SS) can be released to the environment. ABLP proposes that this treated seawater be piped to the TSC Kingscliff WWTP to join with treated wastewater and be discharged into the Tweed River via the outfall at Jenners Corner.

Table 7.1: Waste streams from ABLP Bay Lobster facility

Description	Type classification	Time line of waste production	Approx. quantity kg/year	Treatment	Collection Period	Disposal Method
Construction waste	Inert waste	Mar '05	2 000	Stored in skip	As required	Off site recycling or landfill



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2676 kg
kg/yr

Office	Inert waste	Oct '05	350	Sorted for recycling then stored on site	Weekly	Off site recycling or landfill
Feed waste	Solid waste	Oct '06 267000 Oct '08 534000 Oct '10 801000	801000	Stored in closed, refrig container		Composting or off site landfill
Dead stock	Solid waste	Oct '05 900 Oct '07 1800 Oct '09 2700	2700	Stored in closed, refrig container	Daily	Composting or off site landfill
Diseased stock	Solid waste	N/a	?	Euthanased, stored in closed, refrig container	As required	To approved off site landfill
Canteen	Solid waste	Oct '05	18 250	Storage on site in closed container	Daily	Composting or off site landfill
Toilets	Group C waste	Oct '05 on		none	n/a	To council treatment plant
Sludge from seawater treatment plant	Group B waste	Oct '06 33000 Oct '08 66000 Oct '10 99000	99000 ack	Lime stabilized, stored in closed vessel	As required	To approved commercial disposal facility
Processing building wash water	Group B waste	Oct '05	30	none	n/a	Via drain to council treatment plant
Treated seawater		Oct '06 on	600m ³ per day	Solids filtration, nutrient removal	continuous	To Tweed River via council pipeline

7.2 INDIGENOUS & CULTURAL HERITAGE

Susan Davies (Davies Heritage Consultants Pty Ltd) and the Tweed Byron Local Aboriginal Land Council (LALC) have undertaken an assessment of the indigenous and cultural heritage values of terrain to be potentially impacted by the proposed development.

The survey undertaken included Lot 1 on DP267742 and part of Lot 706 on DP1000580 as well as the route of the proposed pipeline linking the development site with the Pacific Ocean.

The scope of the study was outlined by the Department of Environment and Conservation, who stated the presence or absence of Aboriginal objects should be identified and the significance of the area to the local Aboriginal community must be determined.

Assessment was carried out in the context of the following: -

Environment and Heritage Legislation Amendment Act (No. 1) 2003

This Act amends the Environment Protection and Biodiversity Conservation Act 1999 to include 'national heritage' as a new matter of National Environmental Significance and protects listed places to the fullest extent under the Constitution. It also establishes the National Heritage List and the Commonwealth Heritage List.

Australian Heritage Council Act 2003

This Act establishes a new heritage advisory body to the Minister for the Environment and Heritage, The Australian Heritage Council, and retains the Register of the National Estate.

Australian Heritage Council (Consequential and Transitional Provisions) Act 2003

This act which repeals the *Australian Heritage Commission Act 1975-1990* amends various Acts as a consequence of this repeal and allows for the transition to the new heritage system.



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Aboriginal and Torres Strait Islander Heritage Protection Act 1986

The purpose of this Act is to preserve and protect areas and objects of particular significance to Aboriginal Australians from injury or desecration. In particular, this legislation can provide protection for sacred sites. Any steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10), and this can include the prevention of development. As well as providing protection to areas, it can also protect objects by Declaration, and in particular Aboriginal skeletal remains (Section 12). Heavy penalties may be levied in the case of contravention of provisions of a Declaration (Section 22). Although a Federal Act, it can be invoked in a State if the State is unwilling or unable to provide protection for such sites or objects.

National Parks and Wildlife Act, 1974

This Act protects Aboriginal Places and Relics, the former being sites of demonstrated mythological significance to Aboriginal people and Relics essentially the material remains of Aboriginal culture, including human remains. It is an offence under the Act to knowingly disturb or destroy Aboriginal places or relics without the consent of the Director of National Parks and Wildlife Service (NSW).

Environmental Planning and Assessment Act, 1979

In effect, this Act generates a broad spectrum of protection for Aboriginal sites by requiring that an Environmental Assessment, incorporating an assessment of anthropological and archaeological values be prepared for certain developments and activities. Any site located during such an assessment would be automatically protected under the above Act.

NSW Heritage Act 1977

The provisions of this Act protect places that have been entered onto registers kept by the Heritage Council (Section 22). One register contains information in relation to "items and land that are the subject of interim heritage orders; orders made under this Act; notices served under this Act; and heritage agreements entered into under this Act" (Section 22). The Heritage Council also keeps the State Heritage Register (Section 22). Items can only be listed on or removed from the State Heritage Register at the direction of the Minister (Section 31).

The Heritage Act 1977 notes that both State and local heritage "significance, in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item" (Section 4A).

The Cultural Heritage & Archaeological assessment carried out by the proponent concludes that the proposed development will not result in the disturbance or damage of any areas or artefacts identified as possessing cultural heritage value or significance.

☞ A full copy of this assessment is attached at Appendix E to this submission.

7.3 TRAFFIC, ACCESS AND PARKING

A detailed traffic impact assessment has been carried out by Traffic Planning Services to assess the traffic impacts associated with ABLP's proposed aquaculture development to be situated on the eastern side of the Pacific Highway at the interchange with Tweed Valley Way at Chinderah.

The existing conditions at the Pacific Highway/Tweed Valley Way interchange, traffic generated by the proposed development and future traffic volumes were assessed. Also assessed were the effects of this traffic on operating conditions at the Melaleuca Station access intersection with Tweed Valley Way and at the access road junction with the on-ramp and off-ramp loop on the eastern side of the interchange, following completion of the



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development, and makes recommendations for any improvements to cater appropriately for traffic generated by the proposal.

The proposed aquaculture development is located approximately 11km south of Tweed Heads along the Pacific Highway at Chinderah. The development would be carried out in 3 stages with about 200 employees at full development.

Investigations were carried out into the traffic volumes along Tweed Valley Way past Melaleuca Station access and the southbound on-ramp and off-ramp loop of the Pacific Highway on the eastern side of the interchange at the 15 year design horizon i.e. year 2019, and based on a conservatively high 4% per year growth rate. These include traffic generated by the proposed development as well as traffic generated by adjacent land i.e. sand mining operations by Tweed Turf & Sand and harvesting of sugar cane for the Condong Mill. Consideration has also been given to the proposed highway service centre at Melaleuca Station and the possible future road connection to Kingscliff; it has been determined that these proposals do not affect the proposed aquaculture development.

Analysis has indicated that the existing Tweed Valley Way/Melaleuca Station access intersection would cater for this traffic in a satisfactory manner, in particular the U-turn movement to return northbound along the Pacific Highway. The intersection of the local road with the southbound on-ramp and off-ramp loop on the eastern side of the interchange would need to be upgraded by providing a left turn deceleration lane and taper (with left turn island). This would be provided prior at the commencement of construction on-site.

The sugar cane pad between the local road and the Pacific Highway would need to be maintained or satisfactory alternative provisions made.

A full copy of the detailed Traffic Impact Assessment carried out is attached at Appendix F to this submission.

7.4 NOISE IMPACTS

Richard Heggie Associates Pty Ltd were commissioned to assess operational and construction noise emissions from the proposed development on the nearest residential receivers.

The assessment was conducted in general accordance with the guidelines presented by the Department of Environment and Conservation (DEC), formerly the Environmental Protection Authority (EPA), Industrial Noise Policy and Environmental Noise Control Manual.

In summary, the level of noise emission from the proposed ABLP Bay Lobster aquaculture project at Cudgen was assessed, with it being concluded that no specific noise control measures are required for the operation of the aquaculture project based on the advice that the refrigeration plant will be located within the processing building and that no specific controls are required for the construction of Stages 1, 2 or 3 of the aquaculture project.

Following is an aerial photograph of the proposed site and surrounding noise sensitive locations. Based on this aerial photograph, the nearest noise sensitive locations are:

- Location 1 - Melaleuca Station (owner's residence) ~500 m
- Location 2 - Farmhouse ~1,260 m
- Location 3 - Residences (Cudgen Road) ~1,706 m
- Location 4 - Residences (Cudgen Road) ~1,780 m

*Road traffic noise?
(depends on truck no's)*

Please refer to aerial following.



Figure 7.4: Adjacent or neighbouring noise receptors

The noise environment is typically rural with traffic noise from the Pacific Highway dominant at Locations 1 (particularly), 2 and 3 and audible at Location 4.

A full copy of the detailed Noise Impact Assessment carried out is attached at Appendix G to this submission.



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7.5 VISUAL QUALITY

7.5.1 Introduction

The proposed development will be located adjacent to the off-ramp of the Murwillumbah bypass on the new Pacific Highway, west of Chinderah road. It is located in a rural zoned area and the site itself and surrounding land are utilised either for cattle grazing or cultivation of *Melaleuca* or sugar cane. The land is substantially cleared of native vegetation and is level with a height of approximately 1m AHD.

Small sections of the site can be viewed from balconies of selected properties in Cudgen on the Cudgen Plateau, but the majority of views towards the site are blocked by a spur to the west of Cudgen. A small number of rural properties on the northern side of Cudgen Road have clear views of the site, however, the closest residence is approximately 1.7 kilometres away (Locations 3 & 4). The site is partially visible from the new Pacific Highway and is overlooked by vehicles exiting to Tweed Valley Way.

The nearest residences, approximately 500m and 1260m (Locations 1 & 2 respectively in Figure 7.4) are at or below the proposed level of the ABLP facility.

The ABLP production facility is essentially an indoor aquaculture unit. All of the raceways used to culture Bay Lobster are located within lightweight structures that are very similar to greenhouses and have the same construction of galvanised steel tube and multi-layer plastic fabric. The fabric covering the buildings is black on the inside surface to maintain low light levels within the buildings and white on the outside to reduce heat build up during summer. Suspended over the fabric is a layer of green shade cloth, which reduces glare and protects the fabric from damage by hailstones.

The seawater storage and freshwater storage ponds are covered with similar structures to prevent contamination and nuisance algal growth.

The production buildings are of a nominal 5800mm in height and the processing building is approximately 11000mm high, a 2700mm high bund wall surrounds both.

↓ constructed of?

7.5.2 Visual Amenity

The proposed facility is partially screened from vehicles travelling on the new Pacific Highway by an existing stand of trees on the western boundary of the site and this stand will be increased in density by new plantings.

It is proposed to improve the landscape and enhance visual amenity for the benefit of the local environment and community through planting a variety of species to develop a 10m-perimeter vegetation buffer, which is considered of sufficient width to visually buffer the project from the adjacent Pacific Highway and surrounding properties. Short views to the project will be blocked whilst longer views will be filtered.

The proposed species list included in Appendix H is broken into different categories of vegetation based on structural height variations. This categorization has been necessary to provide the buffering /filtering of long views of the site.

The ABLP facility will have a covering of green shade cloth that will help it to blend into the landscape. In addition the bund wall inside the vegetation buffer will partly obscure the project.

The facility can be seen by vehicles exiting the new Pacific Highway onto Tweed Valley Way though as above the landscaping will in time minimise this, as will the buildings covering of green shade cloth. A relatively small number of residences on the Cudgen plateau overlook



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the ABLP facility, however, the long distance and low overall height of the facility, together with the vegetation buffer minimises the visual impact. The end result will be a facility that has a long-term positive visual impact.

Please also refer to plans contained within Appendix D & H to this submission.

7.6 ECONOMIC, EMPLOYMENT AND COMMERCIAL OPPORTUNITIES

7.6.1 Socio-Economic Impacts on the locality and the broader region

Australian Bay Lobster Producers Pty Ltd (ABLP) will provide the necessary infrastructure to produce through aquaculture approximately 1,000 tonnes of Bay Lobster products in Stage 1 growing through to approximately 3,000 tonnes in Stage 3. Funding of more than \$40M is committed to the development.

Bay Lobster *Thenus spp.* locally known as Moreton Bay Bugs, a lobster species with good market acceptance and excellent eating qualities is the only lobster species in the world that is able to be produced commercially. The leading edge technology developed to produce Bay Lobster is owned by ABLP and protected by international patent.

Production is based on recirculation technology within a controlled environment. The processes involved in producing this highly desirable and exclusive product are environmentally benign and economically and environmentally sustainable. ABLP in its design of production and management systems has been working with Biological Farmers of Australia so that its products will be 'Certified Organic' once produced.

ABLP will employ approximately 70 people and generate \$50M in export income in Stage 1 growing through to employing approximately 200 people and generating \$150M in export income at the completion of Stage 3.

It is expected that the project will also further rural employment in the Tweed indirectly, as it will generate income and contribute to the growth of ancillary industries.

The production facilities would also provide a potential for hatchery development to support industry and stock enhancement.

ABLP will relocate its ongoing research and development from Queensland to the site, which has the potential to act as a catalyst in the development of a significant aquaculture/biotechnology precinct in the Tweed.

Staff training will be undertaken at various levels within the facilities that will include, but will not be limited to, formal training for process and production staff through to technicians at certificate levels and postgraduate research. Further discussions with Universities will be undertaken to consider the inclusion of pre-graduate degree components.

Whilst visual amenity, noise, air quality and traffic issues are dealt with elsewhere within this SEE, it should be further stated that considerable effort has been given to the design and operation of the facilities and into landscaping their surrounds. This has been undertaken in an endeavour to present and manage the construction and production phases of the project in the best possible format not only to minimize any impacts but also to add value to the local environment



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7.7 SOILS & GEOTECHNICAL CONSIDERATIONS

A detailed geotechnical report and acid sulfate soils (ASS) investigation was carried out by Douglas Partners for the proposed Bay Lobster aquaculture project to be located on the subject site.

The assessment was carried out in the context of the following objectives:

Subsurface conditions encountered, including groundwater observations;

- indicative presence or otherwise of ASS;
- suitability of excavated material for re-use as fill;
- indicative settlements;
- suitable ground improvement options (if required); and
- suitable foundation type(s).

Ground surface levels, as indicated on the survey plan supplied by the client, vary between approximately 0.4m and 1.4m AHD. At the time of the field work, the variation in ground surface levels was not obvious due to the presence of the sugarcane.

Soil testing for ASS was carried out with reference to the QASSIT Guidelines¹. Initially eighty samples from the bores were screened by measurement of pH after the addition of distilled water (pH_F) and peroxide (pH_{FOx}). Based on the results of the screening tests, selected samples were subjected to more rigorous Chromium Suite analytical testing. It is noted that acid sulfate soils were present within the site and that an Acid Sulfate Soil Management Plan will be required for those works that will result in their disturbance.

The filling of the site by soils won from on site and the erection of the bund wall will require detailed consideration in terms of filling procedures (layering), supervision and seepage through and within the bund wall in terms of ground and flood water. In this regard, the bund wall will need to be either lined by an appropriate material or constructed of relatively non-porous clay fill.

