EcoSustainAbility

Daintree Salt Water Barramundi

Daintree Saltwater Barramundi

Farm Expansion

Material Change of Use Application Report

Version 2.1
17 June 2018

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1 Introduction

1.1 Barramundi Farm Expansion

After detailed consideration of the environmental characteristics of its farm, Daintree Saltwater Barramundi is proposing a modest expansion of the production aquaculture. The proposal involves 13 additional aquaculture production ponds constructed within two existing bunded settlement ponds and the repurposing of two drains and one settlement pond for primary settlement, treatment wetland and final settlement/balancing storage.

The proposal includes a wastewater wetland treatment and recirculation system with almost 50% recirculation proposed and a formal monitored discharge, with a net nutrient balance between intake and discharge waters.

All construction will be within previously cleared areas and within bunded existing settlement ponds. During construction, specific protection measures for erosion and sediment control, acid sulfate soils and habitat protection are proposed.

1.2 Material Change of Use Application Report

This report forms the Material Change of Use (MCU)) Application Report.

1.3 Environmental Authority Application Report

This report forms the Environmental Authority Application Report.

1.4 Structure

This document has been developed using the "DA Forms Guide Planning Report Template as far as practicable and with the addition of chapters to meet other aspects. The document comprises:

- This Report — The MCU Application Report
- Plans — Plans of site and the proposed design
- Maps — Maps of the site of various values and planning aspects
- Attachments — Various forms and SDAP response templates
- Appendices — Technical reports and supporting information

1.5 Version

This document is version 2.0, dated 17 Junel 2018.

1.6 Status

The document is the final for client approval and lodgement.

1.7 References

In addition to specific pre-lodgement advice from SARA and Douglas Shire Council, this report has been developed with reference to the following:

State of Queensland Documents

DA Forms Guide Planning Report Template
DA Rules V1-1
DA Forms Guide Relevant Plans
Development Applications Involving Native Vegetation Clearing
Factsheet Key Changes To Development Assessment Guide DA Forms
Guide To Public Notification Under The DA Rules And The Planning Act
Offsets Policyv1 4
Planning Regulation 2017
Planning Act 2016
SARA Referral Pathways Under The Planning Act 2016
SDAP V2 2
SDAP V2 2 Appendices
SDAP V2 2 State Code 1
SDAP V2 2 State Code 8
SDAP V2 2 State Code 9
SDAP V2 2 State Code 11
SDAP V2 2 State Code 16
SDAP V2 2 State Code 17
SDAP V2 2 State Code 22
SPP July 2017
SPP Guidance Biodiversity July 2017
SPP Guidance Coastal Hazards July 2017
SPP Guidance Emissions And Hazardous Activities Feb 2018
SPP Guidance Natural Hazards Risk Resilience Flood
SPP Guidance Transport Infrastructure July 2017
SPP Guidance Water Quality July 2017
SPP Guidance Agriculture July2017
SPP Guidance Coastal Environment July2017
Water Quality Guidelines
DSDIP Significant Residual Impact Guideline
Prescribed ERA Application Report Business Queensland
EPP Air
EPP Noise
EPP Water
ERA Gl Air Impacts
ERA Gl Approval Process
ERA Gl Land Impacts
ERA Gl Noise Impacts
ERA Gl Waste Impacts
ERA Gl Water Impacts
Queensland ASS Management Guideline 2014
DAFF Aquaculture approvals guide
DAFF Aquaculture approvals guide
DAFF Aquaculture Regulatory framework
DAFF Management of aquaculture
DAFF Management of aquaculture

Douglas Shire Documents

Douglas Shire Planning Scheme 2006-2013
Key Map Identifying the 6 Localities within the Shire
Rural Areas Rural Settlements Locality Tables of Assessment Maps
World Heritage Areas and Environs Locality Tables of Assessment Maps
Planning for Localities Maps and Tables of Assessment
Acid Sulfate Soils Code
Aquaculture and Intensive Animal Husbandry Code
Filling and Excavation Code
Landscaping Code
Natural Areas and Scenic Amenity Code
Natural Hazards Code
Primary Industry Code
Rural Areas and Rural Settlements Locality Guide
Rural Planning Area Code
Sustainable Development Code
Vegetation Management Code
World Heritage and Environs Locality Code
Policy No 1 Acid Sulfate Soils
Policy No 10 Reports Information the Council May Request
Policy No 5 Erosion Sediment Control
Policy No 7 Landscaping
Policy No 8 Natural Areas Scenic Amenity
FNQROC Development Manual

