CONSULTATIVE ENVIRONMENTAL REVIEW

AQUAEXPORT MARINE SHELL PROJECT
PORT HEDLAND

Prepared for and by:

LEMER MARKETING & CONSULTANCY PTY LTD
PORT HEDLAND WA 6721

PORT HEDLAND AQUAEXPORT MARINE SHELL PROJECT

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INVITATION

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal. Le Mer Marketing and Consultancy Pty. Ltd. proposes to develop a land-based aquaculture marine Shell export facility which include a hatchery and grow-out tanks for Trochus shells, pearl oysters (non-P.maxima species) and native Australian marine shells to be located at Downes Island near Port Hedland Western Australia.

In accordance with the requirements of the Environmental protection Act 1986, Le Mer Marketing and Consultancy Pty. Ltd. has prepared a Consultative Environmental Review (CER) which describes the proposal and its likely effects on the environment and management measures to mitigate these impacts. The CER is available for public review for a period of four weeks, commencing on Monday 17/11/97 and closing on Monday 15/12/97.

Comments from government agencies and from the public will assist the EPA to prepare an assessment report in which it will make recommendations to government.

Why write a submission?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents unless provided and received in confidence subject to the requirements of the Freedom of Information Act, and may be quoted in full or part in each report.

Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining with a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission.

You may agree or disagree with, or comment on, the general issues discussed in the CER or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal environmentally more acceptable.

When making comments on specific proposals in the CER:

- clearly state your point of view:
- indicate the source of your information or argument if this is applicable:
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- refer each point to the appropriate section, chapter or recommendation in the CER;
- if you discuss different sections of the CER, keep them distinct and separate, so there is no confusion as to which section you are considering;
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

your name,

- address,
- date; and
- whether you want your submission to be confidential.

The closing date for submissions is: XX/XX/XX

Submissions should be addressed to:

Chairman
Environmental Protection Authority
Westralia Square
141 St Georges Terrace
PERTH WA 6000

Attention: Ben Hollyock

A EXECUTIVE SUMMARY

A.1 The Project

Le Mer Marketing and Consultancy Pty. Ltd. Proposes to develop a land-based marine Shell Breeding facility to be located at Downes Island near Port Hedland Western Australia to produce Trochus shells (Trochus niloticus) Pearl oysters (Pteria penguin / Pinctada margaritifera / Pinctada albina). The project will also breed other native Australian marine shells for collectors.
The proposal is an expansion of the company's operations which presently exports harvested wild marine shells under its current licences.

The project will be initially be developed over a period of one to three years, commencing with 15 X 250 litre breeding tanks, including associated processing, laboratory and infrastructure. The project will employ 2-7 people during construction and initial operation.

Initial shell broodstock will be collected from the wild and placed in the hatcheries holding tanks for breeding and outgrowing.

In the longer term, the company looks forward to creating a sustainable new industry based at Port Hedland. Significant local employment opportunities will be created by the successful project.

A.2 The project's major components;

250 litre growing tanks

Each of the 15 tanks will contain approximately ten shells and fed seawater via a 60mm poly pipe. The tanks and the pipe will be screened to prevent the escape of shells and the ingress of unwanted material and livestock.

Seawater Intake System

A seawater intake located about 1km. offshore will lead through a secured 60mm pipeline to a holding tank leading to the other tanks. The quantity of fresh seawater required will be 200,000L/day.

Water Discharge System

Water discharge from the tanks will pass through a settlement tank prior to being released to the ocean. As the settled water is discharged micro-mesh filters will remove most of any remaining feed / waste materials.

Buildings

All buildings will be constructed to Zone A cyclonic specifications. The main Buildings will include a small dwelling, laboratory, breeding house, desalinator / solar / wind generating units.

A.3 PROJECT SITE

Downes Island is vested in the Port Hedland Port Authority (PHPA Act 1970). The island is covered by the Environmental Protection Authority (EPA) recommendation 8.6 and recommended to be a "B" Class reserve managed under Conservation and Land Management (CALM). A recent CALM survey reported that Downes Island has no significant Flora or Fauna worthy of special protection.

A.4 DECISION MAKING AUTHORITIES AND AGENCIES

Le Mer's proposal will comply with advice and recommendations from CALM, Department of Environmental Protection (DEP) and the Department of fisheries from its conception through to its establishment and operation. The company will comply with monitoring and auditing programmes requested by the relevant authorities. The 6.5 Ha site will be fenced to protect the company's valuable stocks and to prevent operational interference. Access to Downes Island for recreational activities will not be impeded.

A.5 ALTERNATIVE SITES

No other location investigated by Le Mer meets the essential criteria of a sustainable project:-

Access to quality seawater
Access to labour
It is close to a major town
Is close to shipping facilities
Is close to international airport
Economic access to site

A.6 SCALES OF OPERATIONAL AND STAGING OF PROPOSAL

Initially the project facility will be fenced and a small scale breeding hatchery will be set up for trials. A small construction for equipment and caretakers accommodation for 2 persons be set up using demountable building. A securely anchored 60mm diameter poly pipe is to supply fresh seawater to the main holding tank of approximately 150,000 litres capacity.

This water will feed a series of tanks of sea water which will contain the shell species to be propagated. Following successful initial trials, the company will set up more advanced facilities.

A.7 SITE ACCESS

Access to the site will be by boat. This route ensures that environmental impact / disturbance will be minimal. Mangals impact will be minimal.

A path of consolidated sand will provide access from the beach to the facilities. The use of a 4 wheel drive motorbike as transport from the beach to the site will ensure minimum disturbance of soil on this pathway.

B. SPECIES TO BE CULTURED

Trochus shells (Trochus niloticus)
Pearl oysters (Pteria penguin / Pinctada margaritifera / Pinctada albina)
Native Australian Marine shell for collectors

B.1 TROCHUS SHELLS

This species is native to the area. The breeding program will be monitored by WA Fisheries department. This component of the project will be part of the "Trochus Re-seeding Program" currently conducted by Dr Chan Lee **(Senior Lecturer University of Darwin)** in conjunction with the Fisheries department. The objective of this project is to supplement wild stocks which have been depleted due to overfishing.

B.2 PEARL OYSTERS

These species are native to the area. The breeding program targets to improve the quality of products (shells, shell-meat and pearls) and phase out wild fishing for those species by producing required stocks at the hatchery. The company will undertake a research program based on selective breeding to improve quality of stocks. Ongoing research is viewed as essential by the company. Our objective is to stay ahead of overseas competitors, notably Indonesian operators, in quality and research. It is expected that our research work will also benefit other Western Australian aquaculturalists working in this field under its association of AMWING. **(The West Australian Non-Maxima Pearl Growers Association)**

B.3 SPECIMEN SHELLS

With the exception of the ZOILA group, all species are native to the area. the species listed as per attachment F are all very valuable and much sought after by shell collectors worldwide.

The company aims to phase out wild-collecting of these specimen shells and supply the market with hatchery produced shells instead. The species of the Genus ZOILA, with exception of Zoila decipiens, are temperate species.

These will require translocation from their natural habitat (area between Esperance and Perth, WA) into the Port Hedland facility. Holding tanks for ZOILA Spp will be suitably modified for successful production. At no stage of the process will any specimens escape into the wild. Since the water temperature in their natural area is 10 C or more lower than our local waters, any escapees will be unable to survive.

C. FACT SHEET

Project Details

Name of Project	Aquaexport
Name of Proponent Principal Contact	Le Mer marketing & Consultancy Pty Ltd PO Box 418 PORT HEDLAND WA 6721 Joe Rinkens Ph: 015 991 626 Fax: 019 108 628
Project Location	Downes island, 7km south of Port Hedland, WA
Lease Area (proposed)	6.5 ha (approx.) NW Island
Access to Project Site	By boat
Species cultured	Trochus (*trochus niloticus*) Pearl Oysters (*Pteria penguin*) Specimen Shells (*various*)

Inputs		
Item	*Source*	*Quantity Required*
Broodstock		
Trochus	Port Hedland	30 kg/yr
Pearl oysters	" "	100 kg/yr
Specimen shells	Port Hedland & South Australia	15 kg/yr
Feed		
Algae	Port Hedland area oceans	250 kg/yr
Sponge	" " "	100 kg/yr
Seawater	Port Hedland area oceans	200000 ltr/day
Fresh Water	Seawater Desalinator	2000 ltr/day
Power	On-site Generation	Mainly Solar with diesel generator backup
Diesel Fuel	On-site fuel drums	250 ltr max. stored on site
Chemicals	Chlorine	100kg/yr

Outputs		
Item	*Destination*	*Quantity Produced*
Shells	Domestic / Export markets	1000 tonnes/yr
Meat	Export markets	10 tonnes/yr
Seawater	Settling Tank → Micro Filters → ocean	200000ltr/day
Desalination Plant	Settling Tank → Micro Filters → ocean	2000ltr/day
Settling tank Sludge	Recovered → Dried → Packaged → Mainland	100 kgs/yr approx.

D. THE PROJECT SITE

1	Location of Site	Downes Island near Port Hedland Approximately 19.8 South - 118.7 East
2	Ownership of land	Port Hedland Port Authority Lease
3	Distance from nearest building	7 kilometres (Boodarie Homestead)
4	Zoning of designated site	Within Port Authority lease limits
5	Present use of land	Not in use - vacant
6	Location of facility	Port Hedland Western Australia
7	Approximate area sought	6.5 Ha.
8	Proposed access route	By boat from Finucane Island.
9	Offshore site	An offshore site is not required

E ENVIRONMENT APPROVAL PROCESS

Le Mer Marketing and Consulting Pty Ltd formally referred the proposal to the Environmental Protection Authority (EPA) in December 1996 following extensive consultation with the Department of Environmental Protection (DEP), the Fisheries Department, other government authorities, local environment and recreational fishing organisations and the Hedland community. The EPA determined that the proposal should be formally assessed under Section 38 or the Environmental Protection Act 1986, at the level of Consultative Environmental Review (CER). Following that determination, the DEP prepared Guidelines setting out the main issues to be addressed in the CER. **(The Guidelines are reproduced in Appendix A).**

This CER has been prepared by Le Mer to describe the proposal, examine the potential environmental impacts and set out proposed measurers to avoid, minimise or manage and monitor those impacts. Upon authorisation from the DEP, and CER will be published and available for public review for four weeks, during which time individuals and organisations will be invited to make written comments and submissions to the EPA concerning the adequacy of the CER and acceptability of the project.

A summary of these submissions will be forwarded to the proponent, who will prepare a response to issues raised in the submissions. As a result of consideration of these submissions, the proponent may provide additional information, explanation or details of modifications to optimise the environmental acceptability of the project.

The CER and Response to Submissions will be assessed by the EPA. The EPA will make recommendations to the Minister for the Environment as to whether the proposal should be approved and, if so, under what conditions. These recommendations will be published in an EPA Bulletin and will be open to public appeal for two weeks.

At the end of the appeal period (assuming no appeals are received which need to be considered), the Minister will make a decision as to whether the project can proceed and will set out conditions relating to environmental management, monitoring and reporting which must be fulfilled either before or following commencement of the project.

F. GOVERNMENT AND COMMUNITY CONSULTATION

Le Mer marketing & Consultancy Pty Ltd has communicated with both local and State Government agencies and representatives. Support for the project has been received from a wide cross-section of the community. All concerns have been taken into consideration in the design of the operation. Consultation with and agreement, subject to pre licence conditions being met, received from the lease holder, Port Hedland Port Authority.

Le Mer has consulted in writing and has met the principals / members of many organisation, individuals and companies (Appendices No. 7.1). Each of those listed have been provided with details of the proposal and have been invited to raise any concerns, make suggestions or meet for discussion regarding the proposal. No adverse reactions have been received.

Consultation and site inspection with Traditional Custodians, Ngarla- Coastal Njamal Aboriginal Corporation, who have raised no objection to the proposal.

A survey conducted by the Aboriginal Affairs Department (Mr. L Warren) concluded that there are no significant Aboriginal sites on the island. There are no other known heritage sites on the island.

F.1. Government and Community Organisations

Le Mer Marketing and Consulting Pty Ltd has undertaken extensive consultations with all relevant Government agencies through the Interdepartmental Committee for Aquaculture (IDCA). This Committee is chaired and coordinated by the Fisheries Department of Western Australia. Assistance to the proponent during this procedure is given by the Aquaculture Development Officer for the Kimberley region, again via the Fisheries Department.

The IDCA is responsible for ensuring that the necessary approval processes and concerns of all relevant agencies and interest groups are addressed.

Membership of the IDCA currently includes:

Fisheries Department
Department of Commerce and Trade
Ministry for Planning
Department of Transport
Department of Land Administration
Department of Environmental Protection
Aboriginal Affairs Department
Water & Rivers Commission
Aquaculture Council of Western Australia
Aquaculture Development Council

Department of Agriculture

Conservation and Land Management

In addition to the IDCA process, Le Mer has also direct consultations with representatives from each of these agencies to discuss any relevant issues. Support for the project has been widespread, as is shown by the letters attached in Appendices 7.1. All concerns and recommendations have been taken into consideration in the design of the operation and the subsequent preparation of this CER and the Aquaculture License Application.

Approval of the above agencies will be confirmed in writing during the licensing process directly to the IDCA.

F.2. Community Organisations

Community Consultation

A community consultation and awareness program was initiated in August 1994 to ensure that the local community and other interested groups were fully informed about the project. The consultation program had a number of components including presentations to the Local Government Authority; Port Hedland Town Council on 27 October 1994.

Aboriginal consultation

The Ngarla-Coastal Njamal Aboriginal Corporation is the recognised custodian for the area was consulted during the preparation of the CER:.