Analysis has also been carried out in relation to the groundwater and soil characteristics that are relevant to the pipeline/intake facility (Dreamtime Beach). This analysis included an electromagnetic geophysical survey. The proposed pipeline/intake infrastructure will consist of pipes and attached perforated intakes laid beneath the beach extending at least 30m east of the dunal vegetation line in order to gain good quality seawater for the aquaculture operations.

A full copy of the detailed geotechnical assessment carried out is attached at Appendix J of this submission.

7.8 WATER QUALITY

7.8.1 Stormwater

The disposal of stormwater from the extensive site is influenced by two factors - the first being the need to harvest and store a significant proportion of roof water to meet the fresh water needs of the complex. The second is the bund walls proposed to protect the installation from the 1:100 flood are an impediment to simple disposal of rain which falls on the ground, roads and paths within the bund area.

Thus two systems are required as follows: -

1. The greenhouse style structures covering much of the various races etc, feature arched members supporting the fabric, thus forming valley gutters at approximately



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10M spacing, (In the case of the large growout areas). These gutters will be tapped at high level internally, and piped to the outer wall, then graded down to a collection pipe system, and thence to the storage dam(s). The storage dam(s) will be formed in the earth, and lined with a (high-density polyethylene) HDPE liner and roofed over to prevent pollution by wildlife. Floating suction lines will connect to the automatic pressure pumps and rapid sand filters and thence to the distribution system. Separate and larger automatic pumps will also draw from the storage dam(s) to feed higher pressure and larger volume to the sprinkler system.

Overflow will be directed over the bund walls, to lined spillways, and thence by open drains to connect to the existing drainage canals. These site canals will be cleaned out and made efficient, and extended as necessary, to ensure adequate performance.

2. Rainwater that falls inside the bunded area, and runs off roads and paths, and lawn areas, will be led to a series of collection pits, which in turn discharge through the bund via piping fitted with non-return flaps or valves. When an external flood rises and causes these to shut, a series of automatic flood pumps will be started, to pump the runoff over the bund, to spillways, to join the flood outside.

7.8.2 Saline Water Management

The ABLP aquaculture project has been designed to cultivate a strictly marine crustacean, the Bay Lobster. This animal has a very sensitive larval stage so high quality (low suspended solids, low nutrient, constant salinity etc) seawater is required. This high quality seawater is generally only available from coastal areas with a minimal input of freshwater and no offshore geographical features that may restrict the flow of fresh seawater. These conditions are found on the open beaches of northern New South Wales and proximity to one such beach (Kingscliff) is one of the reasons for the choice of the 355 Cudgen Road site.

Direct observation of water quality at Kingscliff and discussion with long term local residents has indicated that the water off this beach is of a consistent quality. Cudgen Creek water flowing north has a negative effect on water quality during rain events but the small size of the catchment means that these effects are short lived. Kingscliff beach is south of the Tweed River mouth and is minimally affected by the freshwater from this river which flows in a general northerly direction.

7.8.3 Seawater Supply

The project proposes two 150mm plastic pipelines laid within road reserves for the collection of fresh seawater. The pipelines would follow the route as shown in Appendix B from the Cudgen Road site to the ocean beach at Kingscliff near the Police Station. The pipes will connect to a concrete caisson placed vertically in the sand. Water supply pipes will extend seawards under the sand from the caisson at a shallow angle so that the ends of the pipes are below low tide level. It should be noted that there would be no evidence of any pipework from above ground. Seawater will migrate under gravity into the caisson and it will be pumped from the caisson by submersible pumps into the supply pipelines and to the Cudgen Road site. The pumps have a capacity of approximately 12 litres/second to enable catch-up after an interruption of flow and to take advantage of off-peak tariffs for pumping to storage.

7.8.4 Seawater Storage

Fresh seawater arriving from Kingscliff beach will be stored before being used in the production facility. ABLP proposes multiple storage ponds, which are sealed with HDPE liners and covered with opaque greenhouse type structures. The liners function to prevent contamination of the incoming seawater with sediment and prevent leaching of seawater



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into the natural ground. Covers prevent aquatic birds from entering the water and contaminating it with faeces, prevent nuisance algal growth, dust and freshwater contamination and temperature loss in winter. Multiple storage ponds are used to give 8 days storage, isolating the production facility from deterioration in water quality on the beach due to storms, flooding etc and pump or pipeline breakdown. The storage ponds can also be isolated for cleaning purposes without affecting water flow to the production facility.

What to be volume stored on site?

7.8.5 Seawater Economy

Water enters the ABLP production facility after being filtered, heated to 27 °C and sterilised using ozone.

The ABLP project is based on the principle of recirculation aquaculture. This means that water exiting the raceways in which the animals live is cleaned of suspended (faecal material, left over food) and dissolved materials (ammonia) and is then recirculated back into the raceway. A small quantity of fresh seawater is continually added to the raceway to make up for water lost in filter backwash, evaporation etc. The amount of water utilised to grow Bay Lobster is much smaller using this technology than using flow through techniques. For example, the average flow for Stage 1 of the ABLP project is a constant 7 litres/second and this will support a standing stock of over 400 tonnes of Bay Lobster, for an annual production of 1076 tonnes.

The ABLP program for the production of Bay Lobster is based on daily stocking and harvesting of one system, therefore after all systems are stocked the standing stock is nearly constant. The result is that discharge water quantities do not vary from the 7l/sec in Stage 1 to 21l/sec for Stage 3. There are also no seasonal effects on the concentration of nutrients in the treated seawater released.

To further extend the use of the incoming seawater, the clean water first enters the larval rearing system where it is constantly recirculated, the water that overflows this system is collected, sterilised and moved to the nursery system where it again joins the water recirculating through the nursery filtration system. After overflowing this system it is again collected, sterilised and moved to the growout system. When it overflows the growout system the seawater enters the wastewater treatment plant, is cleaned and pumped to the Tweed River via the Kingscliff WWTP discharge pipeline.

7.8.6 Treated Seawater Discharge

ABLP proposes to obtain the supply of required seawater from Kingscliff beach at an initial rate of 7.0 litres/second, rising to 21 litres/second when Stage 3 comes on line. The seawater used in Bay Lobster growout is exchanged at an average rate of 5% per day and passes through a sophisticated water treatment facility before being discharged.

The proposed development seeks to transport treated seawater released from the Bay Lobster production facility to the existing wastewater pipeline from the Kingscliff wastewater treatment plant (WWTP). When combined with this wastewater it is released through the outfall at Jenner's Corner on the Tweed River.

7.8.7 Seawater treatment technology - discharge

ABLP proposes a dedicated treatment plant for the seawater to be released to the Tweed River via the Kingscliff WWTP pipeline and outfall. The system is modular and treats an average daily flow of 600 cubic metres; therefore the modules can be duplicated when the other stages (2 and 3) are constructed. The emergency holding pond, however, is already of a size to hold 24 hours flow from all three stages (1800 cubic metres).

*✓ (see notes on page 62) -
but check Sept 62 re: opel regis & see*



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There are two main streams of marine wastewater in the ABLP facility that will contribute to the treated seawater flow to the Kingscliff WWTP. The first is overflow water (most of the 600m³ added per day) of relatively high quality. This water has <20mg/l suspended solids and low levels of ammonia and nitrite (<1mg/l and <0.1mg/l respectively). However, it also has a relatively high concentration of nitrate (approximately 60mg/l).

The other main source of wastewater is backwash water from the drum filters and condensed foam from the foam fractionators. In both cases this material is settled at the point it is produced (i.e. at the system level) and the resulting sludge is removed for treatment. The supernatant from these settlement tanks is low in suspended material so it enters the denitrification filters at the system level as a source of COD for the denitrification process. The sludge, however, being relatively high in nutrients (Total N approx. 170mg/l and Total P approx. 35mg/l) goes into a different treatment path than the overflow water.

Treatment of overflow water (Figure 7.8.1)

This water arrives at the seawater treatment plant at a rate of 7l/sec due to the slow bleeding in of fresh seawater to the production systems. The maximum design flow rate is 14l/sec, higher flows are diverted to an emergency holding pond (1.8ML) for later treatment. On its way to the treatment plant the overflow water passes through a coarse screen (to remove debris picked up during transport to the waste treatment area) and then a drum filter (Hydrotech 801, 50µm screen or equivalent). Water passing through the drum filter drops into a balance sump (18000l) from which it is pumped to the denitrification tanks via an upflow nitrification filter (1.5m³ volume), which ensures that ammonia and nitrite are converted to nitrate prior to entering the denitrification filters. The nitrification filter also reduces the amount of oxygen in the water and is thus beneficial to the denitrification process that must proceed under anaerobic conditions.

Backwash water from the drum filter is settled in a tank, with the resultant sludge going to the sludge flocculation tank. Supernatant from the settlement tank is recycled back through the drum filter.

Denitrification filters (Figure 7.8.1)

The filters are based on a system developed by Whitson *et al.*, (1993) for marine aquaculture systems modified by Lee *et al.*, (2000) to a point where it is now suitable for large commercial facilities. The ABLP system design has been discussed with Phillip Lee (developer of the technology) and a similar system has been working efficiently for a number of years in southeast Queensland (Caboolture Water).

In the ABLP system four 25000l polyethylene tanks are part (50%) filled with a floating media that is kept in motion by a mechanical stirrer. The tanks are covered so that anaerobic conditions are maintained. The tanks all have an ORP probe, a controlled water inlet valve, and an injection point for methanol (carbon source). The rate of seawater flow into the tank and the rate of methanol injection are monitored and controlled electronically so that the ORP of the tank is maintained between -375mV and -425mV resulting in the highest conversion of nitrate consistent with the smallest production of nitrite and sulphide. The continuous motion of the media ensures that bacterial biomass produced is continually sloughed off and leaves the tank, so there is minimal accumulation of organic material within the tank.

After leaving the denitrification filter water drops into a balance sump (18000l) before being pumped through sand filters with a nominal filtration capability of 20µm. This ensures that bacterial biomass and organic particles are removed from the wastewater prior to it passing to the return sump and being pumped to the ocean.



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Sand filters (Figure 7.8.1)

The sand filters are sized to allow for full flow of 14l/sec while one filter is in the backwash cycle or off line for maintenance. Backwash of the sand filters is initiated on timer with override by pressure differential. Backwash water flows into the common settlement tank for sedimentation, with sludge being withdrawn to the flocculation tank and supernatant going to the head of the overflow water treatment system.

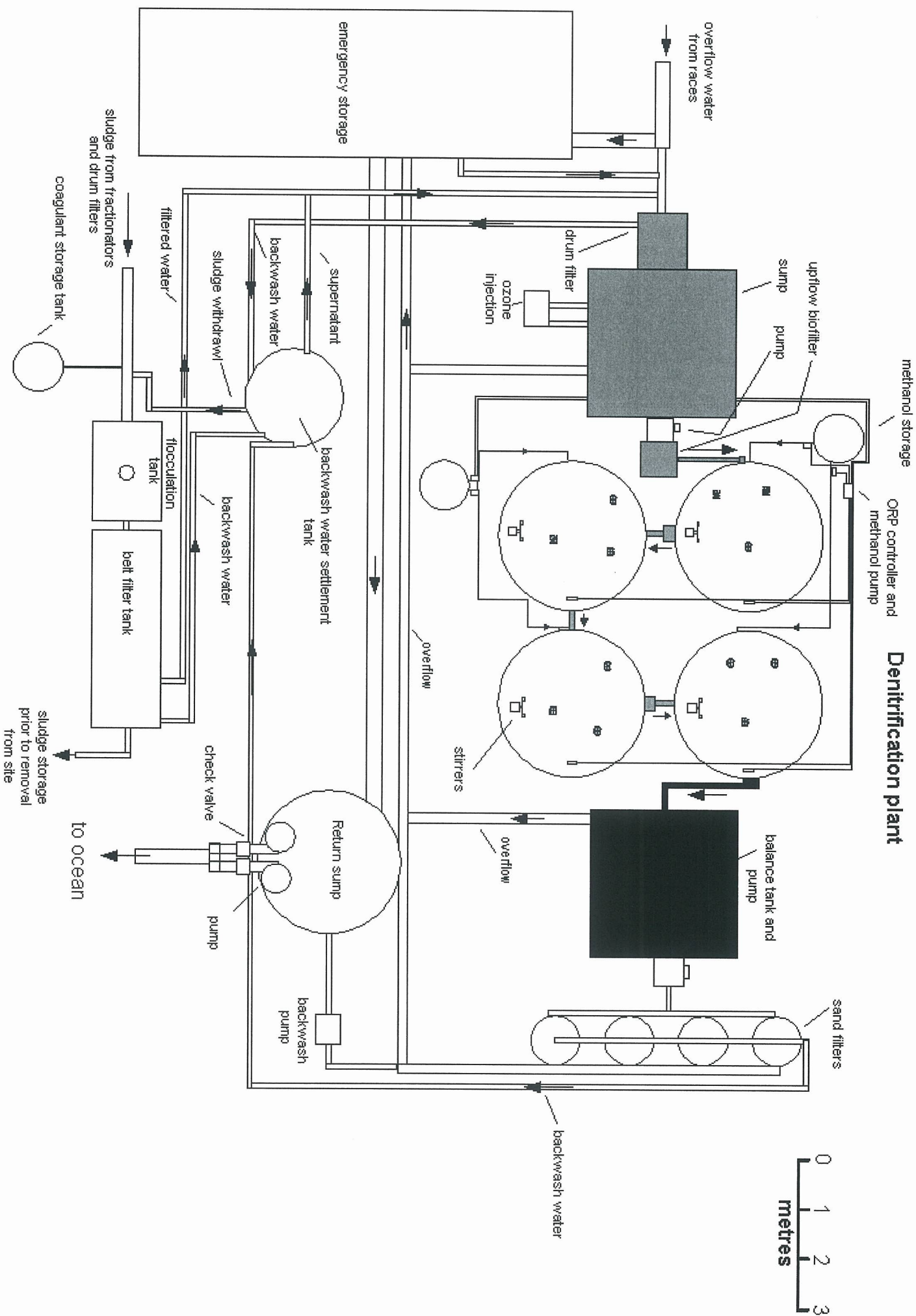
Treatment of sludge (Figure 7.8.1)

Due to the high level of suspended solids and nutrients within the sludge generated from drum filters and fractionators, a different method of treatment is warranted. Sludge from settlement tanks within the production facility is transported to the flocculation tank and dosed automatically with coagulant and polymer based on flow rate data from a flow meter. The type of coagulant and polymer needs to be determined on the actual waste from the facility; however, these materials are available commercially for use in seawater (Maxwell Water Care). In the flocculation tank the mixture is slowly stirred to enhance the formation of flocs. The flocs, now of filterable size, flow into a tank containing a belt filter which gently filters the flocs from the water. Backwash water from the belt filter flows to the common settlement tank. The filtrate enters the same treatment system as the overflow water. Coagulated sludge, now 5-10% solids is scraped off the moving belt, pumped to sludge storage and stabilised by the addition of lime prior to off-site removal by licensed waste contractor.