2 Summary

2.1 Development application details

Proposed development:	13 new Aquaculture ponds over 4.88ha, and the repurposing of two drains and one settlement pond for primary settlement, treatment wetland and final settlement/balancing storage to establish pond wastewater treatment and recirculation system.
Type of approval sought:	Material Change of Use for Aquaculture. Environmental Authority Preliminary Approval for Operational Work
Site address:	Lot 3 SP292103 Vixies Road Wonga Beach QLD 4873
Real property description:	Lot 3 SP292103
Site area:	4.88 ha new ponds
Assessment manager:	Douglas Shire Council
Owner details:	Daintree Saltwater Barramundi Fish Farms Pty Ltd
Applicant details:	Daintree Saltwater Barramundi Fish Farms Pty Ltd C/- EcoSustainAbility Pty Ltd

2.2 Planning instrument details

State planning policy:	SPP Biodiversity July 2017 SPP Coastal Hazards July 2017 SPP Emissions And Hazardous Activities Feb 2018 SPP Natural Hazards Risk Resilience Flood SPP Transport Infrastructure July 2017 SPP Water Quality July 2017 SPP Agriculture July2017 SPP Coastal Environment July2017
Regional plan: **Designation:**	Far North Queensland Regional Plan 2009-2031 Regional Landscape and Rural Production Area
Planning scheme:	Douglas-Shire-Planning-Scheme-2006-2013-full-version (NOTE Application is under the superceded scheme).
Applicable preliminary approval:	N/A
Strategic framework:	ert details of applicable sections of the strategic framework.>
Zone:	Rural Zone>
Local plan:	N/A
Level of assessment:	Impact.
Applicable overlays:	Acid Sulfate Soils Natural Hazards - Bushfire Risk Insert applicable overlays, e.g. Natural hazards.>
Applicable codes:	• Acid Sulfate Soils Code • Aquaculture and Intensive Animal Husbandry Code • Filling and Excavation Code • Natural Areas and Scenic Amenity Code • Natural Hazards Code

- Primary Industry Code
- Rural Planning Area Code
- Vegetation Management Code

2.3 Referral agencies

See Pre-lodgement Advice from SARA at Appendix 1A, 1B, 1C and 1D. Earlier, 2015 Pre-lodgement advice from Douglas Shire Council is at Appendix 1E.

Referral requirement	Referral agency and role
Schedule 10, Part 3, Division 4, Table 3, Item 1 – Clearing native vegetation (if applicable) (NOT CONSIDERED APPLICABLE SEE PRELODGEMENT ADVICE)	Department of Infrastructure, Local Government and Planning – Concurrence.
Schedule 10, Part 5, Division 4, Table 2, Item 1 – Non-devolved environmentally relevant activities	Department of Infrastructure, Local Government and Planning – Concurrence.
Schedule 10, Part 6, Division 1, Subdivision 3, Table 1, Item 1 – Aquaculture	Department of Infrastructure, Local Government and Planning – Concurrence.
Schedule 10, Part 6, Division 3, Subdivision 3, Table 2, Item 1 – Removal, destruction or damage of marine plants	Department of Infrastructure, Local Government and Planning – Concurrence.
Schedule 10, Part 9, Division 4, Table 2, Item 4 – State transport corridor or that is a future State transport corridor	Department of Infrastructure, Local Government and Planning – Concurrence.
Schedule 10, Part 17, Division 3, Table 6, Item 1- Tidal works or work in a coastal management district	Department of Infrastructure, Local Government and Planning – Concurrence.
Schedule 10, Part 20, Division 4, Table 3, Item 1 – Premises in a wetland protection area	Department of Infrastructure, Local Government and Planning – Concurrence.

2.4 Current and Past Approvals

2.4.1 1988 Douglas Shire Council

Originally, when first constructed, aquaculture was as-of right.

Appendix 2 sets out the original 1988 letter from Douglas Shire Council stating Aquaculture is "as of right".

Importantly this shows a plan which identifies Lot 1 on RP 746359 as being land which completely includes what is now Lot 3/SP292103.

2.4.2 Prior Clean Waters Act Permit

The farm once held a Clean Waters Act permit (the precursor to an environmental authority).

Appendix 3 – 1991 Clean Waters Act Permit shows that the site (Lot 1 RP746359, now lot 3SP292103) did once have a licence to discharge. This included water quality limits for BOD, NFR, pH, DO and requiring N, P and Chlorophyll$_a$ to be the "minimum practical". The Permit included a daily discharge limit of 1500m^3 per day. Apparently the Clean Waters Act permit was not renewed by the then owner.