Following a news article in the "The North West telegraph" the general comments received from the Hedland community has been very positive and supportive.

Le Mer has received approval in principle from the Port Hedland Town Council and the Port Hedland Port Authority.

G EXISTING SOCIAL ENVIRONMENT

Port Hedland is located approximately 7.5 km east of the of the proposed hatchery site. South Hedland, a suburb of Port Hedland, is located 7 km to the south east. The Wedgefield industrial area is 5 km to the south. In 1991 the combined population of Port Hedland and South Hedland was 11,349. This was a decrease of 13.3% from the 1986 census level. However, in the past two years the population has again increased to some 15,000 as a result of the construction of BHP's Hot Briquetted Induction (HBI) plant.

(a) REGIONAL SETTING

Port Hedland is one of several major towns which have developed or have grown to service the mining and industrial operations in the region.

(b) HERITAGE CONSIDERATIONS

Aboriginal Heritage

An Aboriginal Heritage Survey of the project area has identified no sites of cultural significance which may be impacted by the project (Warren, 1994).

Should an archaeological site be identified during construction activities, all activities that may impact on the site will cease and discussions will be held with the Aboriginal Affairs Department.

Non-Aboriginal Heritage

There are no structures / buildings on Downes island.

H ENVIRONMENTAL IMPACTS AND MANAGEMENT

Through discussions with the Environmental Protection Authority, and local environmental organisations, the key environmental issues to be addressed by this CER have been identified as:

- land clearing associated with this proposal;
- possible impacts on the mangrove communities on the north / east of the island;
- discharge water quality criteria, the management / monitoring systems for compliance;
- maintenance of existing public beach access and minimisation of interference to recreational activities;
- management of fuel oil storage and potential spills;
- prevention of escape of introduced species from the project;
- management of cyclonic impacts.

The environmental objectives, potential impacts, proposed management, relevant standards and success criteria pertaining to these environmental issued are summarised in table A1, which is presented at the end of this summary.

Without exception, the environmental impacts associated with this project have been found to be relatively minor and readily amenable to management.

I COMMITMENTS

Le Mer marketing & Consultancy Pty Ltd is committed to safeguard the environment and to fully comply with all relevant guidlines and regulations. These commitments are summarised as follows:

Commitment 1

To protect the conservation values of the island, clearing of vegetation for the site construction will be kept to a minimum. Initial site clearance will be 250m^2. During construction no unnecessary removal of native vegetation will occur. Once construction is completed those areas not needed will be rehabilitated to their pre-construction state, to the satisfaction of DEP.

Should the project cease the site will be rehabilitated to its pre-construction state.

Commitment 2

All rubbish presently on the site and produced during the project operations will be removed and disposed to an authorised mainland rubbish tip.

Commitment 3

No mangroves will be removed at any stage of the project.

Commitment 4

To prevent any escape of the subgenus ZOILA into the wild, all holding tanks for this genus will be constructed to the Fisheries Department's specifications.

Commitment 5

In order to ensure that any outbreak of disease at the facility cannot escape to the wild population, Le Mer will implement a Disease Contingency Plan throughout the project operations to the satisfaction of the Fisheries Department of Western Australia.

Commitment 6

Le Mer is committed to monitor and regularly measure water discharges for contaminants leaving the site as specified by the Fisheries department. Le Mer will develop and commit to implementing an environmental monitoring programme to the specifications of the Environmental Protection Authority Bulletin 711 "Protection of Aquatic Ecosystems" and to the requirements of the Department of Environmental Protection

Commitment 7

To prevent any sewage discharge to land or ocean an approved composting toilet system 'Rota Loo" will be installed.

Commitment 8

All fuel and chemicals will be stored in accordance with Department of Minerals and Energy requirements. The amount of fuel stored will not exceed 250 litres.

Commitment 9

Protection against storm surges, cyclones and flooding will be incorporated in all phases of the project from planning through to operation.

Table A1 Summary of Environmental Impacts and Management

Commitment Action	How	Objective	Timing	Whose Advice	Measurement Compliance Criteria	Commitment NoS
1. Minimise vegetation clearing on site	Remove vegetation only where it will interfere with site construction or operation	Protect the conservation values of the island and prevent erosion due to clearing	During construction and operation	CALM Regional Office	Minimal impacts due to land clearing	1
2. Construct Zoila holding tanks to prevent escape	Construct to FDWA specifications for translocated species	To prevent escape and establishment of Zoila species in the wild	During construction	Fisheries Department of Western Australia	Specifications of tank construction does not allow Zoila to escape	2
3. Fuel and oil storage to be in accordance with appropriate regulations	Fuel storage areas constructed to appropriate standards	To prevent accidental fuel and oil discharge to the environment	During construction and operation	Department of Minerals and Energy	Specifications of fuel storage area to appropriate standards	3
4. All rubbish presently on site and produced during aquaculture operations should be disposed to landfill	Initial site clean up and periodic removal of rubbish	To protect the natural and recreational values of the island	Prior to construction and throughout the life of the project	CALM EPA	Site kept in a clean and tidy state	4
5. Appropriate composting toilet or other non-discharging unit sewage control unit to be used	Toilet installed on site	To prevent discharge of untreated sewage to land or ocean	Prior to commissioning of the site and throughout the life of the project	EPA	No sewage discharge to land or ocean	5
6. Develop and implement an environmental monitoring program	So as to measure the contaminants in the effluent leaving the site	To protect the environmental values of the surrounding marine environment	Prior to construction and throughout the life of the project	DEP	No significant impact on the surrounding environment	6

Table A1 Summary of Environmental Impacts and Management

7. Effluent discharge levels to be within the criteria for the protection of aquatic ecosystems	So as to prevent impacts from effluent discharge	To protect the environmental values of the surrounding marine environment	Throughout the life of the project	EPA (Bulletin 711)	All discharge levels within those specified in Bulletin 711	7
8. Public access along the foreshore area will not be restricted	No infrastructure or other devices will be constructed that will restrict access	To protect the recreational values of the area	Throughout the life of the project	CALM	No access restriction along the foreshore	8
9. Upon decommissioning the site is to be returned to state similar to pre-impact	Remove all infrastructure and rehabilitate the land where required	To protect the environmental value and amenity of the area	Decommissioning	DEP and CALM	No significant impacts from the site detectable	9

AQUAEXPORT MARINE SHELL PROJECT

PORT HEDLAND

2.0 INTRODUCTION

2.1 THE PROPOSAL

Le Mer Marketing Pty Ltd proposes to set up facilities to breed marine shells at Downes Island near Port Hedland. The target species are Pearl Oysters, (Pinctada Albina/Pteria Penguin/Pintada Margaritifera) Trochus Shells (Trochus Niloticus) and Specimen Shells for Collectors. The Pearl Oysters and Trochus Shells occur naturally in the area. All species of specimen shells (See Table 1) are also native to the Port Hedland area with exception of the Subgenus Zoila. Under special licence from the WA Dept. of Fisheries, broodstock of these species are proposed to be collected from their natural habitat, being offshore waters between Esperance and Perth.

The project will initially comprise 15 x 250 litre shell-holding tanks, one reservoir (approximately 200000 Litres) with accompanying seawater intake and distribution system, settlement tank, discharge pipe, hatchery/laboratory, office and on site accommodation for up to seven persons initially, intensive research will be conducted at the small scale facility over a period of 3-4 years. It is expected the facility will reach commercial scale covering approx.5 ha of the site around year 6. The unique aspects of the project necessitates the unusually long research period. Most species targeted have not been seriously studied. This research component will be implemented in close conjunction with the WA Fisheries Dept. and is expected to benefit malacology and ultimately advance other aquaculturalists.

After collection of broodstocks of the various species, approximately 5 adults of the major species will be transferred from the wild into the small tanks for selective breeding. The pearl oysters will be outgrown at the leased off-shore site near Downes Island (See Fig 1) when they are about 15mm in size. The trochus shells component is to be advanced pending guidelines of Authorities which the company is now awaiting. The specimen shells are bred and raised in the small shell-holding tanks and will be captive at all times.

Depending on the rate of progress during the research period, the company expects to produce all it's shell-stocks from the hatchery facilities and phase out wild-fishing within approximately 6 years. The resultant sustainable new methods of propagation will generate local employment opportunities due to the value-adding processing of products at the mainland and the labour intensive marine operations.

2.1.1 THE PROPONENT

The proponent for the Aquaexport Project is Le Mer Marketing & Consultancy Pty Ltd (ACN 009 470 786)

Postal Address *PO Box 418 PORT HEDLAND WA 6721*

Principal contact *Joe Rinkens Phone: 015 99 1626 Fax 019 10 8628*

State of Registration *Western Australia*

PROPONENT'S BACKGROUND

The managing director of Le Mer Marketing Pty Ltd, Joe Rinkens has been actively involved in the shell sciences since 1978. He has lived in the North West of Australia since 1975 and set up his business in Port Hedland. He runs a successful shell export business which has clients worldwide.

His involvement in the shell sciences has been to advance knowledge of native Australian marine shells and to promote their conservation and protection. Joe has been widely acknowledged for his contributions in malacological publications in Australia and overseas. His fieldwork has resulted in discovering one new Genus and six novel species of Gastropods. The new species Livonia (Cottonia) joerinkensi (Poppe 1987) and Amoria (Amoria) rinkensi (Poppe 1986) have been named in his honour.

Joe has assisted in many marine science research enquires and has considerable correspondence with such scientists as Professor D. Ovington of the National Parks and Wildlife Service in Canberra.

He recently cooperated in research with Dr. Chan Lee of Darwin University 's Aquaculture Department on it's Trochus re-seeding program. Joe recently assisted the Bardie people of the One Arm Point Aboriginal community to significantly value-ad to their Trochus harvesting operation. This was carried out with the Western Australian Fisheries Aquacultural Officer Mr. Colin Ostle.

Joe wishes to keep scientific knowledge and expertise in Australia and in particular create a new industry in Western Australia, providing new employment opportunities in Port Hedland. Joe Rinkens holds licences to collect native Australian marine shells in the wild. (Licence No. 4045) and distribute those shells worldwide under Export Authority. (PWS A963802)

(*1) Poppe. T. Guido and Yoshihiro Goto (1992) VOLUTES Pub - L'Minformatore Piceno Anacona 1992

(*2) Wilson. Barry (1993). AUSTRALIAN MARINE SHELLS Vol. 1 & 2 .Pub - Odyssey Publishing Aust

(*3) Vokes. E. H. (1993). REVIEW OFTHE MURICINE SUBGENUS PTERYNOTUS (PTEROCHELLUS) IN AUSTRALIA *J. Malac.Soc. Aust. 14:83-105 1993.*

2.1.2 EXISTING FACILITIES

There are no facilities or infrastructures on the Island. (See Plate 1). At the project site there are the rusted remains of a collapsed iron shed with many rusted 200 ltr. drums and other types of rubbish. It does not appear that the land was used for grazing but was accessible at low tides by stock from the nearby Boodarie station. The Island is away from the main shipping channel for Port Hedland.

2.1.3 LOCATION AND TENURE

The project site on Downes Island is located near Port Hedland approximately 19.8 South - 118.7 East. Downes Island is vested in the Port Hedland Port Authority (PHPA Act 1970). The island is about three klms E-W / 1.5 klms N-S. (See Fig 2)

The island is covered by the Environmental Protection Authority (EPA) recommendation 8.6 and recommended to be a "B" Class reserve managed under Conservation and Land Management (CALM). A recent CALM 1994 survey reported that Downes Island has no significant Flora or Fauna worthy of special protection. Currently Le Mer has discussed a 21 year lease with the Port Hedland Port Authority with renewal options.

DETAILS PROJECT LOCATION

A) *LOCATION OF SITE Downes Island near Port Hedland approximately 19.8 °South - 118.7 °East. (See Fig 2)*

B) *OWNERSHIP OF LAND Port Hedland Port Authority*

C) *DISTANCE FROM NEAREST BUILDING Approximately 7 km (Boodarie Homestead)*

D) *ZONING OF DESIGNATED SITE Within Port Hedland Port Authority Limits*

E) *PRESENT USE OF LAND Nil - Vacant*

F) *LOCATION OF PROJECT North Western corner of Downes Island*

G) *APPROXIMATE AREA 6.5 Ha*

H) *PROPOSED ACCESS ROUTE By boat as marked on (Fig 1)*

I) *OFFSHORE SITE An offshore site is not required.*

2.1.4 REASONS FOR SELECTED SITE

Following the investigation of several sites in the area no other location meets the essential criteria of a sustainable project:-

Access to quality seawater
Access to labour
It is close to a major town
Is close to shipping facilities
Is close to international airport
Economic access to site
Natural land fall for drawing water

Good location selection (See Table 2) is vital to achieve optimal production rates and to lend security to the operations.

Table 2 SITE SELECTION PARAMETRES DOWNES ISLAND

PARAMETER	Recommendations	Downs Island
Water Supply		
Adequate volume of seawater		Yes
pH	7.5-8.5	7.5-8.5
Salinity	30-35 ppt	30-35 ppt
Temperature	25-30°C	25-30°C
Pollutant Levels		
Heavy Metals		Low/Acceptable
Pesticides		Low/Acceptable
Surfactants		Low/Acceptable
Hydrogen Sulphide		Low/Acceptable
Ammonia		Low/Acceptable
Tidal range	No Relevance	0.3-7.5
Freshwater	Available	Desalination Plant
Soils		
Ground level of tanks		6 m above high tide
Other		
Electricity supply		Solar / Wind
Supply of labour, feed & equipment	Readily available	Readily available
Predators or poachers	Away from	In control
Transport to markets	Available	Port 1 km -Airport 14

2.1.5 HISTORY OF THE PROPOSAL

Le Mer Marketing and Consultancy Pty Ltd was incorporated in 1990 and set up Aquaexport to investigate and evaluate the feasibility of a shell tank farm in Western Australia. An extensive study has been undertaken on all pertinent matters, including suitable site selection, environmental issues specific to the chosen area, logistical requirements, technical know-how, species selection and market considerations. Investigations of other successful tank farm facilities, both in eastern Australia and overseas, were also made.