Return sump (Figure 7.8.1)

All water reaches this point prior to being returned to the sea. Twin pumps, each with a capacity of 14l/sec are installed in case of duty pump failure.

Denitrification plant





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7.8.8 ABLP commitment to treated seawater standards

Treated seawater from the ABLP facility, which is to be combined with wastewater from Kingscliff WWTP, will meet the quality criteria set by the NSW EPA for the new Kingscliff WWTP.

ABLP treated seawater will be sampled at the point it leaves the facility (return sump) concurrent with sampling of wastewater leaving the Kingscliff WWTP, to establish EPA discharge quality conformation at both treatment plants.

7.8.9 Preliminary discussions on combined discharge - TSC

Preliminary discussions have been held with Tweed Shire Council wastewater engineers regarding the feasibility of combining the wastewater streams from the Kingscliff WWTP and the ABLP Bay Lobster facility. An initial concern of the engineers was whether seawater would have an effect on the chlorination/dechlorination process that occurs in-pipe for wastewater disinfection purposes.

ABLP has used the batch chlorination/dechlorination process for sterilisation of seawater for many years, using the same methodology as is used for freshwater. Seawater chlorinated using sodium hypochlorite and dechlorinated with thiosulfate has proven to be suitable for use in algal cultures and crustacean larval cultures. Crustacean larvae are sensitive to very low levels of toxic compounds therefore it appears unlikely that the batch chlorination/dechlorination process in seawater results in the generation of any deleterious compounds.

The proposed new Kingscliff WWTP, due to come on line in Sept '06, does not use in-pipe disinfection with chlorine (Grant 2004, personal communication).

Once the chlorination issue was addressed, the engineers did not have any objections to combining the two water streams prior to discharge.

7.8.10 Combined Discharge Timelines

Upon receipt of development consent, Stage 1 full treated seawater flow of 7 litres/second would occur by approximately October 2006. This would generally coincide with the proposed new Kingscliff WWTP (coming on line approximately September 2006).

Therefore, ABLP proposes to establish an underground pipeline from 355 Cudgen Road to the existing Kingscliff WWTP (a distance of approximately 3 kilometres) which would be used from commissioning of the aquaculture facility (approx. Sept 05) until the decommissioning of the old Kingscliff WWTP (Sept 06) for treated seawater flows of up to 7 litres/second. Thereafter, a new pipeline would be required from ABLP to the new Kingscliff WWTP (a distance of approximately 1 kilometre) which would initially carry 7 litres/second (Sept 06) rising to 21 litres/sec by 2010.

7.8.11 Discharge Water Quality

ABLP's production facility utilises recirculation aquaculture technology and very high water quality is maintained in all growing systems. Likewise, the treated seawater discharged from the treatment plant will be of high quality in terms of its physical characteristics (pH, dissolved oxygen, salinity etc). Due to limitations in available economic treatment technologies the treated seawater will contain some level of nutrients.



It is ABLP's understanding that the existing Kingscliff WWTP operates under an Environmental Protection Agency (EPA) licence with the criteria as listed in Table 7.8.1. The limits for nutrient concentration in wastewater must be equal to or less than 5mg/l for total nitrogen (N) and less than or equal to 3mg/l for total phosphorus (P) for 90% of the samples taken (Reference 1).

Table 7.8.1: Comparison of existing and proposed discharge quality criteria

Parameter	Existing Kingscliff WWTP discharge quality criteria (90 th percentile)	Proposed effluent quality criteria (Modern Technology Criteria)
BOD (mg/l)	15	10
SS (mg/l)	20	15
TN (mg/l)	5	10 Design target - 5
NH3 (mg/l)	5	<1
TP (mg/l)	3	0.3
O&G (mg/l)	10	10
Faecal coliforms Cfu/100ml	100	100
pH	6.5-8.5	6.5 - 8.5

However, the nutrient limits set by the EPA for the new Kingscliff WWTP are lower, at 10mg/l for total N (with a design target of 5mg/l) and 0.3mg/l for total P (Table 7.8.1)(Reference 1).

There is an obvious argument that any ABLP discharge water flow that is combined with the Kingscliff WWTP discharge flow must meet the nutrient limits set by the EPA for the Kingscliff WWTP. To do otherwise could compromise compliance with the EPA licence of the Kingscliff WWTP through no fault of the TSC. Therefore, should ABLP be permitted to contribute treated seawater to the Kingscliff WWTP discharge, the company would commit to conforming to the nutrient limits established for the new Kingscliff WWTP. ABLP would then be discharging treated seawater with a total N concentration of less than or equal to 5mg/l and a total P concentration of less than or equal to 0.3mg/l.

7.8.12 Effect of combined discharge on receiving waters

EPA Water Quality and River Flow Interim Environment Objectives have been developed for the Tweed Estuary following extensive community consultation (Reference 2). These interim objectives are intended mainly for river, water and groundwater committees to consider and include in their water management plans. The Interim Water Quality Objectives that apply to this area are those for the protection of: aquatic ecosystems, visual amenity, secondary contact recreation, primary contact recreation and aquatic foods (cooked) and commercial shellfish production (Table 7.8.2).

Water Quality Objectives for the Tweed River were also defined in the Tweed River and Catchment Interim Water Quality Management Plan, adopted in October 2000 (Reference 3). These objectives represent typical levels that are desirable over the long term (weeks to months). Occasional violation of the objectives are not a major issue (Reference 3).

Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guidelines are also available (Reference 4). However, it is considered that these guidelines should only be used as a broad planning tool in the absence of local water quality information (Reference 1). Such information exists for the Tweed River. When



comparisons are made, it is important to note that where **criteria** are quoted as relevant limits, these limits apply to the discharge stream itself (i.e. the effluent), while the quoted **guideline** limits are limits that apply to the receiving waters (after receiving the discharge stream).

Of the water quality variables that affect the EPA environmental values of primary and secondary contact recreation, only pH, faecal coliforms and oil and grease are included. ABLP treated seawater will not contain faecal coliforms or oil and grease and the pH will be between 7 and 8. Therefore, the proposed ABLP development will not affect the primary and secondary contact recreation values of the Tweed River estuary.

The treated seawater released from the ABLP facility will be of similar quality to that proposed under the Modern Technology Criteria for the new Kingscliff WWTP (Table 7.8.1). Hence the contribution by ABLP to the combined discharge will be mainly in the nutrient load so, in terms of effects, this will be the primary focus.

Of the EPA environmental values, the one most likely to be affected by ABLP discharge is Aquatic Ecosystem Protection, as this has guidelines for nutrients (<0.50mg/l for total N and <0.05mg/l for total P). However, as noted in the Tweed River and Catchment Interim Water Quality Management Plan (2000) most of the failures to meet this environmental value in the lower estuary, the region where the WWTP input would have the greatest effect, are due to suspended solids (56%)(Reference 3). The remainder of the other failures were caused by various factors, including low pH, high nutrient concentration and low dissolved oxygen.

The impact of nutrients from the existing Kingscliff WWTP discharge water were modelled by SKM in 1998 (Reference 6) as part of an EIS for augmentation of the existing Kingscliff WWTP, and these data were interpolated by GHD for the preparation of an EIS for the new Kingscliff WWTP (Reference 1).

In the SKM assessment (Reference 6), the license criteria for total nitrogen, total phosphorous and faecal coliforms were substantially higher than present requirements (Refer Table 7.8.3 below). Concentrations of nutrients in the nearfield zone predicted from modeling undertaken for the SKM study are reproduced in Table 7.8.4. This modeling was based on peak wet weather flows for 50 000 EP of 610 L/s. For comparison, concentrations for average dry weather flow (ADWF) have also been included. ADWF accounts for the majority of flows from the WWTP.

The modelling determined that with improvements in water treatment at the new Kingscliff WWTP to conform with the EPA Modern Technology Criteria, the concentration of phosphorus in the Tweed River would dramatically decrease, even at the higher Average Dry Weather Flow (ADWF) of 6 Megalitres/day (25 000EP post 2011) (compared to 2.2ML/day from existing plant). Modelling showed that the concentration of nitrogen would increase somewhat as although the existing WWTP discharge concentration is already under 5mg/l, (3.7mg/l) the higher flow does increase the total nitrogen input to the river.

Modelling of the impact of the new Kingscliff WWTP was conducted on discharge flows up to 610 litres/second (five times the ADWF) and the resulting nutrient concentrations in the Tweed River were still considered to meet water quality guidelines (Reference 1)(Table 7.8.4).

If the total flow from Stage III of the ABLP aquaculture facility (21 litres/second) was added to the modelled 122 litre/second flow from the new Kingscliff WWTP (ADWF) the ABLP flow would represent approximately 15% of the total flow.



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Table 7.8.2: Relevant water quality guidelines

Indicator	Relevant Guideline					
	WBM 1999	EPA Water Quality and River Flow Interim Environment Objectives				
		Protection of Aquatic Ecosystems	Protection of Aquatic Foods (cooked) and Commercial Shellfish Production	Visual Amenity	Secondary Contact Recreation	Primary Contact Recreation
BOD (mg/L)	n/a	n/a	n/a	n/a	n/a	n/a
Total phosphorous (µg/L)	<50	10 - 100 river/estuary 5 - 50 lakes/reservoirs	n/a	n/a	n/a	n/a
Total nitrogen (µg/L)	<500	100 - 750 river/estuary 100 - 500 lakes/reservoirs	n/a	n/a	n/a	n/a
Ammonia (µg/L)	n/a	n/a	n/a	n/a	n/a	n/a
Suspended Solids (mg/L)	<10	n/a	n/a	n/a	n/a	n/a
pH	7 - 9	<0.2 pH unit change in marine waters. 6.5 - 9.0 freshwater range	n/a	n/a	n/a	5.0 - 9.0
Faecal coliforms	<14 MPN/100ml	n/a	Median of <14 MPN/100ml	n/a	Median of <1000cfu/100ml	Median of <150cfu/100ml
Oils and grease mg/L	n/a	n/a	n/a	Not visible nor detectable by odour	Not visible	Not visible

7.8.13 Modelling of water quality effects throughout the Tweed Estuary

Modelling of the estuary under average dry weather flows indicated that nitrogen and phosphorous from the WWTP were distributed throughout the estuary, and this would continue to be the case with a combined discharge (Reference 1). Concentrations are likely to be highest in the vicinity of the outfall (Jenners Corner) and upstream to Tumbulgam. Further upstream, near Murwillumbah, they are likely to be slightly less than at the discharge, as the tidal excursions into this upper part of the estuary become limiting (Reference 1). Downstream of the outfall tidal processes dominate and nutrients are likely to be flushed out during the ebb tide (Reference 1). Consequently, concentrations are likely to decrease towards the mouth. Modelled concentrations throughout the estuary are likely to be conservative as instream processes that would tend to decrease nutrient concentration, such as sedimentation of particulates, denitrification and uptake in algae are not taken into account (Reference 1). Based on the modelling of the estuary undertaken (Reference 6) and interpolation using current effluent criteria (Table 7.8.3), concentrations of nitrogen and phosphorous throughout the estuary would generally be within current water quality objectives during average dry weather flow (Reference 1) (Table 7.8.4).

Tweed Shire Council has been conducting water quality sampling in the Tweed River between Ukerebagh Island and Tumbulgam for many years. An examination was made of data collected over the past eight - ten years (making it relevant to the current level of



development in the area)(Table 7.8.5)(Appendix L). The average concentration of total nitrogen at sampling points between Tumbulgum and Ukerebagh Island during this period was 0.47 mg/litre. This is around the 0.5mg/l concentration of total nitrogen adopted for the Tweed River as part of the Water Quality Management Plan. Further, examination of data for total nitrogen at lower (eg Ukerebagh Island) and upper (Tumbulgum) Tweed River estuary sampling locations over this time period does not show a rise in the concentration of nitrogen. Although there are occasional rises and falls in total N concentrations in the river estuary, the variation tends to be around a mean of 0.4 to 0.5 mg/l (Table 7.8.5). Even at the site of the outfall itself, where concentrations of total N concentrations might be expected to be the greatest, the nitrogen concentration still varies around the mean of approximately 0.4mg/l.

It was argued in an earlier study (Reference 6) that the nitrogen concentration in the Tweed River estuary would not be significantly affected by nitrogen inputs from the new Kingscliff WWTP as it represented such a small component of the total input. The diffuse input of nitrogen to the river was quoted in 1996 as being 383 tonnes/year (Table 7.8.6), placing the existing Kingscliff WWTP input of 3 tonnes N per year as less than 1% of the diffuse load. Upper, lower and outfall estuary nitrogen concentrations all show similar means, indicating that the input of nitrogen from the existing Kingscliff WWTP is not impacting significantly on this area of water quality. This is as surmised in the SKM EIS (1998).

When the new Kingscliff WWTP comes on line it would be expected that the relative amount of nitrogen contributed to the Tweed River would be the same as the old Kingscliff plant when it is decommissioned. Table 7.8.6 shows that this would be 3 tonnes of total N per year. The total load of nitrogen added by the Stage 1 of ABLP's Bay Lobster aquaculture facility would be 1.1 tonnes per year (Table 7.8.6). This total amount of nitrogen would add up to 4.1 tonnes, or just over 1% of the nitrogen added by diffuse sources. When ABLP Stages 1-3 are discharging (2010) the new Kingscliff plant will be producing near its 25000EP connected load of nitrogen (population in Kingscliff is predicted to reach 25000 post 2011, Reference 18). The total load of nitrogen to the Tweed River from both sources would be 11.4 tonnes per year. Although this is not an insignificant increase in nitrogen input to the Tweed River estuary it still represents less than 3% of the nitrogen input from diffuse sources.

It could be argued that although the combined nitrogen input from the WWTP/ABLP outfall represents less than 3% of the diffuse source nitrogen input, the management plan aims to reduce the input from diffuse sources. However, ABLP would also be seeking to improve the performance of its own seawater treatment plant over time to reduce the quantity of nitrogen in released water.

Tweed Shire Council water quality data for phosphorus from the past 8-10 years likewise indicates that the concentration has not been increasing at the sample points between Tumbulgum and Ukerebagh Island. However, when data from individual sites are averaged over the ten year period it is apparent that in comparison to nitrogen, concentrations of phosphorus in this section of the river are higher, presumably as a result of the existing Kingscliff WWTP discharge. Data from the outfall sampling point indicates that the phosphorus concentration there is twice the average river concentration (Table 7.8.5). This is to be expected as the diffuse input of phosphorus to the Tweed River is 25.8 tonnes per year (Table 7.8.6) but the Kingscliff WWTP adds another 6.5 tonnes, representing an additional 25% load. Therefore, the water quality objective of 0.05mg/l for the Tweed River is not met in the estuary as the mean concentration is around 0.06mg/l.