2.4.3 ERA Aquaculture

Daintree Saltwater Barramundi does not currently hold an Environmental Authority for the Environmentally Relevant Activity (ERA) of Aquaculture as there is no defined, direct discharge.

2.4.4 Fisheries

Fisheries Aquaculture Development Approval

There is a current fisheries aquaculture approval for the existing production and settlement ponds 1,2 and 3.

The decision notice, reference number SPD-0515-017379 provides a development approval which authorises activities within an approved Aquaculture Area of 22.67 hectares defined within Lot 3 on SP292103 (this includes approximate area of 3.42 hectares of production ponds and 19.25 hectares of settlement ponds identified as number 1, 2 and 3 (see Figure 1 and Appendix 4A).

Note the site has had previous permits/licences for aquaculture: 18 September 1988 – Permit for Aquaculture Purposes, 7 September 1994 – Permit for Aquaculture Purposes, 18 September 1996 – Aquaculture Licence, 31 May 2004 – Aquaculture Licence, 10 February 2012 – Development permit for a material change of use to conduct aquaculture (see Appendix 4B for the 1994 permit).

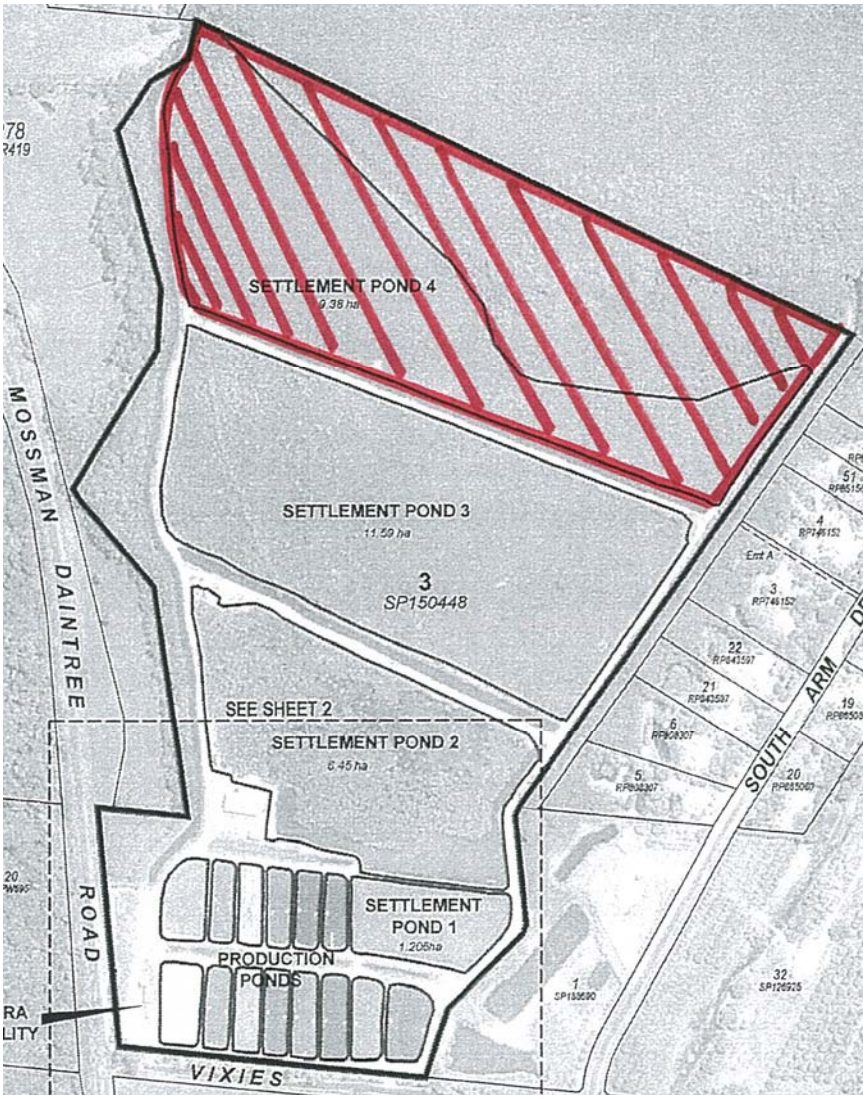
The 1994 permit listed the approved area as:

> *Dams, ponds, tanks, aquaria and approved structures on Lot 1, RP746359, Lots 1 & 2, RP749715, Parish of Whyanbeel, County of Solander.*

Appendix 4C includes the earliest known Aquaculture permit which was issued in 1989. This permit also refers to Lot 1 of RP746359 and Lot 1 and 2 of RP749715. The Plan RP749715 is appended to the Permit and clearly includes land now Lot 3/SP292103.