An Application for an aquaculture licence has been submitted to the Western Australian Interdepartmental Committee for Aquaculture (IDCA). Approval by the Environmental Protection Authority also forms part of the licence process.

The company is currently finalising its engineering and planning programme so that construction of stage 1 can commence as soon as relevant environmental approvals and licences have been obtained.

2.1.6 NEEDS AND BENEFITS

One of the principal of Aquaculture is that it allows the product to be grown and harvested to meet market demands. The markets for the projects products are always in demand. In recent years, Le Mer has seen the rising demand for high quality Australian marine shells, pearls and shell meats. These products supply a global market and are sought by different Industries and the world-wide shell collecting community:

• The Textile Industry -	Shell Buttons	(Japan/Italy)
• Jewellers -	Pearls	(Worldwide)
• Up-Market Restaurants -	Shell Meat	(Domestic/Asia)
• Specimen Shells -	Shell Collectors	(Worldwide)

The economic and social benefits of the project to the local area will include employment opportunities and the investment in a new industry in the area not linked to mining or pastoral industries. Le Mer proposes to meet demand for these products by setting up special designed shell hatcheries at Downes Island. The alternative option would be for the company to increase it's wild stock fishing efforts. This option is not favoured be Le Mer as it would result in increased pressures on existing wild stocks of native marine shells.

Government research show a steadily increasing global demand for marine produce. In order to satisfy the demands of market growth, methods to extract marine products from the worlds oceans are increasingly putting a strain on limited resources. This is resulting in restrictions on catch sizes. Le Mer is of the opinion that aquaculture as opposed to saturation wild fishing is the way to supply marine products to increasing world markets. The company is very conscious of the negative aspects of over fishing wild stocks, but is also aware that aquaculture must be carried out in a responsible manner. Le Mer is committed that it's proposal should carry minimal risk to the environment, or lead to unacceptable socioeconomic consequences.

2.1.7 LEGISLATION

The WA Fisheries Act 1905 contains the governing legislation for aquaculture in western Australia. The operations of Aquaexport will be covered by a licence from the Fisheries department. The licence will regulate the operations from the species that may be cultured, the source of the broodstock and the discharge of water to the ocean among other things. The licence will be renewable annually on the basis of regular reports and the achievements of environmental management objectives.

During the approval, construction and operation phases the following legislation and regulation will apply:-

- the Land Act 1933;
- the Environmental Protection Act 1986;
- the *Quarantine Act 1908* and Regulations;
- the Conservation and Land Management Act 1984;
- the Wildlife Conservation Act 1950-1980;
- the Aboriginal Heritage Act 1972-1980;
- the Soil and Land Conservation Act 1945-1982;
- the Commonwealth Export Control Act 1982; and
- Port Hedland Town Council
- Port Hedland Port Authority

2.1.8 THE ENVIRONMENTAL APPROVAL PROCESS

Le Mer Marketing and Consultancy Pty Ltd formally referred the proposal to the Environmental Protection Authority (EPA)(5 June 1996) following extensive consultation with the Department of Environmental Protection (DEP), the Fisheries Department, other government authorities, various groups in the Port Hedland Community.

The EPA determined that the proposal should be formally assessed under Section 38 of the *Environmental Protection Act 1986,* at the level of Consultative Environmental Review (CER). Following that determination, the DEP prepared Guidelines setting out the main issues to be addressed in the CER. The guidelines are reproduced in Appendix 1.

The CER has been prepared by Le Mer to describe the proposal, examine the potential environmental impacts and set out proposed measurers to avoid, minimise or manage and monitor those impacts. Upon authorisation from the DEP, the CER will be published and available for public review for four weeks, during which time individuals and organisations will be invited to make written comments and submissions to the EPA concerning the adequacy of the CER and the acceptability of the project.

A summary of these submissions will be forwarded to the proponent, who will prepare a response to issues raised in the submissions. As a result of consideration of these submissions, the proponent may provide additional information, explanation or details of modifications to optimise the environmental acceptability of the project.

The CER and Response to Submissions will be assessed by the EPA. The EPA will make recommendations to the Minister for the Environment as to whether the proposal should be approved and, if so under what conditions. The recommendations will be published in an EPA Bulletin and will be open to public appeal for two weeks.

At the end of the appeal period (assuming no appeals are received which need to be considered), the Minister will make a decision as to whether the project can proceed and will set conditions relating to environmental management, monitoring and reporting which must be fulfilled either before or following commencement of the project.

2.1.9 COMMUNITY AND GOVERNMENT COUNSULTATION

Le Mer marketing & Consultancy Pty Ltd has communicated with both local and State Government agencies and representatives. Support for the project has been received from a wide cross-section of the community. All concerns have been taken into consideration in the design of the operation.

Le Mer has consulted in writing and has met members of many organisations, individuals and companies as listed below.

All have been provided with the proposal's details (in writing) and have been invited to raise any concerns, make suggestions or meet for discussion regarding the proposal. We are pleased to report that no adverse reactions have been received.

Both in conjunction with the IDCA and individually, a significant effort has been made to ensure that the community as a whole has had the opportunity to consider the project in their own context and to discuss any issues directly with the company representatives.

Le Mer has held discussions with the Following:

Mr Larry Graham, MLA, Member for Pilbara
Mr Peter Foss, MLC,
Mr E Camaron MLA, Member for Stirling
Mr Monty House, MLA, Minister for Fisheries
Dr Barry Wilson, Malacologist Consultant
Dr Chan Lee, Marine Biologist Darwin University
Dr Jim Stoddard, Consultant - Marine Biologist
Mr Louis Warren, Formally Aboriginal Sites Department (AAD)
Mr T. Allen, Ngarla-Coastal, Ngarla-Coastal Njamal Aboriginal Corporation
Mr Ray Steedman, Chairman, EPA
Mr Derek Miller BHP Iron Ore Hedland
Mr W Warnock BHP DRI Pty. Ltd
Mr Ian Baird and Captain D Barker Port Hedland Port Authority
Mr Darryl Brown, Port Hedland Yacht Club
Mr Bob Cunningham, Cargil Salt
The Mayor and Council, Port Hedland Town Council
The Director, Pilbara Development Commission
The Secretary, Hedland Scuba Diving Club
The Secretary, Hedland Skin Diving Club
The Secretary, Port Hedland Game Fishing Club
Ms. Annemarie Paddick, National Native Title Tribunal
LEAF of Hedland (Local Environment Affinity Force) Port Hedland
Ms Giz Watson, Conservation Council WA

Mr Robin Chapple, Chapple Research
Mr Peter Hardie, Boodarie Station, Port Hedland
The President, Port Hedland Chamber of Commerce
Western Australian Fishing Industry Council

The general comments received from the community of Hedland as a whole have been very positive and supportive.

Le Mer has received approval in principle from the Port Hedland Town Council and the Port Hedland Port Authority. (See Appendix B & C).

Information and assistance in the development of the proposal has also been obtained from the Dr. Chan Lee of Darwin University.

2.1.9.1 GOVERNMENT AND FISHING ORGANISATIONS

Le Mer Marketing and Consultancy Pty Ltd has undertaken consultations with all relevant Government agencies through the Interdepartmental Committee for Aquaculture (IDCA). This committee is chaired and coordinated by the Fisheries Department of Western Australia.
Assistance to the proponent during this procedure is given by the Aquaculture Development Officer for the Kimberley region, again via the Fisheries Department.

The IDCA is responsible for ensuring that the necessary approval processes and concerns of all relevant agencies and interest groups are addressed. Membership to the IDCA currently includes:

Fisheries Department (WA)
Department of Commerce and Trade
Ministry for Planning
Department of Transport
Conservation and Land Management
Department of Agriculture
Department of Land Administration
Department of Environmental Protection
Aboriginal Affairs Department
Bernard Bowen Fisheries Research Institute
WA Marine Research Laboratories
Water and Rivers Commission
Aquaculture Council of Western Australia
Aquaculture Development Council

In addition to the IDCA process, Le Mer has also held direct consultations with representatives from each of these agencies to discuss any relevant issues. Support for the project has been widespread, as is shown by the letters attached in Appendix B,C,D & E. All concerns and recommendations have been taken into consideration in the design of the operation and the subsequent preparation of the CER and the Aquaculture Licence Application.

Approval of the above agencies will be confirmed in writing during he licensing process directly to IDCA.

3.0 PROJECT DESCRIPTION

The proposal is an expansion of the company's operations which presently exports harvested wild marine shells under its current licences.

3.1 MAJOR COMPONENTS

3.1.1 GROW OUT TANKS

Each of the 15 x 250 ltr tanks will contain approximately ten shells and fed seawater via a 60mm poly pipe. The tanks and the pipe will be meshed and/or screened to prevent the escape of shells and the ingress of unwanted material and livestock.

3.1.2 SEAWATER INTAKE

The seawater intake pipe will lead to a holding tank and then leading to the other tanks. The quantity of fresh seawater required will be 200,000L/day.

The 60 mm x 1000mtr poly pipe used to pump seawater to the facility will be buried whilst traversing the beach, as will be the shorter 100 mm diameter return pipe. The pipes will be securely anchored at 10 meter intervals (see Figure 3 & 4) onto the sea floor from the beach to the intake pump, (see Appendix F). Fluorescent floats of 200 mm diameter spaced at 20 meter intervals will mark the intake and return pipelines at all tides.

3.1.3 FRESH WATER SUPPLY

Fresh water will be produced by a small desalinator unit for domestic use.

3.1.4 TANK WATER DISCHARGE SYSTEM

Water discharge from the tanks will pass through a settlement tanks prior to being released to the ocean. As the settled water is being discharged micro-mesh filters will remove most of any remaining feed / waste materials. The waste material will be dried and remove to the mainland for processing.

3.1.5 BUILDINGS

All buildings will be constructed to Zone A cyclonic specifications. The main Buildings will include a small dwelling, laboratory, breeding house, desalinator / solar generating room.

To minimise the risk to the facilities of tidal surges due to cyclonic activity, buildings are locate as high as possible above the water mark. Thus, buildings will be erected approximately 6 meters above the highest spring tide level.

All constructions will be constructed to cyclonic building standards (Zone A). Since all buildings are raised on steel posts approximately 300 mm above ground level and no concrete or bitumen is used to seal any soil surface.

3.1.6 PROJECT TIMELINE

Year 1 - 3

Small scale hatchery set up. Extensive research with emphasis on developing techniques to successfully produce high quality shells.

Trochus
Small scale seeding trials on reefs in Port Hedland area using local broodstock.

Pearl Oysters
Small scale breeding trials at pilot hatchery to develop techniques for production of superior broodstock using local specimens.

Specimen Shells
Extensive research into breeding techniques especially local species. Small scale facilities.

Year 3 - 6

Set up commercial scale hatchery facilities based on research conducted year 1 - 3.

Trochus
Re- seed depleted reefs allocated by supervising Authorities. Small harvest approximately year 5. Commence value added exports by manufacturing button blanks and processed shell meat at Port Hedland industrial area. First commercial exports.

Pearl Oysters
Phase out collection of wild stocks. Significant harvest of high quality pearls, shell-meat and dry shell. Commercial scale production of processed meat and shell buttons at the Light Industrial Area. Significant expansion of employment opportunities.

Specimen Shells
Selective commercial scale breeding of very high value shells. Regular exports of shells bred and outgrown at hatchery in captivity. Surplus output used to release on depleted areas to re-balance marine ecosystems along Western Australian coast. Phasing out of wild shell collection.

3.2 *PROCESS DESCRIPTION*

The shell breeding facilities as outlined in (Item 3.3) are expected to enable the company to produce it's shell stock requirements.

Broodstock will be initially obtained from the wild under current licence issued by the Department of Fisheries. After initial broodstock is collected, the shells will be placed in tanks for reproduction, and their offspring raised to adult specimens.

Following are the basic processes for breeding and grow-out of the target species:

- **Pearl Oysters**

Two to six selected adult specimens are taken for the Port Hedland harbour beacons (their natural habitat) and placed into a holding tank where they are induced to spawn. When the juvenile shells reach sufficient size to allow physical inspection, some selected individuals are grown out at the companies off-shore lease. Upon reaching their adulthood, these specimens are then used for further selective breeding until the desired characteristics are achieved for commercial production. Pearl oysters feed by filtering minute edible particles naturally suspended in the seawater supplied via the 60mm seawater intake pipe. Ocean currents (tides) provide the species nourishment in the oysters natural habitat where they live attached to firm substrates such as rocks, or man made structures such as harbour beacons.

- **Trochus Shells**

Using recently developed hatchery techniques by Dr Chan Lee and his team, Le Mer will -upon receiving approvals from authorities, use 2-6 adult specimens taken from the local intertidal reefs to commence a breeding program. The young shells are to be released on the local reefs as allocated by the Fisheries Department of Western Australia for grow out. At the hatchery, trochus shells will feed on algae which develops naturally on the walls and rocks in their holding tanks by allowing sunlight to reach the tanks. In their natural habitat (intertidal reefs) the species grazes on algal matter found on the reefs.