The new Kingscliff WWTP will, however, meet the new phosphorus discharge standard of 0.3mg/l, which will reduce the phosphorus input to the Tweed River from 6.5 tonnes per year to 240kg/year. In 2006 when this plant comes on line the WWTP input of phosphorus will fall from 25% to less than 1% of the diffuse phosphorus input. The Stage 1 ABLP phosphorus input of 70 kg per year will bring the combined WWTP/ABLP input to 1.2%. In 2010 Stages 1-3 of ABLP and 25000EP connection to the WWTP will result in a combined input of 0.9 tonnes per year, or around 3.5% of the diffuse input of phosphorus. The huge reduction in phosphorus input from the improved WWTP of 6.2 tonnes per year far outweighs the small addition of phosphorus from Stages 1-3 of the ABLP facility. As pointed out in a previous study (Reference 1) the vast reduction in phosphorus input will have wide positive impacts on water quality in the Tweed River estuary and make concentration targets for phosphorus far more easily achievable.

It is hypothesized that a combination of the sand bypassing works and dredging of the Tweed River mouth are increasing the velocity of flow in the area where the old bar formed (Barton, WBM; pers. comm). This would tend to increase the rate of exchange in the estuary, particularly in the lower parts. It is possible that there may be general improvements in water quality, most likely in the lower estuary, when sufficient sampling has been done to detect a trend.

As outlined above, the contribution of treated seawater from the ABLP aquaculture facility to the nutrient load on the Tweed River estuary is small and it is unlikely that there will be any significant negative impact on the EPA protection of aquatic ecosystem objectives.

Table 7.8.3: Comparison of existing water quality and proposed effluent quality criteria

Parameter	Existing Secondary Treated Wastewater Quality (90 th percentile)	PRP Effluent Quality Criteria (90 th percentile)	Effluent Quality Criteria used for modelling in SKM EIS	Proposed Effluent Quality Criteria (Modern Technology Criteria)	ABLP
BOD (mg/L)	7.5	15	15	10	10
SS (mg/L)	17.4	20	20	15	15
TN (mg/L)	3.7	5	15	10 Design target - 5	5
NH3 (mg/L)	0.7	5	5	<1	<1
TP (mg/L)	8.1	3	1	0.3	0.3
O&G (mg/L)	n/a	10	10	10	n/a
Faecal coliforms cfu/100 mL	2380	100	600	100	n/a
pH	9.1	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	7 - 8

Table 7.8.4: Modelled river concentrations of original discharge, compared with concentrations predicted in the two previous EIS's conducted



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Parameter	Original STP 1998 (prior to interim works) ¹	SKM EIS Proposal ²		GHD EIS Proposal ³	
		ADWF	PWWF	ADWF	PWWF
		(5 x ADWF)		(5 x ADWF)	
BOD (mg/L)	0.35	0.11	0.56	0.07	0.37
Suspended Solids (mg/L)	0.68	0.13	0.63	0.10	0.5
Total Phosphorous (µg/L)	350	8	40	2.4	12
Total Nitrogen (µg/L)	200	126	630	42	210
Ammonia NH3 (µg/L)	60	38	190	7.6	38
Faecal Coliforms (cfu/100 ml)	31	6.2	31	<1	5

1 Existing Loading = flow of 90L/s (3.75 times existing ADWF) and existing effluent quality (1995-97).

2 Future Loading = flow of 122L/s (ADWF), effluent quality as per Table 7.8.3 'Effluent Quality Criteria used for modelling'.

3 Future Loading = flow of 122L/s (ADWF), effluent quality as per Modern technology Criteria in Table 1

Table 7.8.5: Concentration of nitrogen and phosphorus in Tweed River samples (mg/litre) (mean of 10 years data, Tweed Shire Council)

Sampling location	Total N	Total P
Northern end of Ukerebagh Island	0.48	0.06
Kirkwood Road	0.43	0.06
Shallow Bay	0.63	0.04
Barneys Point bridge	0.48	0.06
Chinderah Bay	0.41	0.05
Opposite Caravan Park	0.46	0.04
At outfall	0.39	0.12
Off end of island	0.43	0.06
Downstream of Tumbulgum outfall	0.46	0.05
Tumbulgum outfall	0.45	0.06
Tumbulgum bridge	0.48	0.07
Mouth of Rous River	0.49	0.06
Mid stream opposite boat ramp	0.48	0.07
Upstream from hotel	0.46	0.05
Average	0.47	0.06
Standard deviation	0.055	0.019

Table 7.8.6: Nitrogen and phosphorus loads to the Tweed River estuary from various sources

	Timing	Total N Tonnes/year	Total P Tonnes/year
Existing Kingscliff WWTP (8 000EP)	present	3	6.5
New Kingscliff WWTP (8 000EP)	Sept 2006	3	0.24
New Kingscliff WWTP (25 000EP)	2011+	8.1	0.7
ABLP Stage 1	Oct 2006	1.1	0.07
ABLP Stage 2	Oct 2008	2.2	0.13
ABLP Stage 3	Oct 2010	3.3	0.2
Diffuse Load (1996)		383	25.8



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7.9 AIR QUALITY

The proposed ABLP aquaculture facility is to be located to the west of Kingscliff, immediately to the east of the new Pacific Highway. The dominant surrounding land use is currently rural, however, a sand mining operation is located on the neighbouring property to the east.

The nearest residential areas are (Figure 7.4):

- Location 1 - Melaleuca Station (owner's residence) ~500 m
- Location 2 - Farmhouse ~1,260 m
- Location 3 - Residences (Cudgen Road) ~1,706 m
- Location 4 - Residences (Cudgen Road) ~1,780 m

The topography of the site is generally level with a height of approximately 1.0m AHD and forms part of the broad flood plain of the Tweed River. The residences located to the south and south east of the proposed development (Locations 3 and 4, Figure 7.4) are elevated with respect to the ABLP site, whereas Locations 1 and 2 are at a similar elevation to the ABLP site.

While no site-specific air quality data is available, the existing air quality in the vicinity of the site is expected to be good given the largely rural nature of surrounding land use and the lack of other nearby significant industrial activities.

In determining whether effects on air quality could occur the construction or operation phases of the ABLP facility should be considered.

7.9.1 Construction - Earthworks

As previously indicated the ABLP site will be filled and bunded to approximately 3.7m AHD for protection against the 100 year ARI flood event. The fill to accomplish this increase in elevation is to be obtained from a 'borrow' pit excavated on-site. The fill will be moved from the pit to the northwest corner of the site to raise a bench and surrounding bund walls. As determined by previous sampling, the material to be excavated for fill will be predominantly sand, therefore there is a reduced likelihood of nuisance dust being produced from this material. However, the bund walls and bench will be sealed with an impermeable layer (possibly clay) to prevent:

- erosion from floodwaters; and
- groundwater penetration of walls and bench during flood events.

There may be some dust produced during the sealing operations and this will be controlled in the short term by spraying with water from a tanker truck and in the longer term by rapidly establishing vegetation cover on bare areas.

It is estimated that the earthworks component of the ABLP facility construction will take approximately 12 weeks and the creation of dust will occur for only a fraction of that time. It does not seem likely that dust will have a significant impact on the air quality of the area.

7.9.2 Operational Dust Impacts

During normal operation of the ABLP aquaculture facility there will be no effects of dust on air quality as landscaping with native vegetation will protect soil from wind erosion.



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All other areas of the production facility are paved, within closed buildings, or gravel lined.

No dust creating activities are part of process management.

7.9.3 Odour

The ABLP aquaculture facility would be regarded as an intensive animal husbandry facility due to the relatively large biomass of animals (standing stock of approximately 400 tonnes in full stage I). The maintenance and growth of these animals requires a correspondingly large input of food. This food must be prepared prior to feeding and food that is not consumed by the animals will have to be removed from raceways and disposed of. Leftover feed removal and disposal and food preparation will result in the generation of some odours. In contrast to other livestock industries however, the animals are aquatic so food is underwater and does not create odours until removed from the water.

Odour producing activities will therefore occur within the production facility and the processing building. *in standard procedures to ensure waste food well sealed*

Odour Assessment

In referring to the Department of Environment and Conservation's (DEC) *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW (2000)* and draft policy *Assessment and Management of Odour from Stationary Sources in NSW (2000)* a proponent must consider any potential air quality and amenity impacts on nearby private residences.

Whether an odour is a nuisance is dependent on several factors including background levels of other odours, type and mix of compounds from the sources, source characteristics (whether from a point or diffuse source) and personal sensitivity. For modelling purposes odour perception is defined as 1 odour unit (1 OU) or odour threshold, this being the theoretical minimum concentration that produces an olfactory response.

In practice, 'offensive' odour can only be judged by public reaction to the odour, preferably under similar social and regional conditions. The nuisance level can be as low as 2 OU/m³ and as high as 10 OU/m³ for less offensive odours. Experience gained through odour assessments for proposed and existing facilities in NSW indicates that an odour performance criterion of 7 OU/m³ is likely to represent the level below which 'offensive' odours should not occur (for an individual with a 'standard sensitivity' 1 to odours). Therefore, the policy recommends that, as a design criteria, no individual be exposed to ambient odour levels of greater than 7 OU/m³.

The nearest residence to the ABLP facility is located approximately 500m away (Location 1) in an easterly direction with no others within a kilometre (see above). For dispersion modelling purposes, the odour performance criteria are applied at the nearest existing off-site sensitive receptor (or likely future sensitive receptor). For a single residence the odour performance criteria is 70OU/m³.

The draft policy recommends management practices that may be applied separately or in combination to reduce the impact of odours. These measures include:

Odorous activities or equipment can be sited behind structures acting as barriers, so that odour emissions are not directed towards any sensitive areas or so that maximum dilution will occur before reaching them.



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A stand of trees or shrubs can help to disperse odour before it reaches the boundary of a facility and to reduce the wind over an odour source (e.g. an effluent pond). The height, thickness, width and appropriateness of its location determine the effectiveness of a vegetation barrier. This solution may be particularly useful when other odour source controls are either impractical or too costly. Using trees may be an especially suitable option in an agricultural setting, as they also act as a dust filter and may release a natural masking fragrance.

7.9.4 Conclusion

It is considered that odour from the ABLP facility will not be a significant issue as:

- all rearing, feed preparation and processing activities are carried out in enclosed structures;
- all wet organic waste is collected in closed containers and held under refrigerated conditions prior to off site disposal;
- all cleaning of raceways is carried out within enclosed structures; and
- ozone is used at a low level in the air of production buildings to eliminate fungi and neutralise odour.

7.10 FLORA AND FAUNA

Peter Parker Environmental Consultants were engaged to conduct a detailed flora and fauna survey on the proposed ABLP site at 355 Cudgen Road and the pipeline route from the site to the ocean beach at Kingscliff.

The study carried out included a detailed consideration of all habitat area within the subject site and the proposed route pipeline. In this regard, the site was analysed by way of both desktop and physical assessment.

This assessment found that both the site of the proposed aquaculture facility and the pipeline route are dominated by environmental weeds and show distinct signs of prior disturbance. As a result of the poor habitat value of the site and the extent of prior disturbance, it was found that the proposed development would not have an adverse or significant impact upon fauna and flora within the area. It was found however that several threatened species may fly over the site and that therefore the habitat value of the site and its surrounds could be enhanced by way of weed control works, planting of local native species within the site and its surrounds and the planting of landscaped buffers to adjacent cane farms.

The proposal has been the subject of statutory consideration pursuant to the provisions of Section 5A of the Environmental Planning & Assessment Act, 1979 (8 Part Test), the Threatened Species Conservation Act, 1995 and the Environmental Protection and Biodiversity Conservation Act, 1999. In this regard, the assessment concluded as follows:

The proposed ABLP site at 355 Cudgen Road is currently used for the cultivation of sugar cane and grazing.

A proposed pipeline will transport seawater to the site. The pipeline will extend from the South Pacific Ocean at Kingscliff proximal to the Police Station, along a Public/Crown reserve via Marine Parade, Beach Street, Elrond Drive, Chinderah Road, Crescent Street and westward to the site along a proposed new road. A separate pipeline will transport



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wastewater to the Tweed sewage treatment plant using the seawater intake pipeline easement.

The site exhibited little biological diversity. Vegetation was dominated by sugar cane and environmental weeds. Dominant weeds included blue billygoat weed and canary seed grass. Roadside verges along the pipeline route were also dominated by weeds with few native species being recorded.

No threatened plant species was recorded or is expected to occur and it is unlikely that threatened fauna species would frequent the site due to the depauperate nature of the existing habitat.

In terms of the statutory assessment, this study concluded that:

- no viable populations of threatened species were likely to be placed at risk of extinction by the proposal;
- the viability of endangered populations will not be significantly compromised;
- no regionally significant area of known habitat will be removed;
- no known habitat for threatened species will become isolated;
- no critical habitat will be affected;
- the proposed development is not a key threatening process and threatening processes are not likely to increase; and
- threatened fauna which may seasonally or opportunistically occur at the site are not at the extreme of their known geographical range.

A full copy of the detailed Fauna & Flora assessment carried out is attached at Appendix M to this submission.

7.11 FLOODING IMPACTS

Perhaps the most significant issue associated with the proposed development is the affects of flooding on its operational viability and the vice versa impacts of the proposed development on the flood plain. In this regard it is proposed to excavate a pit in a location adjacent to the site of the project buildings, and associated facilities, and transfer the excavated material to build up a 'bench' plus 'bundwall' to keep out the projected flood(s). The height of the proposed bund wall will likely be in the order of 3.70m AHD and therefore will provide for a disruption to the normal flooding regime experienced in the flood plain.

WBM Oceanics Australia is currently undertaking a Review of the Tweed River Flood Study on behalf of Tweed Shire Council. The design phase of the study is typically completed and accepted prior to the model being used for other purposes. However, as timing is critical for this assessment, Council has agreed to complete the impact assessment relevant to this proposal prior to finalisation of the design phase. It has been acknowledged by WBM Oceanics that this will not provide an impediment to the proper completion of the flood study.

The isolated study carried out by WBM Oceanics is attached for review (Appendix N). In general terms, this study found as follows: -

- Maximum predicted increase of the Aquaculture development in isolation (Scenario A) is 7cm immediately south of the proposed bunding.
- Maximum predicted increase of other cumulative development (Scenario B) is 10cm westward of Chinderah Road.

lateral distance?



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- Maximum predicted increase of the aquaculture development in association with other cumulative development is 10cm west of Chinderah Rd.

The general conclusion of the flooding analysis carried out is that the proposed development could proceed without the creation of unreasonable adverse impacts upon existing residential or rural properties within the floodplain.

A full copy of the detailed Flood Impact Assessment carried out is attached at Appendix N to this submission.

7.12 AGRICULTURAL IMPACTS

The proposed development will replace existing agricultural lands that have from time to time been the subject of sugar cane cultivation and more recently, grazing. The effectiveness of the land for the purposes of sugar cane cultivation has been stated by the current owner as questionable. In this regard, the diminishing returns and poor site conditions have made continued cultivation unviable.