Appendix 4D includes the 2004 Aquaculture Permit, this includes a difference of the lot size and aquaculture production area and restricts the production area to 3.34 ha of production ponds. An included plan basically sets out a plan of the current production ponds.

Figure 1: Permitted Aquaculture Area



The figure shows settlement pond 4 being excluded from the permitted area.

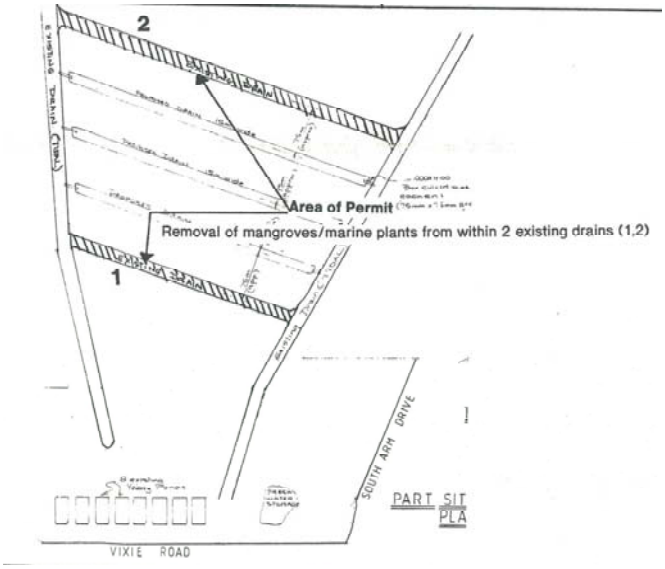
Fisheries - Removal of Marine Plants Permits

Appendix 4A sets out the current permits to control marine plants on the site.

> This development permit extends to authorising the removal and disposal of marine plants on the two constructed drains on the eastern and western boundaries of the property and the approved Aquaculture Area where:
> a) the removal of marine plants, which have self propagated, is required for the maintenance of the two constructed drains on the eastern and western boundaries of the property; and
> b) the removal of marine plants is consistent with the Marine Plant Permit previously issued for initial site works (as per expired DPI Plan No 01NOCA7965MP0238); and
> c) the removal of marine plants, which have self propagated, is required for the maintenance of aquaculture
> structures such as channels, drains and ponds on the approved Aquaculture Area, excluding settlement ponds 1, 2 and 3 as shown on Daintree Saltwater Barramundi Fish Farms Pty Ltd, Site Plan sheet 1 of 2 Lot 3 SP292103 Wonga Beach, RPS Australia East Pty Ltd, 9338-8, 27/1/2015 (as amended in red).
> The developer is not authorised to remove, damage or destroy any marine plants within settlement ponds 1, 2 and 3 or outside the approved aquaculture area to start new site works.

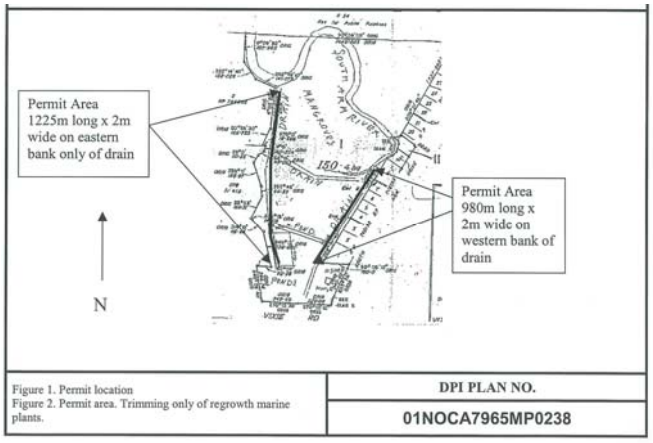
Expired DPI Plan 01NOCA7965MP0238 includes the eastern and western drains, this dates back to the 2001 permit (See Appendix 4E, 4F and Figure 3). A Marine Plants permit issued in 1994, included two east/west oriented drains which are in the general location of the bunds between ponds 2/3 and 3/4 (see Appendix 4G and Figure 2).

Figure 2: 1994 Marine Plants Permit



Refer Appendix 4G for full permit.