- **Specimen Shells**

These are bred and raised in captivity at all times. Molluscs suffer from predation in the wild resulting in high rates of damage to the hard shells, rendering them unsuitable for marketing. As access by predators is denied by keeping the shells in captivity, flawless specimens can be produced. Of the many thousands of marine shells, only a few species have been seriously studied. Le Mer will therefore commence an intensive research program during the first 3 years to establish techniques for successful propagation. The target species will be bred and raised by taking 2-6 adult specimens from the wild and allowed to naturally reproduce offspring in the hatcheries tanks. A typical target species such as *Conus Victoriae* lays a cluster of eggs (about 100 eggs during November) which are attached to a rock or other firm substrate.

After hatching (this species eats its way out of it's egg-capsule) and out grow until a size of approximately 15mm is reached, they are ready to be examined and suitability established for further reproduction of selected individuals. Carnivorous species such as *Conus* will be fed on very small fish.
Other predators like *Murex* will live on juvenile (approximately 20mm) pearl oysters *(Pteria Penguin) Cowrie Shells (Cypraea)* will eat algae matter or sponges.

To successfully breed marine shells, a constant supply of high quality seawater is essential. This will be supplied via the 60mm polythene intake pipe. Recirculating systems are not suitable for breeding the species targeted. These systems cannot provide the essential water composition (notably trace elements) necessary for successful reproduction.

The shell holding tanks will be fitted with standpipes to discharge the overflow water. Before returning to the sea, the overflow water is piped into settlement tanks where detrital matter will sink to the bottom for removal at regular intervals. This residual matter will be removed to the mainland.

Build-up of wastes to detrimental levels at the discharge end will be prevented by a very high flow rate of seawater. The minimum water replacement rate in all holding tanks will be twice per hour, ie: a typical holding tank of 250 litres capacity will be supplied with seawater at a rate of 500 litres per hour or more. Thus, the small number of shells compared to the high rate of water flow throughout all systems coupled with the above mentioned procedure to remove waste, will ensure the discharged water will be comparable to normal seawater.

3.3 PROCESS INPUT AND OUTPUT

3.3.1 Input / Output

As seen in Figure 3.3.4 on page 16 (Input / output Process) the process commences with an intake 60mm poly pipe located about 1 km off shore. Through this pipe fresh sea water is taken to a holding tank which then distributes to a series of tanks.

3.3.2 Broodstock

Wild-caught broodstock are cleaned externally before being introduced to the hatchery. Le Mers will undertake a breeding selection program to develop domesticated strains and eliminate the requirement for wild broodstock.

3.3.3 Species To Be Cultured

a) Trochus shells (*Trochus niloticus*)

b) Pearl oysters *(Pteria penguin / Pinctada margaritifera / Pinctada albina)*

c) Native Australian Marine shell for collectors (See Plate 1 & Table 1)

A) **TROCHUS SHELLS**

This species is native to the area. The breeding program will be supervised by WA Fisheries. This component will be part of the "Trochus Re-seeding Program" currently conducted by Dr Chan Lee **(Senior Lecturer University of Darwin)** in conjunction with the Department of Fisheries.

The objective of this project is to supplement wild stocks which have been depleted due to over-fishing.

The company is committed to progress this component under the supervision of Dr Chan Lee and Mr Colin Ostle of the Fisheries Department of Western Australia.

Trochus shells occur naturally throughout the tropical pacific and have been heavily over-fished. The species is much sought after for the making of buttons from its shell, and as food. Trochus feed on algae matter which it grazes from intertidal reefs. This behaviour assures that the shells can be collected easily and has resulted in serious depletion of populations.

Recent research conducted under Dr Lee has established techniques to breed trochus in hatchery conditions successfully, so that depleted areas can be re-seeded. Le Mer looks forward to taking part in this program along our north west coast.

B) **PEARL OYSTERS**

These species are native to the area. The breeding program targets to improve the quality of products (shells, shell-meat and pearls) and phase out wild fishing for those species by producing required stocks at the hatchery. The company will undertake a research program based on selective breeding to improve quality of stocks. Ongoing research is viewed as essential by the company.

Our objective is to stay ahead in the quality stakes from overseas competitors, notably Indonesian operators. It is expected that our research work will also benefit other Western Australian aquaculturalists working in this field under its association of AMWING. **(The West Australian Non-Maxima Pearl Growers Association)**

C) SPECIMEN SHELLS

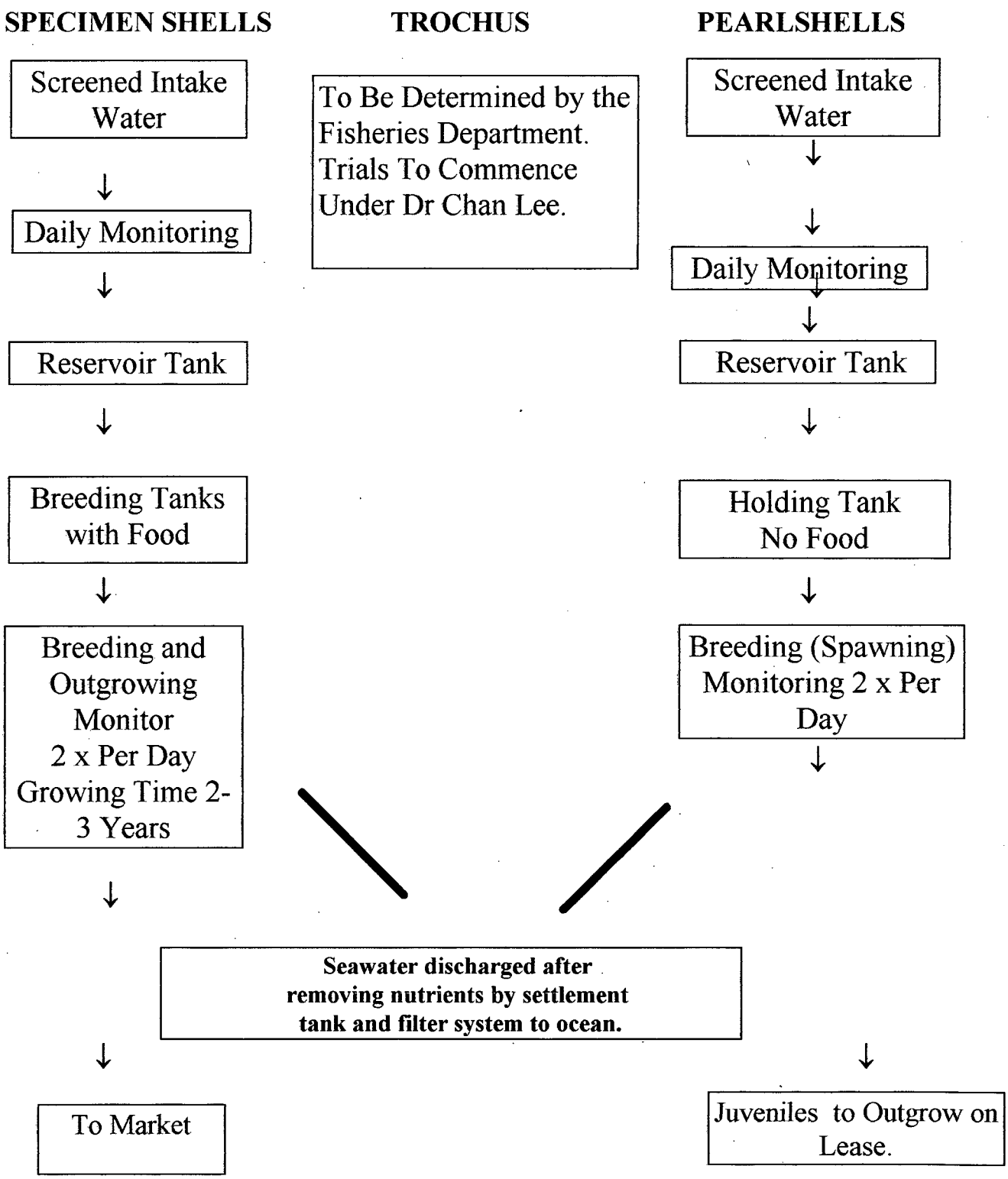
With the exception of the *ZOILA* (See Table 1) group, all species are native to the area. the species listed as per attachment F are all very valuable and much sought after by shell collectors worldwide.

The company aims to phase out wild-collecting of these specimen shells and supply hatchery produced shells instead. The species of the Genus *ZOILA*, with exception of *Zoila decipiens*, are temperate species. These will require translocation from their natural habitat (area between Esperance and Perth, WA) into the Port Hedland facility. Holding tanks for *ZOILA Spp* will be suitably modified for successful production. At no stage of the process will any specimens escape into the wild due to the installation of micro-mesh filters. Also, since the water temperature in their natural area is 10 C lower than the local Port Hedland waters, any escapees will be unable to survive.

Since all ZOILA species have direct development (they attach their eggs onto rocks or sponges) embryonic or juvenile specimens will be kept captive by covering all tank openings with suitable filters and or netting. As egg capsules of ZOILA do not exceed 2.5 x 3mm in dimension, (ref: **Direct Development in Southern Australian Cypraeidae B R Wilson**) All tank openings will be covered with meshing of less than 2mm to ensure captivity. The local Murex species will be fed with the juvenile pearl oysters produced at the hatchery. Species of *VOLUTIDAE* will feed on the locally abundant species of *Nassarius dorsatus.*

We emphasise that *ZOILA* species can not survive in our local warm tropical waters.
The species have been unable to spread northwards from their temperate zone, and none have ever been recorded locally. It is therefore not possible that any will survive in the unlikely event of escape from the facility.

Table 2 INPUT / OUTPUT PROCESS



3.3.5 SEAWATER

The seawater supply to the hatchery tanks is screened at the intake point to prevent small aquatic life and suspended solid particles exceeding approximately 4mm from entering the system. The water is not screened or filtered to a microscopic level and thus will allow the vital natural trace elements to reach the molluscs.

Because Australia does not currently have shell breeding hatcheries which use the species proposed here, no specific guidelines have been developed covering water quality criteria appropriate water quality parameters and a monitoring program with the Fisheries Department of Western Australia. Existing general standards applying to water discharged into the environment in Western Australia are set out in EPA Bulletin 711: Western Australian Water Quality Guideline for Fresh and Marine Waters (1993). In that Bulletin, the most stringent criteria are specified for water who's primary purpose is to support aquatic ecosystems. Le Mer will conform with those standards or better.

Bulletin 711 recognises that appropriate water quality criteria vary between situations and that it is not practical to set firm standards to cover all situations. Nevertheless, it provides indicative ranges to be maintained for the main biological and physical parameters in marine embayments, into which category Downes Island and Port Hedland can be considered to fall, as follows:

Orthophosphate (PO_4)	5 - 15 mg/L
Nitrate0nitrogen (NO_3-N)	10 - 100 mg/L
Ammonia-Nitrate (NH_3-N)	<5 mg/L
Chlorophyll-a	1 - 10 mg/L
pH	<0.2 unit change from background
DO	>6 mg/L (>80 - 90 % saturation)
TSS	<10 % change to seasonal mean.

3.3.6 WASTE WATER

Minimal effluent discharge will occur as a result of the company's activities. Nutrient loadings to the receiving environment via the 100mm diameter discharge pipe will be extremely low.
Nutrient and detrital levels will be kept to a minimum by installing appropriate settlement tanks prior to delivery to the discharge pipe. The detrital will be collected. Should the quantities allow, the company will investigate the possibility of commercial use of the waste as a garden product.

As the water in the holding tanks will be constantly replaced (at least 2 times each hour) this will ensure that build up of nutrient loading to significant levels will not occur. Should nutrient levels in the shell-holding tanks become high, the health of the shells will rapidly deteriorate. It is critical that the ratio of water flow to the breeding tanks be optimum which makes it essential that very low nutrient levels be maintained at all times.

Should nutrient loading become too high, the project will fail. In any event, due to the small scale of the breeding installation, the amount of nutrients returned to the seawater via the settlement tanks will have minimal impact on the surrounding ocean water.

3.3.7 TANK SLUDGE

As water in the tank farms will be replaced at least twice per hour there will be little opportunity for tank sludge build-up. Nevertheless as part of the water monitoring program the tanks will be checked for any sludge or nutrient build-up on a daily basis.

4.0.1 SITE ACCESS

The landing beach is naturally clear of mangroves and a jetty or boat ramp is not required. The pathway (See Figure 1) from the landing beach to the facility will be a cleared strip of consolidated sand about 3 metres wide. A cover of plastic meshing will ensure a 4 wheel motorbike can be used on this path to carry personnel and goods to / from the facility.

4.0.2 POWER SUPPLY

Electricity will be generated by solar / wind power. A standby diesel generator will be used in case of power failure. The operations will need power for a small caretaker dwelling, laboratory, and pumps. No significant noise will be generated by Le Mer's activities (nearest neighbour is Boodarie Station 7 kms). The company is currently investigating various Solar/Wind turbine systems with Murdoch University.

4.0.3 FUEL STORAGE FACILITIES

4.0.3.1 Fuel & Chemical Storage

We will store about 200 litres of diesel, and 20 litres of motor oil in approved containers at any one time. To contain any possible leakages the containers will be stored at suitable enclosures. Hazardous chemicals are not required for the project.

Any chemicals or hazardous materials which may needed for the project will be stored and used in accordance with the manufacturer's Materials Safety Data Sheets (MSDS) and the requirements of the relevant regulatory authorities.

4.0.4 Workforce

The project will initially be developed over a period of one to two years, and initially the project will employ 2-7 people during construction and initial operation.

In the longer term, the company looks forward to creating a sustainable new industry based at Port Hedland. Local employment opportunities will be created by the successful project.