In this regard, the subject lands are identified as Class 3 & 4 Agricultural Lands, further demonstrating the questionable value of the lands for the purposes of conventional agriculture.

There may be a fear that the loss of these lands as a source of produce for the local mill will jeopardize its continued viability, however it has long been acknowledged that the area under cultivation within the Tweed Shire will diminish over a period of years. This loss of cultivated land, estimated by the NSW Sugar Milling Co-operative CEO at 200ha, is understood to be consistent with the viability assessments carried out for the mill and hence will not weaken the long term viability of the industry. Formal acknowledgement of this loss was reported in the Daily News on 12 February 2004.

7.12.1 BUSHFIRE RISKS

ABLP have inspected Council's Bushfire hazard maps and note that no areas subject of this application are affected by an identified bushfire risk.

It is pertinent to note however that the surrounding cane lands do present a fire source risk from time to time. ABLP intends to mitigate against this risk through the inclusion of adequate setbacks and the use of an over roof irrigation system which is included within the design of the facilities.

This risk is likely to be offset further by way of the proposed green harvesting of sugar cane in coming years.



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8.0 ESD CONSIDERATIONS

8.1 PRECAUTIONARY PRINCIPLE

The *Protection of the Environment Administration Act, 1991*, defines the precautionary principle as follows: -

'if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'

In this regard, the predicted impacts are relatively minor and can be suitably mitigated.

8.2 INTER-GENERATIONAL EQUITY

Inter-generational equity requires that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for benefit of future generations. The proposed works are considered to be consistent with the promotion of inter-generational equity by enhancing the long-term future of the existing coastal zone to the benefit of future generations.

8.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND MAINTENANCE OF ECOLOGICAL INTEGRITY

Biological diversity refers to the diversity of genes, species, populations, communities and ecosystems and the linkages between them. Maintenance of a biological diversity will ensure life support functions and is considered to be a minimal requirement for inter-generational equity.

The impact of the proposed works on flora and fauna species and communities has been addressed within the body of this statement and in specific detail within the attached Fauna and Flora report. Impacts of the proposed works on ecology of the site will be minimal.

Overall the project will have no significant negative impact on the environment and will ultimately promote the rehabilitation and proper management of wildlife habitat in the locality. Mitigation measures have been identified to minimise any impact, which may arise from the proposed works during both construction and operation.



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9.0 Zoning, Management & Statutory Approvals

9.1 LAND OWNERSHIP AND MANAGEMENT

The proposed works are to be carried out within the following properties. Table 9.1 identifies the statutory zoning of the subject properties that are affected by the proposed works.

Table 9.1: Properties and zoning

PROPERTY	OWNERSHIP	ZONING
Public reserve 1001008 - Tweed Coast Reserve.	Crown under Council control (Reserves Trust)	6(a) Open Space
Road Reserves - Marine Parade, Beach Road, Elrond Drive, Chinderah Road, Crescent Street and un-named road reserves.	Crown & Council. Please note that all crown roads affected by the proposal are to be converted to Council controlled roads.	Unzoned lands
Lot 32 in DP 847319, Lot 128 in DP1039348	Tweed Shire Council	5(a) Drainage, 1(a) General Rural, 5(a) Sewage Treatment Plant / Turf Farm
Lots 706, 708, 709, 710 in DP 1000580; Lot 1 in DP 267742; and Lot 1 DP 578962	Private	1(a) General Rural and 1(b2) Agricultural Protection

Approval has been granted to lodge a development application, including this SEE, for the laying of the pipe and the construction of the pump facility within the 6(a) zone by the Reserves Trust (resolution dated 8 September 2004). Appendix R.

Tweed Shire Council has granted its permission to lodge a development application, including this SEE, for the placement of the pipes within Lots 128 in DP 1039348 and Lot 32 in DP 847319 (these lands represent those accommodating the existing Kingscliff Sewage Treatment Plant and adjacent land; the pipes will be laid within existing service easements located within each allotment) and within Council Road Reserves (Appendix R).

The extension of the proposed pipeline from the Kingscliff Sewage Treatment Plant will result in works within current and proposed road reserves for the full distance to the subject lands.

Works are also proposed within the Pacific Highway road reserve. These lands are owned by the crown and administered by the Roads & Traffic Authority.

9.2 ZONING AND DEVELOPMENT APPROVALS

9.2.1 Coastal Protection Act 1979 and the Coastal Protection Regulation 2004

The concurrence of the Minister for the Department of Infrastructure, Planning & Natural Resources is required to carry out development within the coastal zone that is below the mean high water mark. This requirement is relevant to the proposed pumping facility to be located beneath Dreamtime Beach. The concurrence of the Minister is sought in this instance.

↓ how has it been addressed Ref: to Reg's in Reg's



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9.2.2 Environment Protection and Biodiversity Conservation Act 2000

Assessment and approval provisions

Under the assessment and approval provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of national environmental significance are subject to a rigorous assessment and approval process. An action includes a project, development, undertaking, activity, or series of activities.

Actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land), and actions taken by the Commonwealth that are likely to have a significant impact on the environment anywhere in the world, may also require approval under the EPBC Act.

Biodiversity conservation provisions

The EPBC Act promotes the conservation of biodiversity by providing strong protection for:

- listed species and communities in Commonwealth areas (this includes listed threatened species and ecological communities, listed migratory species and listed marine species);
- cetaceans (all whales, dolphins and porpoises) in Commonwealth waters and outside Australian waters;
- protected species in the Territories of Christmas Island, Cocos (Keeling) Islands and Coral Sea Islands; and
- protected areas (World Heritage properties; Ramsar wetlands; Biosphere reserves; Commonwealth reserves; and conservation zones.
- wildlife species and wildlife products subject to international trade.
- The Act provides for:
 - the identification of key threatening processes;
 - the protection of critical habitat;
 - the preparation of
 - recovery plans;
 - threat abatement plans;
 - wildlife conservation plans;
 - bioregional plans;
 - conservation agreements;
 - the issuing of conservation orders; and
 - the regulation of exports and imports of live animals and plants, wildlife specimens, and products made or derived from wildlife.

Permits are required under the EPBC Act for: certain activities in Commonwealth reserves; activities that affect listed species or communities in Commonwealth areas; cetaceans in Commonwealth waters and outside Australian waters; the import and export of wildlife; and activities involving protected species in the Territories of Christmas Island, Cocos (Keeling) Islands and Coral Sea Islands.

Conclusion

Based on the above, the proposed ABLP aquaculture project will not require a permit under the Commonwealth EPBC Act 2000.



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9.2.3 Statutory Assessment - SECTION 79C of the Environmental Planning & Assessment Act, 1979

The proposed development requires consideration pursuant to the provisions of Part IV of the Environmental Planning & Assessment Act, 1979.

9.2.4 Integrated Development - S.91a EP&A Act, 1979

The proposal constitutes "integrated development" pursuant to Section 91 of the EP&A Act, 1979. In this regard, the following approvals would be required: -

- NSW Fisheries under the Fisheries Management Act, 1994 for the granting of an Aquaculture permit;
- Roads & Traffic Authority under S.138 of the Roads Act for works within the reserve of the adjacent Pacific Highway;
- Department of Planning Infrastructure and Natural Resources under the Water Act, 1912, for the claiming of water from the Pacific Ocean; ?
- Department of Environment & Conservation pursuant to the provisions of the Protection of the Environment Operations Act, 1997.

→ + Council
+ Lands

In these circumstances, the consent authority will consult with the 'integrated' authorities during the development assessment process, and prior to determination of the application, these authorities must advise the consent authority whether or not approval would be issued and what the general terms of their approval would be.

9.2.5 State Environmental Planning Policy No. 14 - Coastal Wetlands

Ensures coastal wetlands are preserved and protected for environmental and economic reasons. The policy applies to local government areas outside the Sydney metropolitan area that front the Pacific Ocean. The policy identifies over 1300 wetlands of high natural value from Tweed Heads to Broken Bay and from Wollongong to Cape Howe. Land clearing, levee construction, drainage work or filling may only be carried out within these wetlands with the consent of the local council and the agreement of the (Director-General of the Department of Urban Affairs and Planning). Such development also requires an environmental impact statement to be lodged with a development application.

Conclusion

The proposed ABLP Bay Lobster facility does not impact on any designated SEPP 14 Coastal wetlands.

9.2.6 State Environmental Planning Policy No. 26 - Littoral Rainforest

Protects littoral rainforests, a distinct type of rainforest well suited to harsh salt-laden and drying coastal winds. The policy requires that the likely effects of proposed development be thoroughly considered in an environmental impact statement. The policy applies to 'core' areas of littoral rainforest as well as a 100 metre wide 'buffer' area surrounding these core areas, except for residential land and areas to which SEPP No. 14 - Coastal Wetlands applies. Eighteen local government areas with direct frontage to the Pacific Ocean are affected, from Tweed in the north to Eurobodalla in the south.

Conclusion



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The proposed ABLP Bay Lobster facility does not impact on any designated SEPP 26 littoral rainforest.

9.2.7 State Environmental Planning Policy No. 34 - Major Employment Generating Industrial Development

The proposal will employ in excess of 20 staff with the commencement of Stage 1 and around 200 staff with the commencement of Stage 3. In accordance with Schedule 1 of the SEPP, intensive livestock operations employing 20 or more persons are considered to be major employment generating industries, and the Minister is the consent authority. Although not specifically listed, it is considered the proposed development is similar to an intensive livestock operation such as a cattle feedlot, poultry sheds or a piggery.

It is noted that the Minister, on 3 September 1999, made a declaration pursuant to Section 76A(7) of the EPA Act 1979 declaring aquaculture industry to be state significant development if:

*"The Project has been identified as being of state or regional significance in a strategic plan adopted by the Director General; or
The project will employ more than 20 people"*

As the project will employ more than 20 people the proposed development is listed as State Significant Development and like many other forms of intensive livestock industries as listed under SEPP 34 the Minister is the Consent Authority.

aquaculture
not intensive
livestock

9.2.8 State Environmental Planning Policy No. 44 - Koala Habitat

In summary, this policy requires a plan of management to be prepared and approved by the Director General of the Department of Infrastructure, Planning and Natural Resources before Council may consent to development within core Koala habitat areas. The proposal does not impact upon core koala habitat and the SEPP does not specifically apply to this development.

9.2.9 State Environmental Planning Policy No. 62 - Sustainable Aquaculture

State Environmental Planning Policy No. 62 is the principal environmental planning instrument controlling development for the purposes of aquaculture in NSW.

Pursuant to Clause 6(1), this policy prevails in the event of any inconsistency with another environmental planning instrument, inclusive of the Tweed Local Environmental Plan 2000. In this regard, the proposed water supply works to be carried out within the 6(a) Open Space zone are not prohibited by virtue of the exclusion of open space zonings from the specific prohibited areas identified within Clause 7 of Part 2 of the Policy.

check.

Clause 7: Pond Based and Tank based Aquaculture Permissible with Consent

Clause 7 of the policy provides that;

"A person may carry out tank based aquaculture with development consent if in the opinion of the consent authority it complies with the site location and operational requirements set out in Schedule 1 for the development (the minimum performance criteria)."

The minimum performance criteria for permissible development contained in Schedule 1 are reproduced in attached Table 1 together with comments thereon. In brief the proposal satisfies the minimum performance criteria.



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Clause 10: Consent Authority to Take Aquaculture Industry Development Plan in to Consideration

Clause 10 of the policy requires the consent authority, in determining a development application, to take into account relevant provisions of any aquaculture industry development plan. The North Coast Sustainable Aquaculture Strategy (August 2000) includes an aquaculture industry development plan comprising sections on:

- Business planning
- Species selection
- Site selection
- Planning and design
- Operating the farm

Site selection and planning and design considerations are particularly relevant to this investigation. The principle issues that arise from these considerations include:

Water Supply

The need for a potable water supply for processing and employees: Water supply is proposed to be obtained from roof water runoff, treated and stored on site to provide an adequate supply.

Flooding

Sites that are flood prone should be avoided. If unavoidable, then a detailed risk assessment should be undertaken: The site is to be filled so that it is protected from the adopted design flood level of 3.3 metres AHD plus 400 mm. A detailed Flood Impact Study is attached for consideration.

Native Title Issues

The NSW North Coast Sustainable Aquaculture Strategy indicates, "*most vacant crown land on the north coast is under one claim or more*".

A license from Tweed Shire Council and the Department of Lands for a pipeline over road reserves to the beach and the beach reserve has avoided the need to resolve any potential native title claims.

Heritage Issues

The proposed site is not affected by heritage listings on the NSW Heritage Office data base or under Tweed Local Environmental Plan 2000 or the North Coast Regional Environmental Plan 1988

Amenity Issues

The Strategy identifies a preferred location where no residences are within 400 m of ponds or pumps or 200m of tanks. There are no apparent dwellings within these buffer distances.

Agricultural Land Issues

The preferred location is where no aerial pesticide spraying occurs within 1 km of the site. There are a number of cane fields to the north and west of the site where spraying



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of herbicides and pesticides may occur within 1 km of the subject land. Advice from local growers and the only local aerial spraying contractor confirms that aerial pesticide spraying is not undertaken within 1 km of the site.

Native Vegetation

Section 2.2 of the Planning and Design Guidelines provides for a preferred design which does not disturb native vegetation or habitat. The Tweed Vegetation Management Plan (1999) indicates that the majority of the site is substantially cleared of vegetation. Accordingly the construction of the proposed aquaculture facility will not have a significant impact upon native vegetation.

Coastal Crown Lands and Road Reserve

This has implications for any development within the crown road reserve, however it is considered that suitable underground pipelines as proposed will have negligible impacts on Public Access along the road reserves and to Coastal Crown Lands. Minor disruptions will occur during construction and laying of the pipeline, however these will be short term in duration and have little impact over the life of the project.

CLAUSES 12 AND 13

These clauses provide that a "*project profile analysis*" in relation to the site location and operational attributes of the development is to be completed to determine the level of risk.

The project profile analysis is then used to determine the category of development as follows:

- Class 1 - Non designated development - Low level risk;
- Class 2 - Non designated development - Medium level risk;
- Class 3 - Designated development.

The relevant class of development is determined as follows;

- Class 1 - If all the risk levels in relation to each attribute are level 1,
- Class 2 - If all the risk levels in relation to each attribute are level 2 or levels 1 and 2,
- Class 3 - If any risk level in relation to an attribute is level 3.

The NSW North Coast Sustainable Aquaculture Strategy (August 2000) contains criteria to be considered in a project profile analysis. The relevant criteria are addressed in the following table.

tier 1 - site evaluation for tanks

SITE EVALUATION CRITERIA FOR TANKS	TIER 1 LEVEL OF ASSESSMENT FOR TANKS		
	LEVEL 1	LEVEL 2	LEVEL 3
1. Water Supply Based on DLWC information			
(a) Saline - if dependent on estuarine - tidal amplitude	Ocean intake, therefore tidal amplitude >> than 300mm		
(b) Fresh - water availability	Not applicable - no fresh water aquaculture		



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SITE EVALUATION CRITERIA FOR TANKS	TIER 1 LEVEL OF ASSESSMENT FOR TANKS		
	LEVEL 1	LEVEL 2	LEVEL 3
2. Acid Sulfate Soils			
If site <2m AHD; ASS Risk profile based on ASS Risk maps	Ap2	Wa2	
3. Heritage Issues			
(a) Heritage sites based on LEP or REP maps and State Heritage Inventory	No listed sites under Tweed Local Environmental Plan or North Coast Regional Environmental Plan 1988.		
(b) Aboriginal Heritage based on NPWS Aboriginal Sites Register	Highly disturbed site, NPWS register to be searched.		
4. Conservation Issues			
(a) NPWS protected areas, RAMSAR Wetlands, Critical habitat, Aquatic Reserves and Marine Parks (except "General Zone")	Not located in or adjacent these areas and no potential to disturb these areas		
(b) SEPP 14, SEPP 26, Marine Parks ("General Zone") World Heritage Areas	Not located in or adjacent these areas and no potential to disturb these areas		
5. Stock Species			
Note: Species that are inconsistent with translocation policy are not permissible	<i>Thenus spp.</i> is indigenous to NSW and is consistent with translocation policy		
6. Site Accessibility			
Vehicle and electricity accessible based on LEP maps and power suppliers information	Existing access and services or access and services can be readily provided		

tier 2 - site evaluation for tanks

SITE EVALUATION CRITERIA FOR TANKS	Tier 2 level of assessment for tanks		
	LEVEL 1	LEVEL 2	LEVEL 3
7. Water Supply			
(a) Water quality risks from nearby land uses	Not applicable		
(b) Potable water for processing or other purposes	Project will utilise roof shed rain water from storage pond treated to potable quality		
8. Water Supply			



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SITE EVALUATION CRITERIA FOR TANKS	Tier 2 level of assessment for tanks		
	LEVEL 1	LEVEL 2	LEVEL 3
Access From Rivers or Estuaries			
(a) Estuarine - pump station site		Project requires intake pipelines (into ocean beach) and pump station	
(b) Estuarine - estuary circulation	N/A		
(c) Freshwater - pump station site	N/A		
(d) Freshwater - Environmental flows	N/A		
9. Soils			
For freshwater tank culture: Area to irrigate for agriculture, plantation, horticulture or landscaping if:	Not applicable - Saline water - marine culture with no land disposal of waste water		
(a) no trade waste agreement for disposal of discharge water; or	N/A		
(b) no non-irrigation reuse scheme, e.g. hydroponics	N/A		
10. Hydrology Issues			
(a) Catchment Stormwater Drainage	Project will have provisions to manage across site flows not likely to affect surrounding area		
(b) Flood liability for non-indigenous species to the catchment (except high security species, e.g. barramundi which must be located >PMF	N/A <i>Thenus spp. are indigenous</i>		
(c) For fresh water tanks: Drinking water supply protection	Project is not located in a drinking water catchment		
11. Ecology			
(a) Type of existing vegetation on the actual development site	Predominately cleared, some cultivation		
(b) Likely disturbance of native vegetation communities		Pipeline access may require disturbance of native vegetation if it is present	
(c) Likely occurrence	No threatened		



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SITE EVALUATION CRITERIA FOR TANKS	Tier 2 level of assessment for tanks		
	LEVEL 1	LEVEL 2	LEVEL 3
of threatened species, populations or ecological communities or their habitats	species, populations or ecological communities or their habitats known or likely to occur - 8 Part Test Report not required		
(d) Likely impact on aquatic habitats and mangroves	No likely disturbance or impact		
12. Aboriginal Heritage			
(a) Location of Aboriginal Sites	Because of the characteristics of the land no aboriginal sites are likely to occur. An Archaeological Study has been undertaken demonstrating that the site is not an aboriginal site.		
(b) Consultation with Aboriginal community (Call NPWS for appropriate contacts)	The local aboriginal community has been consulted.		
(c) Likely impact on Aboriginal heritage	No impact on Aboriginal sites or places of significance to Aboriginal community is likely. The local aboriginal community have been consulted and it is concluded the proposal will not impact on aboriginal items of heritage.		
13 Adjacent Land Use To Tank Culture			
(a) Potential for Conflict with Neighbours	Neighbouring land zoned for compatible purposes e.g. agriculture or industrial development		
(b) Potential Visual Impact	Project predominately housed in building < 7.2 metres in height	Site overlooked by dwellings on Cudgen ridgeline & visible from Motorway overpass. Process	



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SITE EVALUATION CRITERIA FOR TANKS	Tier 2 level of assessment for tanks		
	LEVEL 1	LEVEL 2	LEVEL 3
		building 11 metres in height.	
(c) Proximity to Residences	In rural zone with no residences within 200 m of buildings or pumps.		

tier 3 - operational evaluation criteria for tanks

OPERATIONAL CRITERIA FOR TANK CULTURE	Tier 3 level of assessment		
	LEVEL 1	LEVEL 2	LEVEL 3
14. Health Management			
(a) Arrangements for the timely identification and treatment of diseases	Project has trained on-site staff (microbiologists, crustacean physiologist) with appropriate facilities		
(b) Clean in Place (CIP)	Project designed with biologically separate systems which can be independently disinfected and dried		
15. Food and Feeding Management			
(a) Feed storage to prevent odour emissions or vermin problems	Feed for project is in frozen storage in enclosed building		
(b) Feeding system	In this project leftover feed is removed from raceways and the quantity leftover is used to adjust the amount fed at the next scheduled feed		
16. Water Monitoring			
(a) Capacity Level (1) DO, temperature & pH	All raceway systems are sampled at least every day for temperature, DO, pH, salinity		
(b) Capacity Level (2) Water analysis eg N,P, Alkalinity/acidity, NFR, BOD	In house facilities for water sampling of raceway systems and wastewater system for nutrients, NFR, BOD etc.		
17. Tank and Raceway Water Management			
(a) Water Supply	Project proposes an ocean intake with twin pipelines and pumping station rated at approx. 200% of maximum daily flow plus eight day storage reserve		



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OPERATIONAL CRITERIA FOR TANK CULTURE	Tier 3 level of assessment		
	LEVEL 1	LEVEL 2	LEVEL 3
(b) Water quality management and recycle system	Recycle system with mechanical and biofiltration and/or chemical treatment, or better		
(c) Storage capacity of recycling ponds	Project is based on recirculation technology. There are no recycling ponds as in the prawn farming context but the holding pond prior to discharge has a volume >> 2 times the volume of the largest raceway		
18. Tank and raceway discharge water management			
(a) Saline tank and raceway culture (b) Water quality management and recycle system	Recycle system with mechanical and biofiltration and chemical treatment, or better	Mechanical filtering <1000 microns.	
19. Organic Waste Management (eg dead fish, processing waste and other waste)			
(a) Temporary storage of organic waste prior to disposal (eg. dead fish, processing waste and other putrescible waste)	Project proposes daily disposal of organic waste		
(b) Disposal of organic waste	Disposal at an approved off-site recycling or landfill facility		
20. Planning and Building Issues			
(a) Buildings or structures set back from nearest road boundary	> 5 metres		
(b) Building height excluding any parapet	< 7.2 metres	Process building 11 metres in height.	
(c) Landscaping with trees and shrubs on each street frontage or surrounding buildings(except in industrial sites where space is a limiting factor)	Min 3 metres in width		
(d) Driveways with regards to access, widths and turning circle	Comply with R.T.A. standards		
(e) Truck loading and unloading space on site	Queuing or waiting not required on public roads		
(f) Compliance with Building Code of Australia	Meet the deemed to satisfy provisions		



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OPERATIONAL CRITERIA FOR TANK CULTURE	Tier 3 level of assessment		
	LEVEL 1	LEVEL 2	LEVEL 3
(g) If unsewered site, on-site human sewerage system	Complies with the approval requirements of the Local Govt. Act		

In summary, the proposal can be defined as Class 2 under clause 13(2) (i.e. all risk levels in relation to each attribute are level 2 or levels 1 and 2). It follows pursuant to clause 14(f) of the instrument, that if the proposal can properly be categorized as Class 2, then it would not be classified, as designated development and therefore an Environmental Impact Statement would not be required. (Schedule 3 of the Environmental Planning and Assessment Regulations, 2000 provides that development for the purposes of aquaculture is not designated if State Environmental Planning Policy No.62 - Sustainable Aquaculture applies.)

CLAUSE 15 - ADVERTISED DEVELOPMENT

The proposal is identified as advertised development for the purposes of the EPA Act 1979.

Schedule 1 Pond Based and tank based aquaculture

Part 2 Minimum Performance Criteria for Permissible Development

Clause 2 - Zoning under Environmental Planning Instrument

The proposed tank based aquaculture farm is located within an area zoned for rural purposes. The proposal complies with the requirements of clause 2.

Clause 4 - Elevation AHD for tank based aquaculture

The proposal will be sited on land which is to be filled and bunded to an average RL of 3.7 metres AHD. Complies with the requirements of Clause 4.

Clause 5 - Landform Exclusion Zones

The proposal is not sited on Acid Sulphate Soils identified as EsO, EcO, EuO, or Em on the ASS Risk Maps published by the DLWC.

Clause 6 - Flood Liability

The proposed site is to be protected from the design flood level plus 400 mm adopted by Tweed Shire Council (3.3 metres AHD + 400 mm). The site is to be filled and a bund wall to a height of 3.7 m AHD constructed around the aquaculture farm.

↓ to what height?

Clause 7 - Conservation Exclusion Zones

The proposed site of the aquaculture farm is not located on land or water identified as a national park, marine park or aquatic reserve, or on vacant Crown land.

Clause 8 - Species Selection



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The species proposed to be harvested, *Thenus orientalis* and *Thenus indicus* are identified as suitable species for aquaculture purposes.

Clause 11 - Saline Discharges

The emergency holding pond has the capacity to hold treated seawater for a minimum of 24 hours prior to discharge to the tidal realm of the Tweed River, if required. The proposal is consistent with the provisions of clause 11.

Clause 12 - Outlets from Ponds

Raceway outlets are to be screened to ensure Bay Lobster do not escape into the Tweed River

Conclusion

It is considered the proposal is consistent with the provisions of SEPP 62 for Tank Based aquaculture. For further details in relation to how the proposal satisfies the performance criteria please refer to the engineering and design plans as attached.

9.2.10 State Environmental Planning Policy No. 71 - Coastal Protection

SEPP 71 applies to land within the 'coastal zone'. The subject land is located within the coastal zone and the provisions of SEPP 71 therefore apply to the proposed development.

The aims of SEPP 71 are:

- (a) to protect and manage the natural, cultural, recreational and economic attributes of the New south Wales coast, and
- (b) to protect and improve existing public access to and along coastal foreshores to the extent that this is compatible with the natural attributes of the coastal foreshore, and
- (c) to ensure that new opportunities for public access to and along coastal foreshores are identified and realised to the extent that this is compatible with the natural attributes of the coastal foreshore, and
- (d) to protect and preserve Aboriginal cultural heritage, and Aboriginal places, values, customs, beliefs and traditional knowledge,
- (e) to ensure that the visual amenity of the coast is protected, and
- (f) to protect and preserve beach environments and beach amenity, and
- (g) to protect and preserve native coastal vegetation, and
- (h) to protect and preserve the marine environment of New South Wales
- (i) to protect and preserve rock platforms, and
- (j) to manage the coastal zone in accordance with the principles of ecologically sustainable development (within the meaning of section 6(2) of the Protection of the Environment Administration Act 1991), and
- (k) to ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area, and
- (l) to encourage a strategic approach to coastal management.

The proposed aquaculture farm is located some kilometres from the Coast and as such will not impact on the beach environment, be visible from the coast or require the removal of native coastal vegetation. The proposed water intake pipeline is located under the foreshore reserve and the beach and will in no way be visible to the public. The pump station is to be located within the vicinity of the existing public toilet block or car park site located on the foreshore reserve known as the Jack Bayliss Park. Public Access will in no way be compromised to the beach or the foreshore reserve, and construction work on the pipeline across Jack Bayliss Park will be completed within the shortest possible time frame to minimize any disruptions that may occur during construction.



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Clause 7(b) requires the matters in Clause 8 to be taken into account by a consent authority when it determines a development application to carry out development on land to which the policy applies.

Clause 8 provides the following matters for consideration:

- (a) the aims of this Policy set out in clause 2,
- (b) existing public access to and along the coastal foreshore for pedestrians or persons with a disability should be retained and, where possible, public access to and along the coastal foreshore for pedestrians or persons with a disability should be improved,
- (c) opportunities to provide new public access to and along the coastal foreshore for pedestrians or persons with a disability,
- (d) the suitability of the development given its type, location and design and its relationship with the surrounding area,
- (e) any detrimental impact that development may have on the amenity of the coastal foreshore, including any significant overshadowing of the coastal foreshore and any significant loss of views from a public place to the coastal foreshore,
- (f) the scenic qualities of the New South Wales coast, and means to protect and improve these qualities,
- (g) measures to conserve animals (within the meaning of the *Threatened Species Conservation Act 1995*) and plants (within the meaning of that Act), and their habitats,
- (h) measures to conserve fish (within the meaning of Part 7A of the *Fisheries Management Act 1994*) and marine vegetation (within the meaning of that Part), and their habitats,
- (i) existing wildlife corridors and the impact of development on these corridors,
- (j) the likely impact of coastal processes and coastal hazards on development and any likely impacts of development on coastal processes and coastal hazards,
- (k) measures to reduce the potential for conflict between land-based and water-based coastal activities,
- (l) measures to protect the cultural places, values, customs, beliefs and traditional knowledge of Aboriginals-
- (m) likely impacts of development on the water quality of coastal waterbodies,
- (n) the conservation and preservation of items of heritage, archaeological or historic significance,
- (o) only in cases in which a council prepares a draft local environmental plan that applies to land to which this Policy applies, the means to encourage compact towns and cities,
- (p) only in cases in which a development application in relation to proposed development is determined:
 - (i) the cumulative impacts of the proposed development on the environment, and
 - (ii) measures to ensure that water and energy usage by the proposed development is efficient.

Having regard to these matters under Clause 8 it is submitted:

- The proposed development is consistent with the aims of SEPP No. 71 as discussed earlier in this report. The proposed development will not impact on existing public access to and along the coastal foreshore.
- The proposed 'type' of development is consistent with the current statutory controls at the state, regional and local levels. The proposed aquaculture farm is consistent with the existing and surrounding rural farming activities.
- The proposed development will not result in any detrimental effects on the coastal foreshore or the scenic qualities of the New South Wales coast. The proposal is not likely to significantly impact on existing wildlife corridors, or the conservation of fish, animals or



plants.