4.1 EXISTING ENVIRONMENT

4.1 CLIMATE

Temperature

Port Hedland - Downes island has a hot, semi-arid climate. The highest average temperatures occur in January (average maximum 38.8 ° C, average minimum 22.9 °C) and the lowest in July (average maximum 24 °C, average minimum 11.4 °C).

Rainfall and Evaporation

Annual rainfall averages 280 mm, but is highly variable. Most rainfall occurs between November and March.

The wettest months are generally January - February, with most mean falls of about 60 mm. The heaviest short-term falls typically occur in December - February as a result of tropical cyclones. Tropical cyclones typically contribute 40 - 60 % of the average annual rainfall.

Rainfall averages for Port Hedland are 286 mm per annum.

The rainfall is offset by high evaporation, which averages 3,000mm/year and exceeds average rainfall in all months of the year.

Winds

Wind roses for Port Hedland Airport prepared from Bureau of Meteorology records (1967 to 1975 inclusive) are presented on Figure 4. South Westerly winds dominate the wind pattern. Winds are more easterly in the winter months. During the summer, afternoon sea breezes arise from the west and south-west, while on winter afternoons easterly winds are common. Strong winds from the north and north-east are infrequent but are commonly associated with tropical cyclones.

Cyclones

Severe tropical cyclones with wind speeds in excess of 120 - 170 km/hr occur every two to five years in the region between November and April, but usually between December to March.

Noise And Dust Control

No significant noise will be generated by Le Mer's activities and the sites nearest neighbour is Boodarie Station some 7 kilometres away.

Social Surrounding Issues

Heritage

The Ngarla Coastal Njamal Aboriginal Corporation has raised no objection to the proposal. A survey conducted by the Aboriginal Affairs Department concluded that there are no significant Aboriginal sites on the island. There are no other known heritage sites on the island.

Recreational use

Currently, the north-eastern end of Downes Island is used fro water skiing, camping, swimming, fishing and picnicking by the people of Hedland and some tourists. The proposed project site is located at the western end of Downes Island, away from the main recreational areas.

No restrictions will be placed on persons who use the island or its beaches for recreational purposes. Visitors will be requested to take their rubbish with them when leaving and generally keep the place tidy. Signs to this effect may be erected by the company.

The fenced off-site project will be restricted and not accessible to the general public. This is to prevent theft of valuable stock and or interference with equipment. Should anyone wish to see the operation (we believe this project will be interesting to the public), we request to be asked first.

4.2 TIDES/STORM SURGE

Downes island is located to the east of Finucane Island, both of which are located east of the Town of Port Hedland. This area is on the northern margin of a transition zone between microtidal, diurnal regime of Carnarvon to the south and Port Hedland. The tides at Downes Island are similar to those at Port Hedland. Tidal averages are summarised as follows:

Table 4

TIDE	CHART DATUM (CD)	AUSTRALIAN HEIGHT DATUM (AHD)
Highest Astronomical Tide (HAT)	7.6 m	0.6 m
Mean High Water Springs (MHWS)	6.8 m	1.2 m
Mean High Water Neaps (MHWN)	5.2 m	0.6 m
Mean Sea Level (MSL)	3.4 m	0.0 m
Mean Low Water Neaps (MLWN)	2.2 m	0.6 m
Mean Low Water Springs (MLWS)	0.6 m	0.0 m
Lowest Astronomical Tide (LAT)	0.0 m	0.0 m

Storm Surge

Tropical cyclones can cause significant increases in the water level as a result of strong onshore winds and large waves breaking inshore. There have been a number of detailed studies into the frequency and severity of storm surges experienced along the coast and in the Port Hedland area. These investigations have included analysis of long-term tidal records by the Department of Marine and Harbours (DMH), as well as computer modelling of various cyclones by Steedman Ltd (1986).

4.3 PROJECT SITE

Downes Island consists of degraded sand dunes surrounded by intertidal reef, sand and mudflats. (See Appendix 7.2) It's fauna and flora is reflective of the mainland which is accessible via dry land at average low tides.
The proposed hatchery site offers protection from storm surges (The land allows buildings to be approximately 6m above high water levels), is as close as possible to the mangrove-free landing beach, and provides access to quality ocean water.

4.4 WATER TEMPERATURE AND SALINITY

Monthly means sea surface temperatures in the region range from 22.8°C in September to 27.2°C in March, as shown in table 4.

TABLE 5

AVERAGE SEA SURFACE TEMPERATURES - PORT HEDLAND

MONTH	AVERAGE WATER TEMPERATURE (°c)
January	25.2
February	26.2
March	27.2
April	26.8
May	25.7
June	24.5
July	23.4
August	22.9
September	22.8
October	23.3
November	23.8
December	24.6

Sea salinity average 35 parts per thousand (ppt)throughout the year.

4.5 MANGROVES

Downes Island is surrounded by intertidal reef platforms on it's north western side, whilst mud and sand flats abut to the mainland to the south east. The marine fauna and flora is representative of typical tropical species. There are no species in need of special protection. Their are no sea grass beds.

Downes Island has extensive populations of *A. marina* and ***Rhizophoria*** mangroves. These mangals are found on the island's south-eastern side. It's western boundary does not harbour mangroves and consists of limestone reef platform with and a sandy beach. There is a small community of *A. marina* on the north-western tip of the island which also will not be impacted by the project.

The company's proposal will not interfere with any mangals. A jetty or boat ramp is not required, and access to the beach will be via the routes indicated on figure 7.2. The landing beach is naturally free of mangroves.

4.6 IMPROVING ENVIRONMENTAL SUSTAINABILITY

Significant research is underway by the Aquaculture Industry towards understanding the dynamics of Marine Seashell farming and its impacts. Research towards full or partial recycling of tank water is part of this process. The primary purpose of recycling is to avoid diseases brought from the wild in seawater from infecting farm populations. However, an important secondary benefit would be the reduction or elimination or waste water exports from the farms.

Le Mer will support continued research towards increased Sustainability and improved environmental practices such as waste water discharge.

4.7 RUBBISH REMOVAL

Before clearing the site Le Mer will collect and remove all rubbish which is now present at the proposed location. This rubbish includes one collapsed building, old tyres, fuel drums and a significant quantity of smaller items such as cans and bottles. Since the company will not use the site for downstream processing of product, such as button making, but only to farm its shells and other 'clean' activities such as seeding pearl oysters (implant oysters with pearl-nuclei), no significant amounts of rubbish will be produced. The domestic rubbish is to be removed from the island to the Port Hedland tip at regular intervals. Organic waste will be collected and removed to the mainland. Human waste will be processed through a suitable eco-toilet system such as depicted in Figure 7.2.

5.0 ENVIRONMENTAL IMPACT AND MANAGEMENT

INTRODUCTION

The ongoing viability of the Aquaexport project is dependent on the maintenance of the surrounding environment and the quality of seawater required to develop and produce high quality shells. It is a necessary component of the project that the environment of the area be preserved and every effort will be made by Le Mer to ensure this.

5.1 KEY ENVIRONMENTAL ISSUES

The key environmental issues to be addressed in the CER have been identified as:

1. **Vegetation clearance during construction**
2. **Protection of mangroves at Downes Island**
3. **Public access and recreational activities**
4. **Beach and dune vegetation and stability**
5. **Management of Mosquito Breeding**
6. **Water Discharge quality, criteria and compliance**
7. **Translocation of non-endemic species**
8. **Preventing the escape of disease from operations**
9. **Storm surge/flood management.**

This section describes the potential environmental impacts associated with the project and the measures taken to avoid, mitigate or ameliorate those impacts.

5.2 Vegetation Clearance During Construction

Objective

To minimise the area of vegetation disturbance during the construction and the life of the project.

Impact

Approximately 0.5 ha of vegetation will be cleared during the construction and research stage (up to 3 years) of the project.

After the research stage, (year 3-6) a further 2 ha are to be cleared to accommodate full production hatchery facilities. The vegetation to be cleared consists of spinifex hummock grassland and low shrubs. This vegetation type is well representad elsewhere in the Pilbara region.

The intake and discharge pipes will be buried whilst traversing the beach adjacent to the facility. As the respective diameters of those pipes is only 60 mm and 100 mm, there will not be any adverse consequences environmentally.

Management

The siting and layout of the project has been designed to minimise the requirement of vegetation clearance. The boundaries of the clearing will be marked out on the ground before clearing begins. All topsoil and debris stripped from the clearing areas will be stockpiled for rehabilitation and stabilisation.

5.3 Protection of Mangroves at Downes Island

Objective

To protect the mangroves from construction and operational impacts.

Impact

Mangroves in the tropical arid zone of Western Australian inhabit a particular ecological zone defined by the extent of tidal inundation (Gordon, 1987). They are a dynamic group, with the ability to adapt quickly to changes in an unstable habitat. There will be little or no impacts to the mangrove ecosystem by the company's operations.

Management and Monitoring

No mangroves will be cleared for the construction of the discharge channel. This will be confirmed to the satisfaction of the DEP by photographic monitoring before and after construction.

5.4 Public Access And Recreational Activities

Objective

Minimum impact on existing public access and recreational activities.

Impact

Due to the location of the project which is away from the main recreational areas on the eastern side of the island, there will be little impact on public accessibility, However, Le Mer is committed to maintaining uninterrupted public access along the foreshore.

Management

Le Mer will assist in maintaining a clean environment by co-operating in any community litter clean up campaigns.

5.5 Beach And Dune Stability

Objective

To minimise disturbance to the beach so that the stability of the dunes is maintained and erosion minimised.

Impact

Two black plastic poly pipes (intake 60 mm/ output 100 mm) will be buried through the crests of the dunes and the beach to a maximum depth of 300 mm. This trench will be approximately 200 mm wide and will be backfilled once the pipes have been laid and tested.

Management

After the pipe is laid and tested and the trench backfilled, any vegetation and topsoil removed will be redistributed over the disturbed area. the stability and vegetation of the rehabilitated areas would be subjected to annual quantitative monitoring.

5.6 Management of Mosquito breeding

Objective

To prevent or minimise the creation of new mosquito breeding sites and control breeding in any potential sites that are created.

Impacts

Mosquito nuisance and mosquito-borne diseases occur in the Port Hedland area. *Aedes Vigilax* lays desiccation-resistant eggs which lay dormant for indefinite periods until temporary stagnant pools are formed by tidal or rainfall induced inundation. The eggs hatch within one or two days after inundation and larval development commences. The successful development of adult mosquitoes from these larvae depends upon the presence of shallow stagnant pools that persists for longer than 7 - 10 days in summer and from three to four weeks in winter.

Management

The impact of the additional open water area will be negligible on mosquito breeding as:

1) The tanks will contain constantly moving seawater which is not suitable for mosquito breeding.

2) The open water areas of all tanks will be covered by, or surrounded with suitable netting to prevent access by mosquito's.

5.7 Water Discharge Quality, Criteria and Compliance

Objective

To Develop appropriate water quality criteria for discharge waters to prevent adverse impacts, and to implement a monitoring program to ensure compliance with the criteria.

Impact

The water discharge from the breeding tanks will contain small levels of algae, dissolved nutrients (Phosphorus and Nitrogen) and suspended solids (including fecal matter, uneaten feed and soil particles). There maybe a marginal increase of salinity but this will be in the order of less than 1%.
Prior to operational commencement of the tank farm, Le Mer will prepare Water Quality Monitoring Plan (WQMP) to the satisfaction of the DEP, for the purpose of ensuring that the impact of the project on the quality of receiving water is minimised and that any adverse impacts are detected and remedied. The monitoring program will set out the details of:

- water quality criteria;
- details of monitoring sites, monitoring frequency and analysis; and
- further review of the results, criteria and monitoring program after three years in consultation with the Fisheries Department.

5.7 Water Discharge Quality, Criteria and Compliance Cont.....

Management and Monitoring

The proposed criteria for Stage 1 are:

1) Implement Best Practice in the design and operation of the tank farm and settling tanks to achieve the best practicable minimisation of all forms of contamination in the discharge water.
2) The average concentration of nutrients in the discharge should not be sufficient to cause any measurable increase in biological productivity outside the immediate vicinity of the discharge. The measured nutrient concentrations should be within 5% of ambient levels in seawater outside the immediate vicinity of the discharge.
3) The concentration of algae (as indicated by Chlorophyll-a) in the discharge should not be sufficient to cause significant light attenuation or changes in dissolved oxygen levels or bioproductivity in nearby coastal waters.
4) The levels of Total Suspended Solids (TSS) should not be sufficient to cause significant light attenuation or increased sedimentation in nearby coastal waters. The measured TSS concentration should be within 5% of ambient levels in seawater outside the immediate vicinity of the discharge.

The primary management tool for controlling discharge water quality in the tank farm discharge will be the settling tanks system.

Settling tanks will enable suspended solids to settle to the bottom, thereby removing a high proportion of dissolved nutrients from the water.

Given the uncertainties concerning the concentrations of contaminants in the tank farm discharge and the shortage of suitable local data upon which to base predictions, it is proposed that the first stage of the Aquaexport project be used as an intensive data gathering exercise to measure the loadings of algae, solids and nutrients in the tank effluent and the efficiency of the settling tanks in removing these contaminants.

To this end, a monitoring and evaluation programme will be designed and implemented in consultation with the Fisheries Department of WA and the EPA. Daily monitoring and measurement will be undertaken of the intake water, tanks, discharge stream and receiving waters. A database will be established for use by both the Company and the relevant authorities in the ongoing tank farm management.