- The proposal will not impact on coastal processes or coastal hazards or increase the potential for conflict between land-based and water-based coastal activities. No items of heritage, archaeological or historic significance are likely to be impacted on by the proposal.
- The development is not likely to adversely impact on the water quality of coastal waterbodies. Re-circulated seawater to be treated and disposed of in accordance with the requirements of SEPP 62 prior to discharge back into the Tweed River.
- It is concluded that the proposed development performs satisfactorily in relation to the matters specified in Clause 8 of SEPP No. 71.

Part 4 of the SEPP contains provisions relating to development control. The following table provides an assessment of the proposed development in relation to the provisions of Part 4.

Provision	Compliance
Clause 13— Flexible Zone Provisions A provision of an environmental planning instrument that allows development within a zone to be consented to as if it were in a neighbouring zone, or a similar provision, has no effect.	The proposed development does not rely on the provisions of any flexible zoning provision.
Clause 14 – Public Access A consent authority must not consent to an application to carry out development on land to which this Policy applies if in the opinion of the consent authority, the development, will, or is likely to, result in the impeding or diminishing, to any extent, of the physical, land-based right of access of the public to or along the coastal foreshore.	The proposed development will not diminish or impede public access to or along the coastal foreshore.
Clause 15 – Effluent Disposal The consent authority must not consent to a development application to carry out development on land to which this policy applies in which effluent is proposed to be disposed of by means of a non-reticulated system if the consent authority is satisfied the proposal will, or is likely to, have a negative effect on the water quality of the sea or any nearby beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or a rock platform.	The proposed development will be connected to the West Kingscliff Sewage Treatment Plant and a rising main will be constructed accordingly. The proposal is unlikely to have a negative effect on the water quality of the sea or any nearby beach, or an estuary, a coastal lake, a coastal creek, or other similar body of water, or a rock platform.



Clause 16 – Stormwater The consent authority must not consent to a development application to carry out development on land to which this policy applies if the consent authority is of the opinion that the development will, or is likely to, discharge untreated stormwater into the sea, a beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or onto a rock platform.	A preliminary discussion of stormwater treatment is provided in this document. It is acknowledged that a Stormwater Management Plan will be required for construction and operation of the ABLP facility. The proposed development will not discharge untreated stormwater into the sea, a beach, an estuary, a coastal lake, a coastal creek or other similar body of water, or onto a rock platform.
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The proposed development is consistent with the aims of SEPP No. 71 and complies with relevant provisions.

9.2.11 North Coast Regional Environmental Plan 1988

Clause 12 Development control—impact of development on agricultural activities

Prior to issuing development consent authority must consider the likely impact of the proposed development on the use of adjoining or adjacent agricultural land and whether or not the development will cause a loss of prime crop or pasture land. The proposed aquaculture project is not located on land that is considered to be prime crop or pasture. In terms of adjoining agricultural uses the aquaculture farm is not out of character with the area and will not compromise the continued operations of the adjoining and surrounding cane and melaleuca farms or the horticultural or grazing activities on adjoining properties. It is considered the project is consistent with the provisions of the clause

Clause 29A Development control—natural areas and water catchment

The provision of Clause 29A require Council to consider the following prior to issuing consent

- (1) The council must not grant consent for the clearing of natural vegetation in environmental protection, scenic protection or escarpment preservation zones unless it is satisfied that:
 - (a) the wildlife habitat will not be significantly disturbed by the proposed development, and
 - (b) the scenery will not be adversely affected by the proposed development, and
 - (c) an erosion and sediment control plan will be implemented which will successfully contain on the site any erosion or sediment caused by the proposed development.
- (2) In this clause, clearing of natural vegetation means:
 - (a) the removal of the majority of the vegetation, ground cover, topsoil or flora (other than noxious weeds, or trees which are dead, dangerous, exotic or propagated for horticultural purposes) within an area in excess of 1 hectare, or



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- (b) the reduction of the canopy or the population of any one tree species in excess of 20 per cent within an area in excess of 1 hectare, but does not include such removal or reduction:
- (c) within 3 metres of the boundary of land in different ownership or occupation for constructing or maintaining a fence, or
- (d) within 0.5 metre of the common boundary of land in different ownership or occupation to allow a registered surveyor to survey the boundary.

In this regard the proposal, including the water pipeline, is not located on land within an environmental protection, scenic protection or escarpment preservation zones.

Clause 32B Development control—coastal lands

The proposed development is located on land which is located within the Coastal Zone and the NSW Coastal Policy 1997 applies. The provisions of this clause state inter alia: -

- (1) This clause applies to land within the region to which the NSW Coastal Policy 1997 applies.
- (2) In determining an application for consent to carry out development on such land, the council must take into account:
 - (a) the NSW Coastal Policy 1997,
 - (b) the Coastline Management Manual, and
 - (c) the North Coast: Design Guidelines.
- (3) The council must not consent to the carrying out of development which would impede public access to the foreshore.
- (4) The council must not consent to the carrying out of development:
 - (a) on urban land at Tweed Heads, Kingscliff, Byron Bay, Ballina, Coffs Harbour or Port Macquarie, if carrying out the development would result in beaches or adjacent open space being overshadowed before 3pm midwinter (standard time) or 6.30pm midsummer (daylight saving time), or
 - (b) elsewhere in the region, if carrying out the development would result in beaches or waterfront open space being overshadowed before 3pm midwinter (standard time) or 7pm midsummer (daylight saving time).

In this regard the proposed aquaculture project is not inconsistent with the NSW Coastal Policy, the Coastline Management Manual or the North Coast Design Guidelines. In terms of public access, public access will be impeded for a limited time only during construction and installation of the pipeline. Once installed the pipeline will not be visible and will be buried under the beach and the foreshore reserve. The project will not create any adverse overshadowing of beaches or waterfront open space.

In conclusion the proposed aquaculture farm does not compromise the provisions of Clause 32B of the North Coast Regional Environmental Plan.

Clause 33 Coastal Hazard Area

Before granting development consent on land affected by coastal processes, the Council must consider the following under Clause 33:

- (a) take into account the Coastline Management Manual,
- (b) require as a condition of development consent that disturbed foreshore areas be rehabilitated, and
- (c) require as a condition of development consent that access across foredune areas be confined to specified points.

The aquaculture farm is located some kilometres landward of the defined erosion zones and as such is highly unlikely to be adversely affected by Coastal erosion. The water



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intake pipeline though will be situated within the erosion zones at a depth of approximately 4 metres below the surface.

but not seeking consent for?

Clause 81 Development Adjacent to the Ocean or the Waterway

The provisions of Clause 81 state *inter alia*: -

- (1) The council shall not consent to a development application for development on land within 100 metres of the ocean or any substantial waterway unless it is satisfied that:
 - (a) there is a sufficient foreshore open space which is accessible and open to the public within the vicinity of the proposed development,
 - (b) buildings to be erected as part of the development will not detract from the amenity of the waterway, and
 - (c) the development is consistent with the principles of any foreshore management plan applying to the area.
- (2) Nothing in subclause (1) affects privately owned rural land where the development is for the purpose of agriculture.

The proposed water pipeline traverses the Kingscliff Foreshore Reserve more commonly known as the Jack Bayliss Park. In this regard the pipeline is to be substantially buried under the reserve and will not impact upon the public's access and usage of this park. Infrastructure associated with the pipeline such as the water pump will be housed below ground level either within the existing public amenities site or car park adjacent to Marine Parade. There is no foreshore management plan applying to the park. However it is noted the park is utilised on a regular basis for weekend markets. Construction work associated with the installation of the pipeline will be carried out to ensure the operations of this fortnightly market are not disrupted.

9.2.12 Tweed Local Environmental Plan 2000

The proposed development is permissible with consent pursuant to the provisions of the Tweed Local Environmental Plan 2000.

Clause 11 - The Zones

As discussed previously the proposal is located on land zoned 1 (a) Rural and 1(b2) Agricultural Protection.

The proposed water supply pipeline runs through a number of properties and is located on land zoned 1(a) Rural, 1(b2) Agricultural Protection, 5(a) Drainage and 5(a) Sewage Treatment, 6(a) Open Space and through unzoned land.

The proposed aquaculture facility is defined as an animal establishment pursuant to the provisions of Tweed Local Environmental Plan 2000.

The following comments are provided in terms of permissibility within the zones: -

The 1(a) Rural Zone

The objectives of the 1(a) Rural Zone are as follows:

Primary objectives

- to enable the ecologically sustainable development of land that is suitable primarily for agricultural or natural resource utilisation purposes and associated development.
- to protect rural character and amenity.



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Secondary objectives

- to enable other types of development that rely on the rural or natural values of the land such as agri- and eco-tourism.
- to provide for development that is not suitable in or near urban areas.
- to prevent the unnecessary fragmentation or development of land which may be needed for long-term urban expansion.
- to provide non-urban breaks between settlements to give a physical and community identity to each settlement.

It is considered the proposal is consistent with the objectives of the 1(a) Zone and is a permissible form of development pursuant to the provisions of the 1(a) Zone.

The 1(b) Agricultural Protection Zone

The objectives of the 1(b) Rural Zone are as follows:

Primary objective

- to protect identified prime agricultural land from fragmentation and the economic pressure of competing land uses.

Secondary objective

- to allow other development that is compatible with agricultural activities.

The proposal development is consistent with the objectives of the 1(b) Zone with the land identified as both Class 3 and 4 Agricultural lands. The proposal as such will not fragment prime crop or pasture lands and is compatible with surrounding agricultural activities. Animal Establishments are permissible with consent in the zone.

Zone 5(a) Special Uses (Drainage and Sewerage Treatment)

The proposed pipeline traverses land zoned 5(a) Special Uses (Drainage and Sewerage Treatment). The objectives of the 5(a) Special Uses Zone are as follows:

Primary objective

- to identify land which is developed or is proposed to be developed, generally by public bodies, for community facilities and services, roads, railways, utilities and similar things.

Secondary objective

- to provide flexibility in the development of the land, particularly if it is not yet or is no longer required for the relevant special use.

The proposed pipeline is in many ways ancillary infrastructure similar to a sewer or water main or other public infrastructure. It is considered the pipeline does not jeopardise the objectives of the zone and is a permissible form of development being compatible with the existing use and flexible with its long term usage.

Zone 6 (a) Open Space

The proposed pipeline traverses land zoned 6(a) Open Space as it traverses the Coastal Reserve between Marine Parade Kingscliff and the Beach.

The objectives of the 6(a) Open Space Zone are as follows:

Primary objective

- to identify existing public land, and land that is proposed to be acquired for public ownership, to satisfy the open space and recreational needs of local residents and visitors to the area of Tweed and to enable its development to encourage or assist their recreational use and enjoyment of the land.

Secondary objective

- to allow other development that is compatible with the recreational use of the land.



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The only works proposed within the 6(a) Open Space zone are water supply works associated with the pumping of water from the Pacific Ocean to the subject site. These works include the fitting of a pump facility within either the existing public toilet facility or within the car park and the laying of pipe beneath the beach to the east and in to Marine Parade to the west.

Water Supply works are not separately defined within the Tweed LEP 2000, however it is noted that the definition of a Public Utility Undertaking includes reference to water supply works.

The definition of a public utility undertaking is as follows: -

public utility undertaking

any of the following undertakings carried on or permitted or suffered to be carried on by or by authority of any Government Department or under the authority of or in pursuance of any Commonwealth or State Act:

- (a) railway, road transport, water transport, air transport, wharf or river undertakings,
- (b) undertakings for the supply of water, hydraulic power, electricity or gas or the provision of sewerage or drainage services,
- (c) undertakings for the provision of telecommunications infrastructure.

A reference to a person carrying on a public utility undertaking is to be construed as including a reference to a council, county council, Government Department, corporation, licensed telecommunications carrier, firm or authority carrying on the undertaking.

The definition above makes reference to water supply works that are permitted by a public authority or government department or those authorised under any Commonwealth or State Act. The proposed water supply works, will be carried out by a firm (as referenced within the above definition), with the written authority of the Crown Reserves Trust, whilst this application ensures that authority is requested and granted prior to the commencement of works.

It can also be reasonably stated that as several of those uses permitted within the 6(a) zone require a water supply (the existing public toilets being a current example), the provision of same could be classed as ancillary and therefore exempt from any requirement to gain formal development consent. The prohibition of water supply works, simply by virtue of the lack of a clear definition, is undoubtedly inconsistent with the intent of the LEP as it relates to the 6(a) zone.

We also make reference to the provisions of Clause 6 of Part 1 of SEPP 62, which states that in the event of any inconsistency between the SEPP and any other environmental planning instrument, SEPP 62 will prevail. In this regard, Clause 7 of Schedule 1 of the Policy, identifies zones where aquaculture is permitted or prohibited. In this regard, should the water supply works proposed to be carried out within the 6(a) zone be deemed to be 'Aquaculture', then it is pertinent to note that the 6(a) zoned lands are not identified as an area within which Aquaculture is prohibited. Accordingly, the permissibility of such works within the 6(a) zone pursuant to the policy overrides any prohibition contained within the Tweed Local Environmental Plan 2000.

Accordingly, the proposed water supply works, whether defined as Aquaculture or a Public utility Undertaking, are permissible with development consent.

The proposed development is considered to be consistent with the relevant provisions of the 6(a) Open Space zone.

Clause 13 Development of uncoloured land on the zone map



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The proposed pipeline is to be sited within various road reserves which are unzoned land under Tweed LEP 2000. The objectives of this clause are:

- to enable the control of development on unzoned land.
- to ensure that development of unzoned land is compatible with surrounding development and zones.
- to ensure that development of certain waters takes account of environmental impacts and other users of the waters.

In deciding whether to issue consent the consent authority must consider the following:

- (a) whether the proposed development is compatible with development permissible in the adjoining zone and the character and use of existing development in the vicinity, and
- (b) in the case of unzoned land that is below the mean high-water mark of the ocean or an estuary, bay, lake or river:
 - (i) whether or not the proposed development would alienate the use of the waters of the ocean, estuary, bay, lake or river from recreational uses or from commercial fishing and, if so, whether there is sufficient area in the locality for those uses to mitigate the adverse effect of the proposed development on those uses, and
 - (ii) the provisions of any coastal, estuary or river plan of management in force from time to time that applies to the unzoned land or land in the vicinity, and
 - (iii) any impact the proposed development may have on the natural environment.

The proposed pipeline where it is located within unzoned land will not impact upon the natural environment or the recreational use of rivers, foreshores, the ocean or surrounding waterways. It is considered the proposed pipeline does not prejudice the provisions of the clause.

Clause 15 Availability of Essential Services

The proposed site for the aquaculture farm is serviced by telecommunications and power. Ultimately a rising main is to be constructed to transfer effluent to the West Kingscliff Sewage Treatment Plant. Water will be harvested and stored in rain water tanks on-site for domestic purposes. It is envisaged Council will seek to impose conditions of consent in relation to sewer headwork's charges.

Clause 17 Social Impact Assessment

The proposed Aquaculture farm will employ more than 25 people and will undoubtedly result in a number of significant socio-economic benefits.