The water quality monitoring programme at the Aquaexport will include:

- Continuous recording of water flows into the tank farm by means of data loggers or pump rating curves.
- Daily or twice-daily measurements of salinity, pH, turbidity, hardness and dissolved oxygen: at the intake to the tank farm; in the grow-out tanks; at the overflow from the grow-out tanks to the settling tanks; and at the outflow from the settling tanks Monthly sampling and measurement of TSS, nitrogen, phosphorus, chlorophyll-a and BOD at the above locations plus: immediately before the point of discharge to Ocean

5.8 Species Translocation

Objective

To prevent specimens of the subgenus ZOILA be introduced into local waters.

Impact

If survival were possible, the introduction (translocation) of gastropods of the subgenus ZOILA could have adverse impacts upon the local marine eco system by altering it's diversity.

Management

The escape of exotic species is not an issue for the project, as all species to be cultivated are indigenous to the local area and/or will be sourced locally.

The only species not sourced locally is ZOILA which, occurs naturally in Southern Australia.

Escape from the hatchery (1) and survival in the local waters (2) will be prevented by:

1) Suitable modification of all Zoila holding tanks.

   Research conducted by Dr Barry Wilson (Ref.: Direct development in Southern Australian Cypraeidae) shows that Zoila are egg-laying species and their egg capsules do not exceed 2.5 mm x 3 mm in dimensions. Preventing escape can therefore be accomplished by covering all holding tank outlets with a suitable mesh. (Less than 2mm) (See Appendix Letter Dr B Jones Page).

2) In the unlikely event of any ZOILA escaping into the wild, survival will not be possible due to the significant difference in ocean water temperatures at Port Hedland compared to the area of ZOILA's natural habitat. Since no ZOILA (except Z-decipiens) occur naturally in the local warm tropical waters, this subgenus has been unable to spread naturally northwards due to the 10° C or more difference in water temperature. Any escapees therefore can not tolerate the local high water temperatures and consequently translocation of ZOILA is prevented.

3) The assessment of the translocation of Zoila will be undertaken under supervision of the Fisheries Department of Western Australia. The memorandum of understanding between the EPA and the Fisheries Department "(The Environmental Assessment of Translocation of live Aquatic Non-Endemic Species into or within Western Australia)" is the established method Le Mer is committed to adopt to implement this component of the project.

5.9 Preventing The Escape Of Disease

Objective

To prevent the escape of diseases from the tank farm stock to the environment, and to implement appropriate monitoring and response systems to ensure that any risk of escape can be identified and remedied.

Impact

The possibility of introducing exotic diseases to native flora and fauna from the projects tank farm is extremely remote.

All known cases of disease in Australian Aquacultural operations have been found to be caused by bacteria or viruses that are endemic to Australian wild populations but multiply in the crowded conditions of the aquaculture tanks.

Management and Monitoring

Disease in tank farm stock can have very severe impacts on the profitability of the project, and for this reason disease prevention is a very high priority. (See Table 6 App. 7.3). The disease prevention program has three main aspects:

- Control of inputs - seawater and broodstock.
- Tank Hygiene and Hatchery Hygiene.
- Continuous monitoring and implementation of a pre-prepared contingency response in the event that disease is detected.

Control of Inputs:

In order to ensure that the potential for escape of diseases is minimised, Le Mer will maintain strict compliance with Australian quarantine regulations and licences. This compliance will be maintained to the satisfaction of the Fisheries Department of WA.

Seawater:
Seawater is screened at intake.

Broodstock:

Wild caught brood stock are cleaned and washed before being introduced to the tank farm. Le Mer will undertake a breeding selection program to develop domesticated strains and eliminate the requirement for wild broodstock.
In order to ensure that any outbreak of disease at the tank farm cannot escape to wild populations, Le Mer will implement a Disease Contingency Plan throughout farm operations to the satisfaction of the Fisheries Department of WA.

Table 6

Le Mer Disease Contingency Plan

a) Shell Health Monitoring Program

1. During grow-out, sub-samples of animals from each tank will be visually checked daily for signs of disease.
2. Tank feed intake will be monitored daily for signs of abnormal consumption.
3. Daily visual tank inspections will be carried out for diseased individuals.
4. Weekly shell growth rates, feed consumption and estimated survival rates will be analysed for abnormalities.
5. Detailed records will be kept of all monitoring data results for ongoing analysis and use in the evaluation of environmental data.

b) Detection of Disease

1. Diseased animals will be diagnosed onsite to determine whether disease is bacterial or viral.
2. Samples of diseased animals will also be sent to appropriate laboratories for comparative analysis.
3. Quarantine procedures will be put into place, isolating the affected tank from the remainder of the farm.
4. the percentage of the tank population affected will be determined.

c) Bacterial Disease Confirmation

1. Management decision to determine whether to immediately harvest or to retain stock.
2. If stock is retained, appropriate management strategies will be implemented to improve tank conditions and farm management practices to prevent further outbreaks.
3. Stock are continually monitored for signs of improvement.
4. Daily reassessment of situation by management.
5. Upon harvest, tank will be chlorinated (80ppm) and sun dried.

d) Viral Disease Confirmation

1. Tanks will be immediately harvested by netting, and tank water retained in the tank and chlorinated (80ppm).
2. If tanks are unable to be harvested, the disease is highly infectious or a reportable disease such as exotic virus, then the tank (including stock) will be immediately chlorinated (80ppm).
3. Appropriate liaison will be maintained with government departments.
4. Water will be held within the tank until chlorine has naturally dissipated before being released into the settling tanks.
5. Upon draining, dead tanks and other fauna will be immediately removed from the tank, placed into a pit that is isolated from other farm operations, covered to protect against scavengers, burnt and buried to prevent further spread of disease.

5.10 Storm Surge And Flood Management

Objective

To design the tanks, and other structures to be stable under conditions of high tide, storm surge and flooding associated with cyclonic conditions.

Impact

Cyclones periodically affect the Port Hedland area, bringing strong winds, storm surge and flooding. Anecdotal evidence, suggests that the maximum storm surge height likely to occur at the project site is approximately 1m AHD, possibly rising to 1.5m AHD.

Storm surge enters Downes/Finucane Island at Oyster Point/West Creek and extends up into the creek systems to the east of Downes Island. The project site is protected from frontal incursion of storm surge by its elevation and by the presence of a 6m to 10m high sand dune immediately behind the beach.

At the predicted levels, storm surge would be below the ground level of most of the site and below the level of all buildings and structures. The project can therefore be effectively protected against storm surge by suitable construction methods.

Management

Protection against storm surges and flooding will be incorporated in all phases of the project. All buildings and structures will be build to zone A cyclonic specifications. The fuel storage facility will be sited on high ground and will be constructed to DME standards to with stand cyclonic winds and flooding.

5.11 Protection Of Heritage Sites

Objective

To avoid damage to known or unknown sites of aboriginal heritage significance.

Impact

Downes Island has been surveyed by the Aboriginal Heritage Department (Ref.: L Warren P 93) and has no sites listed under the Aboriginal Heritage Act. No non-aboriginal heritage sites of significance were located. The survey found the proposed lease area free of significant heritage values.

Management

Should any Aboriginal sites any Aboriginal sites be found during the ground disturbing work, all activity will cease immediately and the Aboriginal Affairs Department will be contacted.

5.12 Landscape

Objective

To minimise the impact of the project on the visual landscape of the area.

Impact

The tank farm will be located a minimum of 6 km from the Finucane Island boat ramp access road. The North west coastal highway is some 16 km to the east of the project site.

The tank farm will not be visible from the beach because of the 6-10 metre dune which runs between the farm and the beach.

Management

The project will be designed so as to be unobtrusive in the landscape.

5.13 Non-Performance Criteria

Le Mer is aware that it's proposal involves the use of public resources such as land and water. The company realises use of these assets should therefore be beneficial to the community, and that Authority in which they are vested ensure their exploitation is affected beneficially. The Fisheries Department of Western Australia is the main Authority to which this proposal is relevant in this respect, and the IDCA (Inter Departmental Committee for Aquaculture) will develop the performance criteria relevant to the Le Mer's proposal.

5.14 Decommissioning

In the event of closure of the project, Le Mer is committed to rehabilitate the site as close as possible to its current values. In this event all buildings, equipment and materials used will be removed from the island.

6.0 CONCLUSION

SUMMARY OF ENVIRONMENTAL IMPACTS AND MANAGEMENT

The environmental impacts of the proposed Aquaexport project have been assessed in this CER and associated studies.

The project is not expected to have any significant adverse impacts on the surrounding environment or other land uses beyond those immediate physical impacts associated with the construction of the tanks and other facilities. All potential impacts identified are now considered minor and readily managed.

Le Mer has made a number of formal commitments designed to safeguard the environment and demonstrate the project's compliance with relevant guidelines and regulations. These commitments are summarised in Section 5. A summary of all environmental objectives, impacts, management and criteria for success is presented in Table A1 in the Executive Summary at the front of this document.

5.11 ABORIGINAL HERITAGE

Archaeological and Ethnographic Surveys

Archaeological and ethnographic survey advice and assistance (including an inspection of the proposed project area) was received from staff of the Pilbara office of the Aboriginal Affairs Department in March 1995. Further ethnographic and archaeological surveys were undertaken and reported on (Warren 1995a).

One archaeological site and no ethnographic sites were recorded as a result of the heritage surveys. The archaeological site, a low density and diffuse surface scatter of reworked midden material, extends for approximately 100 metres and has a maximum width of 10 metres. The site is situated to the north of the proposed project area, occurring along the crest of the near shore sand dune. In some places eroding cultural material extends down the face of the dune.

The archaeological survey work undertaken also involved a review of previous archaeological research and survey work in the region and immediate vicinity of the proposed project. A review of this work indicated that a number of archaeological sites are recorded on the mainland directly to the south of the island and to the west, on Finucane Island (Warren 1994 and Warren 1995b). None of these sites will be affected by the proposed development.

The ethnographic survey and consultation was conducted with Ngarla speaking Aboriginal people and involved an inspection of the proposed project area and a review of previous ethnographic research and survey reports. Although no ethnographic site was recorded within the project area or on Downes Island, information concerning Aboriginal knowledge of and associations with the island was documented.

Aboriginal Heritage Management

The one archaeological midden site recorded to the immediate north of the proposed project area will not be affected by the current proposal and every attempt will be made to avoid the need to utilise the land upon which this site is situated. Should the land, or part thereof, upon which the site is situated be required for the future purposes of the project (and taking into consideration the assessed low archaeological significance of the site) then a formal application to do so will be made in line with the provisions of the Aboriginal Heritage Act 1972.

If in the course of construction earthworks sub surface Aboriginal cultural material or material suspected as such is exposed work will ceases and the finding reported to the Pilbara office of the Aboriginal Affairs Department in Port Hedland.

All employees, contractors and visitors to the project area will be informed of the provisions of the Aboriginal Heritage Act and appropriately inducted as to the heritage concerns for the area.

Bibliography

Warren, Louis 1994 An Archaeological and Ethnographic Survey For Aboriginal Sites. Finucane Island Townsite Port Hedland W.A Department of Aboriginal Sites.

Warren, Louis 1995a A report of a preliminary archaeological survey of proposed Hot Bricketed Iron quarry areas on Boodarie Station, near Port Hedland W.A and heritage management recommendations. BHP Iron Ore.

Warren, Louis 1995b A report of an archaeological and ethnographic survey of a proposed aquaculture project on Downes Island, Port Hedland W.A.

Appendices 7.1

Members of Public and Government Organisations

Mr E Camaron, MLA, Minister for Stirling

Mr Monty House, MLA, Minister for Fisheries

Mr Barry Wilson, Malacologist Consultant

Dr Chan Lee, Marine Biologist, Darwin University

Dr Jim Stoddard, Consultant

Mr Louis Warren, Aboriginal Sites Department (ADD)

Mr T Allen, Ngarla-Coastal, Njamal Aboriginal Corporation

Mr Ray Steedman, Chairman, EPA

Mr Derek Miller BHP Iron Ore, Hedland

Mr W Warnock BHP DRI Pty Ltd

Mr Ian Baird, Captain D Barker, Port Hedland Port Authority

Mr Darryl Brown, Port Hedland Yacht Club

Mr Bob Cunningham, Cargil Salt

The Mayor and Council, Port Hedland Town Council

The Director, Pilbara Development Commission

The Secretary, Hedland Scuba Diving Club

The Secretary, Hedland Skin Diving Club

The Secretary, Port Hedland Game Fishing Club

Ms Annemarie Paddick, National Native Title Tribunal

LEAF of Hedland (Local Environmental Affinity Force) Port Hedland

Ms Giz Watson, Conservation Council WA

Mr Robin Chapple, Chapple Research

Mr Larry Graham, MLA, Member for Pilbara

Mr Peter Foss, MLC,

AQUACULTURE FACILITY AND RESIDENCE, DOWNES ISLAND NEAR PORT HEDLAND ~~(994)~~ 1030 LE MER MARKETING

CONSULTATIVE ENVIRONMENTAL REVIEW GUIDELINES

Overview

All environmental reviews have the objective of protecting the environment, and environmental impact assessment is deliberately a public process in order to obtain broad ranging advice. The review requires the proponent to describe the proposal, receiving environment, potential environmental impacts and the management of the issues arising from the environmental impacts, so that the environment is protected to an acceptable level.

Throughout the assessment process it is the objective of the Department of Environmental Protection (DEP) to assist the proponent to improve the proposal such that the environment is protected in the best manner possible. The DEP will co-ordinate relevant government agencies and the public in providing advice about environmental matters during the assessment of the Consultative Environmental Review (CER) for this proposal.