A completed socio economic checklist is attached for consideration at Appendix I to this submission.

In conclusion, it was found the proposal would have a positive social and economic impact upon the Tweed area.

Clause 22 Development near Designated Roads

The development site has frontage to a designated road being the Pacific Highway with access available to the site from the Interchange with the Tweed Valley Way. The property also has a frontage to Cudgen Road, but this will not be relied upon as a means of access to the aquaculture farm. Access will also be available back to Chinderah Road.

Accordingly the provisions of clause 22 apply and pursuant to subclause 4, the following matters must be considered prior to issuing development consent:-

- (4) The consent authority may grant consent to development on land to which this clause applies only if it is satisfied that:



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- (a) the development (because of its nature, appearance, cumulative effect or illumination, or the intensity or the volume or type of traffic likely to be generated, or for another similar reason) is unlikely to constitute a traffic hazard or materially reduce the capacity or efficiency of the designated road, and
- (b) the location, standard and design of access points, and on-site traffic movement and parking arrangements, would ensure that through traffic movement on the designated road is not impeded, and
- (c) the development, or proposed access to it, will not prejudice any future improvements to, or realignment of, the designated road, and
- (d) where the land is in Zone 1 (a), 7 (a), 7 (d), 7 (f) or 7 (l), the development is of a type that necessitates a location in proximity to the designated road for reasons other than only commercial advantage, and
- (e) the development is of a type that is not sensitive to traffic noise or, if it is, it is located or adequate measures are included to ameliorate any potential noise impact, and
- (f) the development would not detract from the scenic values of the locality, particularly from the point of view of road users, and
- (g) where practicable, access to the land is provided by a road other than the designated road, and
- (h) in respect of any application for commercial or retail development near the Pacific Highway in Zone 1 (a), 7 (a), 7 (d), 7 (f) or 7 (l), the development:
 - (i) would not compromise the Highway's function as the North Coast's primary inter- and intra-regional road traffic route, and
 - (ii) would not contribute to the need to expend public money on the Highway to overcome the effects of ribbon development, and
 - (iii) would not compromise highway safety and efficiency, and
 - (iv) would not cause or contribute to the shifting of the retail/commercial foci of any town from the town centre to a highway-orientated site.

The following comments are provided in response to the above matters.

The proposed aquaculture farm will not constitute a traffic hazard or materially affect the capacity of the Pacific Highway, Tweed Valley Way or Chinderah Road. It is proposed that the intersection with the Pacific Highway - Tweed Valley Way interchange with a separate left turn and deceleration lane on the southbound on ramp be constructed. These measures will be required to ensure through traffic is not impeded by the proposed development.

A Traffic Impact Assessment has been prepared and is attached to this report in Appendix F.

In terms of future upgrading of the Pacific Highway or the Tweed Valley Way interchange, discussions have been held with the RTA who have advised that future planning along this section of the highway will not require any land for road widening purposes.

There is no commercial advantage in locating the aquaculture farm adjacent to the Pacific Highway and the proposed site has been selected for a number of reasons including:

- it's proximity to the Pacific Ocean in terms of the supply of seawater;
- topography, in that that aquaculture farm is to be sited on relatively level land simplifying construction measures; and
- accessibility to services such as water, power, telecommunications and sewage.

The proposal is not sensitive to traffic noise generated by the Highway.

The proposal is located on farm land and the proposed activity as such is commensurate with the rural zoning of the land. It is considered the proposal will not detract from the scenic values of the locality with the predominant views in this locality being Mount Warning and the surrounding ranges to the south west of the site.



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The primary form of access to the proposed development is from the Tweed Valley Way Interchange with the Pacific Highway. As discussed previously the interchange is to be upgraded so that through traffic is not in anyway impeded by the vehicles entering and leaving the aquaculture farm.

In conclusion it is considered the proposal is not inconsistent with the provisions of the clause.

Clause 24 Setbacks to Designated Roads

The provisions of Clause 24 apply to the site and a setback of 30 metres is required from the Pacific Highway. It is proposed that all structures associated with the aquaculture farm will be setback a nominal 30 metres in accordance with the requirements of Tweed LEP 2000.

Clause 34 Flooding

The proposal is located on flood prone land with an average RL of 1 metre AHD. Using a combination of filling and bunding, it is proposed to raise the height of the proposed development to 3.7 metres AHD. The design flood level plus 400 mm has been adopted from Development Control Plan No. 5 - Flood Liable Land for the Chinderah and Kingscliff localities. As such it is submitted the aquaculture farm will be effectively flood proofed from the 1:100 year level flood event. get copy of DCP 5

A flood Impact study has been undertaken to identify cumulative impacts associated with the development on the local flooding regime. (See Appendix N for detail)

Clause 35 Acid Sulphate Soils

The subject site of the aquaculture farm is identified as Class 2 and Class 3 Acid Sulphate Soils under Tweed Local Environmental Plan 2000. The proposal involves the excavation of a borrow pit for the purposes of filling and bunding the site of the aquaculture farm to a height of 3.7 m AHD.

An Acid Sulphate Soils Management Plan will be prepared in accordance with the ASSMAC guidelines and the provisions of Clause 35, and is discussed in the attached report (Appendix J).

In terms of the pipeline, the route from the aquaculture farm to the ocean traverses Class 3 and Class 2 Acid Sulphate Soils as identified under the Tweed Local Environmental Plan 2000. The pipeline will have a maximum depth of less than 1m below ground level through these Acid Sulphate Soils. Therefore the proposal will not impact upon Class 3 acid sulphate soils - that is the works will not be more than a metre below ground level. In terms of the identified Class 2 soils, this area has been substantially filled in recent years with the residential expansion of West Kingscliff. Accordingly excavations in this area for the pipeline will not extend beneath the depth of the fill.

In conclusion, excavations for the pipeline will not result in acid sulphate soils being exposed.

9.2.13 Tweed 2000+ Strategic Plan

The proposed development is considered to be consistent with the aims and objectives of the Tweed 2000+ Strategic Plan. In this regard, particular reference is made to the



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promotion of employment generating developments and the encouragement of alternative primary producing activities upon rural lands.

ANY DEVELOPMENT CONTROL PLAN

Development Control Plan No. 2 - Site Access and Parking Code

The plans nominally indicate provision for up to 25 car parking spaces to be provided on-site for stage 1. As the development increases in size up to Stage 3 additional car parking will be provided on-site to cater for increased staffing numbers. Adequate area is available on-site for this to occur, and it is envisaged a further fifty spaces will be provided. Furthermore it is planned to run a minibus for staff at the commencement of Stage 2 with the bus picking up and setting down staff within the major town and villages of the Tweed Shire. It is noted the aquaculture farm will operate 24 hours per day seven days a week with a minimum of three shifts per day planned. That is with approximately 200 staff employed at stage three it is likely that approximately 60 - 70 staff will be engaged at each shift. Total car parking provided at this stage would number 75 spaces.

Under DCP No. 2 there is no specific requirement for an animal establishment. It is noted for an abattoir and the sugar mill the car parking rate has been set at 1 space per staff member. Having regard to the proposed staff bus and the parking arrangements proposed car parking is adequate for the proposed venture with the layout and manoeuvring areas to be designed and constructed in accordance with the requirements of Tweed Shire Council.

Development Control Plan No.5 - Development of Flood Liable Land.

The subject land is flood prone having an average RL of 1 metre AHD. To protect the aquaculture farm from flood waters it is proposed to fill and construct a bund wall to an approximate height of 3.7 metres AHD. The design flood level of 3.3 metres AHD for Chinderah and West Kingscliff from DCP No.5 has been adopted. Therefore the proposed development will be protected from flooding up to the 1:100 year level events.

A detailed Flood Analysis in accord with the recent Tweed River Flood Review by WBM Oceanics has been undertaken and is attached for consideration. This study concludes that the proposed development will have an acceptable net impact upon the surrounding floodplain.

Development Control Plan No. 45 - Socio Economic Impacts of Development

A Socio / Economic checklist has been prepared and attached at Appendix I for consideration. In summary the proposal will generate approximately 200 new jobs and will have a positive impact upon the Tweed Area in terms of economic growth and development. The ABLP facility would represent a major investment generating significant employment within close proximity to the major residential areas of the Tweed Shire.

ANY DRAFT ENVIRONMENTAL PLANNING INSTRUMENTS

No draft environmental planning instruments affect this proposal.

ANY MATTERS PRESCRIBED BY THE REGULATIONS



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9.2.14 NSW Coastal Policy

As a function of the sites proximity to the coast, the NSW Government Coastal Policy affects the subject site. In this regard, the proposed development is not inconsistent with the design and locality objectives of the Coastal Policy. In this regard the proposed aquaculture farm will not adversely impact upon Coastal Processes, cause any overshadowing of foreshore reserves, or adversely impede public access to the foreshore reserves or the beach.

The following table provides a summary of the relevant provisions of the NSW Coastal Policy 1997.

Goal.	Objective	Strategic Action	Comment
1. To protect, rehabilitate and improve the natural environment.	1.3 To improve water quality in coastal and coastal rivers where it estuarine waters and is currently unsatisfactory and to maintain water quality where it is satisfactory	1.3.2 Problems of other non- point source pollution (eg resulting from urban development) will be addressed through a range of actions including the setting of ambient water quality objectives; the development of stormwater management plans; the promulgation of environmental guidelines; and encouraging the adoption and implementation of industry and developers 'best management practices' for minimising pollution. 1.3.8 The discharge of contaminated stormwater to coastal waters will be minimised, with the aim being to ensure environmentally sound management of stormwater and prevent contamination in the future	The proposed development includes adequate measures for stormwater management, and a stormwater management plan will be prepared demonstrating how stormwater will be treated, stored and disposed utilizing best management practices and preventing contaminated wastewater from entering the local waterways.
2. To recognize and accommodate natural processes and climate change.	2.1 To give the impacts of natural processes and hazards a high priority in the planning and management of coastal areas.	2.1.3 Physical and ecological processes and hazards will be considered when assessing development applications.	



		2.1.4 Initiatives will be taken to address the impacts of acid sulfate soils (ASS) through: - consideration being given to the need for environmental studies which address ASS early in the planning and development process; - the use of ASS soils risk mapping undertaken by the Department of Land and Water Conservation and guidelines for their assessment and management prepared by the Environment Protection Authority in the assessment of any proposals likely to disturb ASS; - The preparation of management plans, as appropriate, to effectively manage project level impacts and the remediation of ASS sites.	An ASS Management Plan will be prepared demonstrating how ASS if disturbed will be treated to minimize any adverse impact on local waterways and marine environments.
3. To protect and enhance the aesthetic qualities of the coastal zone.	3.2 To design and locate development to complement the surrounding environment and to recognise aesthetic qualities,	3.2.1 Guidelines such as the North Coast Design Guidelines and Guidelines for Tourism Development along the New South Wales Coast will be promoted to encourage good development and design in order to conserve the natural environment and integrate built features with the natural environment. 3.2.2 The use of good design principles will be encouraged to ensure more compact, human scale towns are developed with	The proposed development has been designed to be functional to its purpose and will not be visible from Coastal Areas. Landscaping is proposed around the periphery of the farm to integrate the built features of the development into the natural environment and to screen the development from Public places (eg Pacific Highway)



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		their own character within the constraints of the existing infrastructure	
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It is concluded the proposed development is consistent with the relevant provisions of the NSW Government Coastal Policy 1997.

(b) The likely impacts of that development, including environmental impacts on both the natural and built environment, and social and economic impacts in the locality

The proposed development seeks to facilitate an alternative use of the site that will create significant socio-economic benefits, without the creation of un-manageable or adverse environmental impacts.

A preliminary environmental management plan outline has been prepared for the proposed aquaculture farm demonstrating that the proposal will follow best management practices to ensure the built and natural environment is not adversely impacted upon. Measures are included:

- to protect ground water and surface water;
- the treatment of Acid Sulphate Soils during construction;
- to maintain air quality;
- noise mitigation;
- dust mitigation during construction;
- waste management; and
- environmental monitoring.

In summary the proposal will effectively manage all environmental impact that may result from the proposal and ameliorate any adverse impacts to ensure the environment is not adversely impacted upon.

In terms of economic impact the aquaculture farm will initially employ 70 people and generate upwards of \$50 million in export income per annum and has the potential to generate approximately 200 jobs and \$150 million in export income per annum. This will create a positive multiplier effect throughout the local economy and generate additional employment and income opportunities throughout the Tweed locality. It is also proposed to relocate research and development facilities from Queensland to the site which has the potential to act as a catalyst in the development of an aquaculture/biotechnology precinct in the Tweed. Employment opportunities will be created for a range of positions from the unskilled to the highly skilled university qualified positions.

Considering the local unemployment rate for the Tweed Locality sits at 6.9% (June quarter 2004 - Dept of Employment and Workplace Relations) the proposed development will have a positive economic impact to the local economy and provide a much needed expansion to the economic base of the Tweed Shire.

(c) the suitability of the site for the development

The subject site is utilised for the growing of sugar cane and grazing cattle, and as such provides little in the way of native habitat for flora and fauna. In terms of hazards the land is liable to flooding. This is to be mitigated by raising the site and constructing a



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bund wall around the aquaculture farm to provide protection from the adopted design flood level for the 1:100 year flood event plus 400 mm.

The land contains Acid Sulphate Soils which may be exposed during earthworks and construction. The need for an ASS Management Plan has been identified to demonstrate how this risk can be satisfactorily managed during construction without adversely affecting the surrounding environment and waterways.

The subject site is not identified as having a bushfire risk under Tweed Shire Council's Bushfire Mapping.

In terms of the pipeline, this has been located within private property, along various Council road reserves, through the Council sewage treatment plant, and through the Crown Coastal Reserve known as Jack Bayliss Park. The pipeline is required for the supply of fresh sea water to the aquaculture farm a necessary ingredient for the success of the operation. Seawater directly from the beach, as opposed to the Tweed River, is cleaner carrying minimal pollutants and nutrients, which is a requirement for the farm to be organically certified. The pipelines will have a diameter of 150 mm and the pump station is to be installed within the site of the public amenities building or car park at Jack Bayliss Park. The pump will be acoustically enclosed to ensure that noise does not impact upon surrounding residential properties in Marine Parade. Once installed the pipeline will not be visible to the public and will not impact upon the public realm.

It is submitted the proposal raises no issues in terms of site suitability.

(d) any submissions made in accordance with the Act or the Regulations

The Consent Authority will need to consider any submissions it may receive from the public or Local, State or Federal government agencies.

(e) the public interest

It is submitted the proposed development will not prejudice or compromise the public interest.



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10.0 CONCLUSION AND FINDINGS

For reasons outlined within this statement, the need to carry out the proposed works is justified and is of a significant community benefit. In addition, the proposed development can be demonstrably carried out without the creation of adverse impacts. In this regard, the proposed facility will be complete with best practice environmental and operational safeguards and will be constructed and operated in accord with all relevant standards.

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September 2004.



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