Environmental Management

The EPA considers that the proponent should approach environmental management in terms of best practise. Best practice environmental management includes :

- agreed environmental objectives;
- management of environmental objectives;
- involve the public as appropriate;
- audit performance against agreed indicators;
- regular reporting to the EPA (or nominated agency);
- commitment to a quality assured management system and continuous improvement; and
- periodic (for example 5 yearly) review in conjunction with EPA (or nominated agency).

Contents of the CER

The contents reflect the purpose of the CER, which is to:

- to communicate clearly with the public (including government agencies), so that EPA can obtain informed public comment to assist in providing advice to government;
- to describe the proposal adequately, so that the Minister for the Environment can consider approval of a well-defined project; and
- to provide the basis of the proponent's environmental management programme, which shows that the environmental issues resulting from the proposal can be acceptably managed.

The language used in the body of the CER should be kept simple and concise, considering the audience includes non-technical people, and any extensive, technical detail should either be referenced or appended to the CER. Remember that the CER would form the legal basis of the Minister for the Environment's approval of the proposal and, hence, should include a description of all the main and ancillary components of the proposal, including options if necessary.

The fundamental contents of the CER should include:

• introduction of the proponent, the project and location. A clear overlay of a suitably scaled aerial photograph, which clearly indicates the nature and extent of works proposed and a regional map should also be included which identifies the proposal within a social and regional setting;
• the legal framework, decision making authorities and involved agencies;
• consideration of alternative sites, scales of operation and shell-fish species to be cultured;
• description of the components of the proposal, including details of the ultimate scale and proposed stages of the aquaculture proposal, infrastructure, and other requirements associated with proposal, and identification of the potential impacts. This information should be described in the form of a summary table which describes the key characteristics of the proposal;
• description of the receiving environment which may be impacted upon;
• discussion of the key environmental issues, including an assessment of the significance as related to relevant policies, objectives and /or standards which may apply, to aquaculture practices identified by Fisheries Department of WA;
• discussion of the management of the issues, including commitments to appropriate action; and
• a summary of the environmental management programme, including the key commitments, monitoring work and the auditing of the programme.

For this proposal, the environmental review would focus on ensuring that there are no unacceptable environmental impacts on Downes Island or surrounding marine environments as a result of implementation of the proposed aquaculture development.

Key issues

The key issues can be determined from a consideration, called scoping, of the potential impacts from the various components of the proposal on a receiving environment, including people. The CER should focus on the key issues for the proposal, and it is recommended that these be agreed in consultation with the DEP and relevant public and government agencies. A description of the project component and the receiving environment should be directed towards the discussion of the issue. The technical basis for measuring the impact and any specifications or standards for assessing and managing the issue should be provided.

The EPA considers that the proponent should provide a table which describes the following:

(a) the present state of the environment;
(b) potential impacts of the proposal on the environment;
(c) nominate environmental [illegible] those aspects which require management;
(d) environmental management response to manage impacts to meet the above objective(s); and
(e) envisaged state of the environment

The topics from which the key issues are derived (and their corresponding objectives) at this stage should be set out under the following categories :

• biophysical issues;
• pollution issues; and
• social surroundings issues

The topics identified and the EPA's management objective for these topics have been identified in the table below.

Topic	EPA's Objective
Biophysical Issues	
Coastal Processes	Ensure that coastal environment (e.g. coastal dunes and intertidal area) is not adversely impacted as a result of the aquaculture development (e.g. access points, infrastructure, water pipelines).
Regional Conservation Values	Protect the environmental values of areas which have been identified as having significant conservation value.
Cyclone / Flood Management	Ensure [illegible] and that intensity [illegible] degradation [illegible]
Marine - Fauna and Vegetation	[illegible] aquaculture development is managed so that it does not have an adverse impact on [illegible] (e.g. mangroves, reefs, [illegible]
Terrestrial - Fauna	Protect habitat of island species, especially the bird species which are declared rare [illegible]
Terrestrial - Vegetation	[illegible]
Declared Rare Flora	[illegible]
Non-Endemic species	[illegible]
Translocation of Non-Native Species	Demonstrate that all species proposed to be farmed [illegible]
Pollution Issues	
Fuel and Chemical Storage	[illegible]
Noise and Dust Control	[illegible]
Solid and Liquid Waste Disposal	[illegible]
Water Quality	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Other	

In discussing the key environmental topics, the CER should address:

- appropriate landuses for Downes Island;
- land tenure and status of potential leases;
- potential impacts of the proposed aquaculture proposal;
- management of the potential impacts;
- detailed maps of all infrastructure associated with the proposal; and
- details of the techniques expected to be used for farming of mechus shell, noting that any processing of shell-fish which may be required will be the subject of a separate environmental impact assessment by the EPA.

The level of detail expected in the CER should be sufficient to provide a brief yet comprehensive discussion of the environmental issues. For example, details on infrastructure such as inlet and outlet pipes, should include:

- how far the inlet and outlet pipes will extend beyond the high water mark;
- the precise point of intake of ocean water and discharge of used water below the low water mark;
- proximity of intake points to discharge points; and
- location of pipelines.

Further key issues may be raised during the preparation of the CER, and on-going consultation with the DEP and relevant agencies is recommended. Minor issues which can be readily managed as part of normal operations for similar projects may be briefly described. Information used to reach conclusions should be properly referenced, including personal communications. Assessments of the significance of an impact should be soundly based rather than unsubstantiated opinions, and the assessment should lead to a discussion of the management of the issue.

Public consultation

A description should be provided of the public participation and consultation activities undertaken by the proponent in preparing the CER. It should describe the activities undertaken, the dates, the groups involved, and the objectives of the activities. Cross reference should be made with the description of environmental management of the issues which should clearly indicate how community concerns have been addressed. Those concerns which are dealt with outside the EPA process can be noted and referenced.

Environmental management commitments

The method of implementation of the proposal, as outlined by the proponent in the CER would become legally enforceable under the environmental conditions of the Minister for the Environment's approval.

Specific commitments to protect the environment should be separately listed, numbered and take the form of:

- who would do the work;
- what the work is;
- when the work would be carried out; and
- what agencies would be involved.

DEPARTMENT OF CONSERVATION AND [illegible]

Please address all enquiries to:

PO Box 835
Karratha WA 6714

Your Ref.
Our Ref: 2411 FS
Enquiries: F Stanley

Mr Joe Rinkens
Le Mer Marketing and Consultancy Pty Ltd
PO Box 418
Port Hedland WA 6721

Dear Mr Rinkens

AQUACULTURE FACILITY - DOWNES ISLAND

I refer to your request for CALM approval to place a pipeline [illegible] Downes Island to provide seawater for your aquaculture facility.

At this stage Downes Island is being recommended for reservation for the purposes of conservation recreation and other land use. The reserve would extend to the mean high water mark, thus including the intertidal region as it provides a habitat for mangroves and contains important feeding grounds for many bird species.

Permission is granted for the pipeline to be buried in the [illegible] Island as detailed in your letter of 3 April. The steep dune area should be protected as much as possible and measures taken to prevent erosion of the dune after the laying of the pipeline. This would consist of laying any vegetation removed over the exposed sandy [illegible].

The pipeline should be placed on top of the rocky platform in the intertidal region that will be impacted by your facility. The manner in which the pipeline is placed should be as unobtrusive as possible, and should not prevent [illegible]. You may secure the pipeline using U-shaped fixtures but do not bore holes in the rock. The Department of Transport may require some [illegible] you should contact them to enquire about this.

I apologise for the tardiness in replying to your request. Please do not hesitate to contact Fran Stanley at this office if you have any queries about the above.

Yours sincerely

F Stanley

for CHRIS MULLER
REGIONAL MANAGER
PILBARA

22 April 1996

PORT HEDLAND MOORING [illegible]

PORT HEDLAND PORT
P.O. BOX 2, PORT HEDLAND

OUR REF ICB:RD:2315:P50-06

YOUR REF

23 November 1995

Mr Joe Rinkens
Le Mer Marketing & Consultancy
PO Box 418
PORT HEDLAND WA

Dear Mr Rinkens

MARICULTURE PROJECT

Your request for comment on your latest proposal [illegible] Downer Island was considered by the Board at its meeting on 22nd [illegible]

After discussion, Members agreed in principle with your request for the project on the north west corner of Downes Island. However, Members considered that your request for 10 hectares of land was excessive, and it would be appreciated if you would review the [illegible] for the area required and revert to the Authority.

Before the Authority will [illegible] environmental approvals. Meanwhile [illegible] Island is a Class B Reserve of the [illegible]

Members wish [illegible]

Please keep the Harbour Master, Captain [illegible]

Yours sincerely

Captain Ian Baird
General Manager

PORT HEDLAND [illegible]

TOWN OF PORT HEDLAND

PO BOX

Our Ref.:

Your Ref.:

GH:jeb

20 July 199

Le Mer

PO Box

PORT HEDLAND

Dear M

RE:

Further to

proje

Council

I trust

Yo

Gordon

Acting Executive Manager

Principal Environmental

TOWN

LEAF
(Local Environment Affinity Force)
P.O. Box 2106 South Hedland
WA 6722 PH 091 721176

1 August 1995

Mr J Rinkens
Director
Le Mer Marketing and Consulting Pty Ltd
PO Box 418
PORT HEDLAND WA 6721

Dear Sir,

AQUACULTURE EACILITY AT DOWNES ISLAND

Thank you for giving us the opportunity to [illegible] above proposal. Since you last communicated with LEAF we have [illegible] on similar projects to learn of any possible environmental downside [illegible] from this type of operation.

We are please to advise that LEAF can see no reason why your proposal should not proceed on Downes Island, subject to EPA approval and guidelines, as outlined in your submission. In matters pertaining to [illegible] environmental aspects please feel free to contact Priscilla Hu[illegible] on [illegible].

We wish you every success with [illegible].

Yours faithfully,

John Walker
Convenor

PORT HEDLAND TOURIST [illegible] NEWS SEPTEMBER [illegible]

[illegible] John Walker [illegible]

22 June 19[illegible]

[illegible]
Le Mer Mart[illegible]
PO Box [illegible]
PORT HEDL[illegible] WA [illegible]

Dear M[illegible]

You may also [illegible] note that [illegible]
land use issues associated with the Pilbara is[illegible]
significant changes [illegible] land use of the lands [illegible]
October this ye[illegible]ion of the [illegible]
however, [illegible] delay in [illegible]
[illegible]

[illegible]

[illegible]

[illegible]

Figures 7.2

SUAN ENVIRONMENTAL PTY LTD

(A.C.N. 009 136 841)

A Permaculture Lifestyle Supplier

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Le Mer Marketing & Consulting
Po Box 418
Port Hedland 6721

Dear Mr Rinkens

Thank you for your enquiry; please find
as requested. The RotaLoo is
most authorities in South
treatment of human waste

Tests indicate that RotaLoo is a superio
RotaLoo is environmentally friendly and
reticulated systems do not and make o
very low maintainence unit.

The RotaLoo is made in three sizes the 650 for
for a 3-4 bedroom home and the 1200 Maxi o
units can be incorporated into solar or 12

When
arise
t
proce
ins
health

If you
It is adv
please look thr
the
would like further inform

Yours

Michael Ward
10/2/97

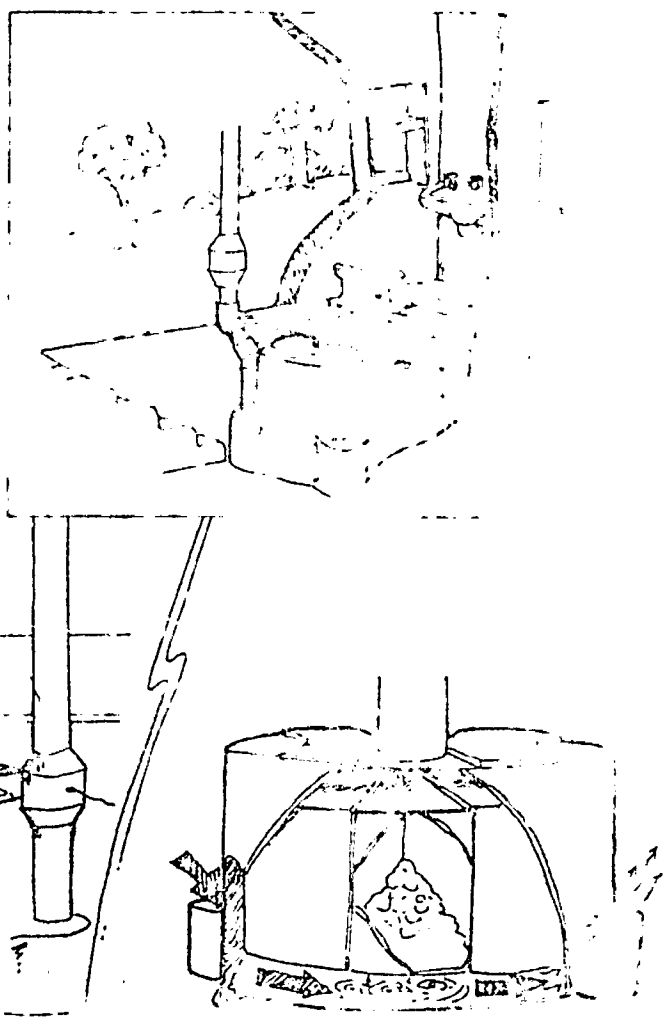
INSTALLATION

lowest of all composting toilets. So they can be easily ...ed
...imum of fuss.
...y for the average handy person to install their unit. The ...t
...led together with all the components needed and an
...guide.

...you do:

...between two joists and cut a hole

...ace below the hole, keeping in mind.
... and width of your unit,
...te chute position you intend to use,
...spection hatch be easily accessable,
...nough room to remove a composting bin,
... nough room to comforatbly get to the air intake & vent
...ould be diagonally opposite).
... waste chute, air intake & vent pipe.
...pad & put ROTA-LOO into position.
... & pedestal. Secure air intake pipe ... nt pipe and fat.



SPECIFICATIONS

FIG 5

R... ...are manufactured from a linear
... polyet... e, with h...h rigidity & impact
... ...

... ...ure from ... ...
... ...

...

				No. of people for permanent use
Mini 650	65cm	120cm	6	5
Standard 950	95cm	120cm	6	8
Maxi 1200	120cm	170cm	8	20

... Distance of waste chute above finished floor
... ... centre of waste chute to ... wall
... waste chute ... of ROTA-LOO

... 21... ...

... ...

A correct y ins... ROTA-LOO is completely odourless.
... ... the ... ... air

... ...

... ...

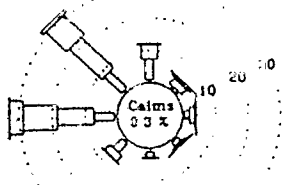
... ...derless b... ...cause they
... ... somewhere else. It doesn't
... ...et board the same way as
... ...
... ...
... ... ROTA-LOO ... ...se it

... ...

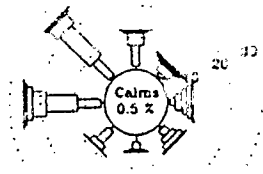
... ...

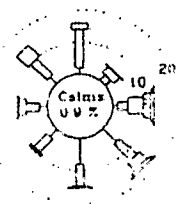
ON SUGAR CANE PULP PAPER

FIGURE **1985 - 1995**

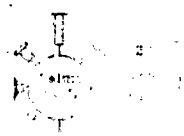


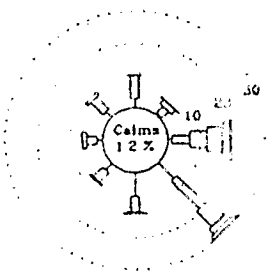
January



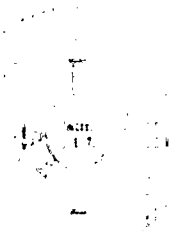


April

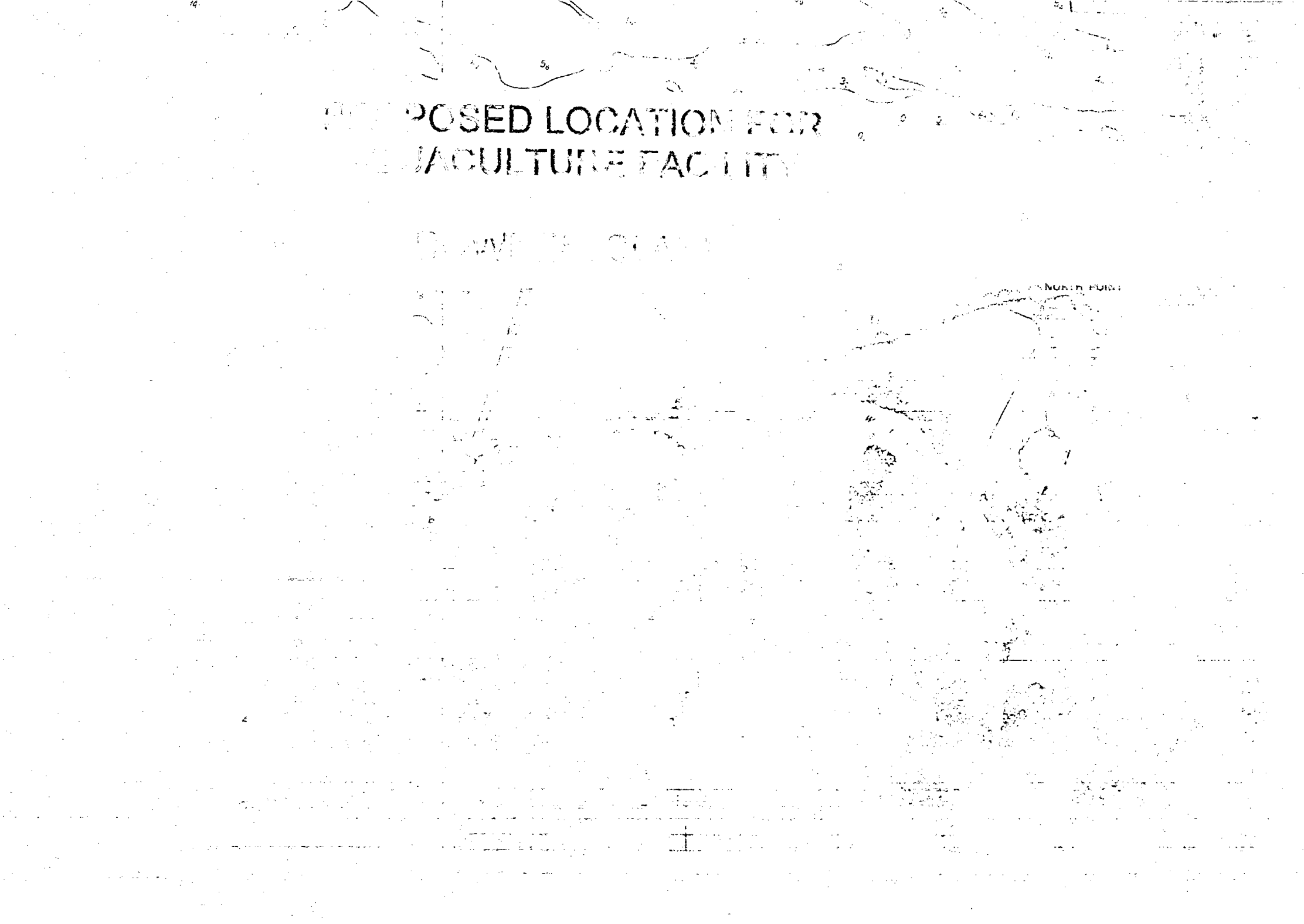




July



Sea Floor
Sea Floor


POSED LOCATION FOR
JACULTURE FACILITY
NORTH POINT

Tables 7.3

Table 2 SITE SELECTION PARAMETRES DOWNES ISLAND

PARAMETER	Recommendations	Downs Island
Water Supply		
Adequate volume of sea water		Yes
pH	7.5-8.5	7.5-8.5
Salinity	30-35 ppt	30-35 ppt
Temperature	25-30°C	25-30°C
Pollutant Levels		
Heavy Metals		Low/Acceptable
Pesticides		Low/Acceptable
Surfactants		Low/Acceptable
Hydrogen Sulphide		Low/Acceptable
Ammonia		Low/Acceptable
Tidal range	No Relevance	0.3-7.5
Freshwater	Available	Desalination Plant
Soils		
Ground level of tanks		6 m above high tide
Other		
Electricity supply		Solar / Wind
Supply of labour, feed & equipment	Readily available	Readily available
Predators or poachers	Away from	In control
Transport to markets	Available	Port 1 km -Airport 14

Table 3 INPUT / OUTPUT PROCESS

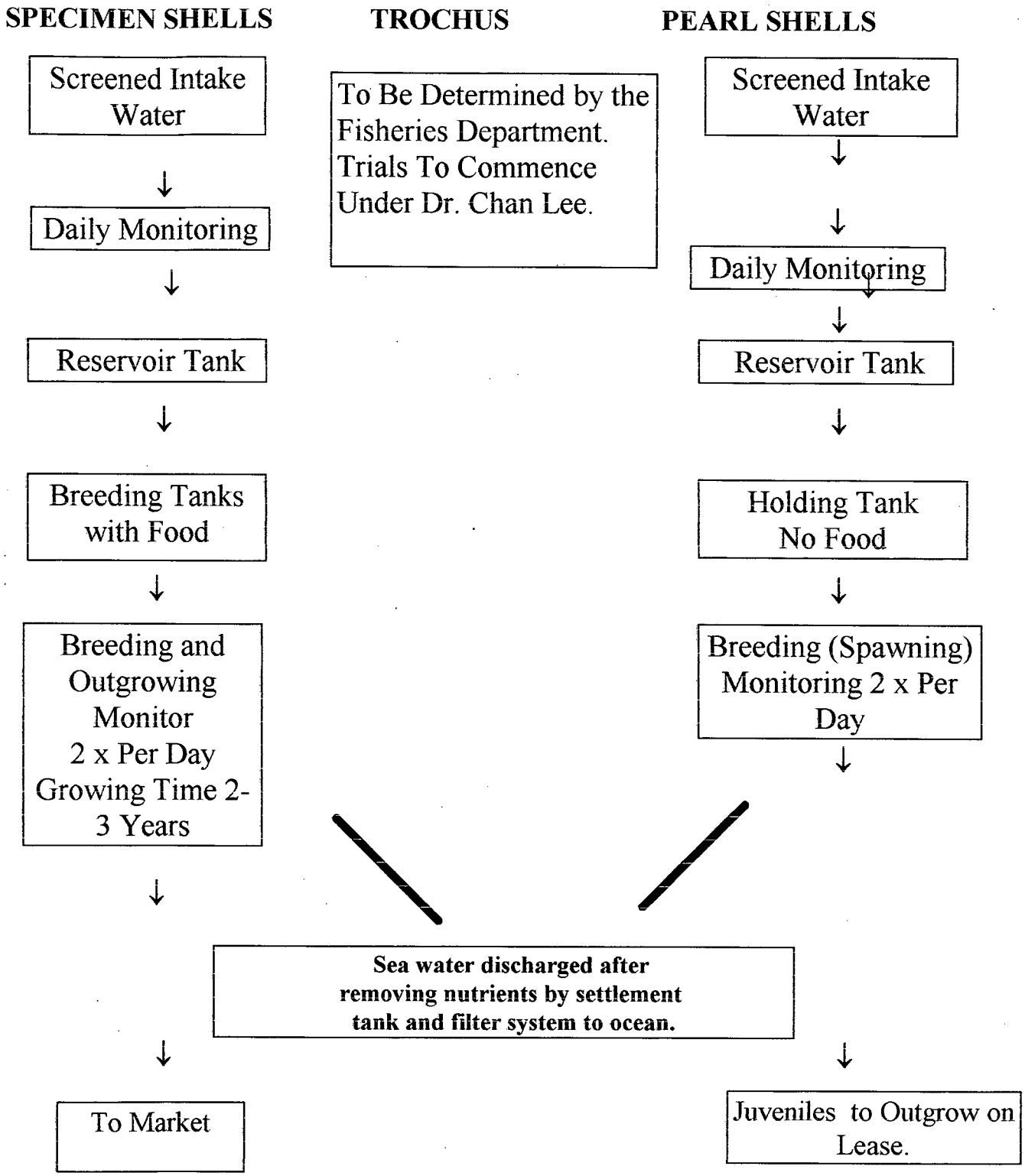


Table 4

TIDE	CHART DATUM (CD)	AUSTRALIAN HEIGHT DATUM (AHD)
Highest Astronomical Tide (HAT)	7.6 m	0.6 m
Mean High Water Springs (MHWS)	6.8 m	1.2 m
Mean High Water Neaps (MHWN)	5.2 m	0.6 m
Mean Sea Level (MSL)	3.4 m	0.0 m
Mean Low Water Neaps (MLWN)	2.2 m	0.6 m
Mean Low Water Springs (MLWS)	0.6 m	0.0 m
Lowest Astronomical Tide (LAT)	0.0 m	0.0 m

TABLE 5

AVERAGE SEA SURFACE TEMPERATURES - PORT HEDLAND

MONTH	AVERAGE WATER TEMPERATURE (°c)
January	25.2
February	26.2
March	27.2
April	26.8
May	25.7
June	24.5
July	23.4
August	22.9
September	22.8
October	23.3
November	23.8
December	24.6

Table 6

Le Mer Disease Contingency Plan

a) Shell Health Monitoring Program

1. During grow-out, sub-samples of animals from each tank will be visually checked daily for signs of disease.
2. Tank feed intake will be monitored daily for signs of abnormal consumption.
3. Daily visual tank inspections will be carried out for diseased individuals.
4. Weekly shell growth rates, feed consumption and estimated survival rates will be analysed for abnormalities.
5. Detailed records will be kept of all monitoring data results for ongoing analysis and use in the evaluation of environmental data.

b) Detection of Disease

1. Diseased animals will be diagnosed onsite to determine whether disease is bacterial or viral.
2. Samples of diseased animals will also be sent to appropriate laboratories for comparative analysis.
3. Quarantine procedures will be put into place, isolating the affected tank from the remainder of the farm.
4. the percentage of the tank population affected will be determined.

c) Bacterial Disease Confirmation

1. Management decision to determine whether to immediately harvest or to retain stock.
2. If stock is retained, appropriate management strategies will be implemented to improve tank conditions and farm management practices to prevent further outbreaks.
3. Stock are continually monitored for signs of improvement.
4. Daily reassessment of situation by management.
5. Upon harvest, tank will be chlorinated (80ppm) and sun dried.

d) Viral Disease Confirmation

1. Tanks will be immediately harvested by netting, and tank water retained in the tank and chlorinated (80ppm).
2. If tanks are unable to be harvested, the disease is highly infectious or a reportable disease such as exotic virus, then the tank (including stock) will be immediately chlorinated (80ppm).
3. Appropriate liaison will be maintained with government departments.
4. Water will be held within the tank until chlorine has naturally dissipated before being released into the settling tanks.
5. Upon draining, dead tanks and other fauna will be immediately removed from the tank, placed into a pit that is isolated from other farm operations, covered to protect against scavengers, burnt and buried to prevent further spread of disease.

Plates 7.4

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