Figure 3: 2001 Marine Plants Permit



Refer Appendix 4E for full permit.

Figure 4 depicts the extent of clearing in 1982 and Figure 5 shows the extent of clearing and pond, bund and drain works in 1996. Some areas of pond 4 (to the south of a constructed bund) were cleared and included in the "aquaculture farm" at the time of construction and the early approvals.

Clearing

Appendix 5 includes previous land clearing permits for the lot.

Figure 4: 1982 Aerial Photo Showing Clearing

Figure 5: 1996 Aerial Photo Showing Clearing

NOTE Above photograph is NOT north orientated.

2.4.5 Town Planning Approvals

Originally, when first constructed, aquaculture was as-of right. Now, any expansion of aquaculture must meet various codes and assessment process for development approval.

1988 Douglas Shire Council

Appendix 21 sets out the original 1988 letter from Douglas Shire Council stating Aquaculture is "as of right".

This shows a plan which identifies Lot 1 on RP 746359 as being land which completely includes what is now Lot 3/SP SP292103.

3 Site Details

3.1 Site Description

Guidance
DA Forms Guide Planning Template
The site description should provide context of where the site is located at a local and regional level. You should include a description of the site itself.
Provide site photos to show features of the site and existing use, surrounding land uses and site frontages. You may include as many photos as required to accurately represent all features of the site.
Mapping provides context for the subject site. You should provide both an aerial and satellite image, with a north point pointing north, within this section. Aerial images (see figure 1) are best for clearly defining lot boundaries, different land uses (e.g. parks) and road networks. Satellite images (see figure 2) will show different features, such as vegetation and access points. Ensure that you clearly identify any applicable premises on all mapping.

Figure 6 shows the overall locality of Lot 3, SP292103 (hereafter referred to as Lot 3).

Figure 7 shows the survey plan of Lot 3 (see Plan 1)

Figure 8 depicts the surrounding topography and Figure 9 the adjoining contours.

Figure 10 (and Plan 2) shows the overall layout of the site, with existing production ponds and the settlement ponds and the extent of the current bunding and disturbance. Figure 11 (Plan 3) depicts the existing production ponds in more detail.

Plans 4, 5, 6, 7 and 8 depict greater details of elevations on site from recent and past surveys and LIDAR imagery.

Figure 12 has a series of photographs of the site.

Table 1: Site description

Site characteristic	Description
Existing land use	Aquaculture with ancillary tourism use.
Existing structures	14 Aquaculture ponds 4 settlement ponds 1 office building 1 workshop building 1 Tourism visitor centre and toilets
Frontage and access	220m frontage on Mossman Daintree Road The whole southern boundary front Vixies Road. Vehicular access is from Vixies Road.

Topography and views	Site is located at base of adjoining hill, separated from this hill by the Mossman Daintree Road. The site slopes gently from its south west corner to the north east. The remainder of the sites topography is dominated by bunds pond wall and drains. The northern area is relatively flat with minor elevation changes within the settlement ponds. There is a creek to the west of Lot 3 (partially within Lot 3 in places which then becomes an intake drain/creek to the north of the site). To the west of the site in the south is the Mossman Daintree Road, then the west of the creek there is a rural property. To the east of the site is a drain and to the east of this is a series of chenier dunes and swales, the closes has houses along the chenier and the South Arm Drive road.
Existing vegetation	There are mangroves and some wetland and lowland rainforest communities to the east, north and west of the site. Within the site in the northern settlement pond 4 there is remnant vegetation and there are mangroves in and paperbarks in Settlement Pond 3 and freshwater paperbarks and other wetland vegetation in Settlement pond 2. Most of the pond walls are grassed. Sections 3.6, 3.7, 3.8, 3.10, 7.3, 7.4, 7.5, 8.2, 8.3, 8.4, 8.5, 8.6, 9.2 and 9.4 discuss the vegetation on site in more detail.

3.2 Site History

Anecdotally, when originally cleared the land of the current production and settlement ponds were(freshwater) tea-tree swamp.

The majority of the farm was a (*sic*) "tee tree" swamp when it was first cleared even as far down as and past settlement pond 3 according to Vixie Scommozzon, the then owner. He stopped clearing land when he hit the mangrove area which at the time was where the very last bund wall he placed to the north of settlement pond 4.

3.3 Climate

The site is has a wet tropical climate. Local evaporation is 2000mm average per year (Mossman, Bureau of Meteorology) and rainfall of 2020mm (Port Douglas Station, after Bureau of Meteorology)

Figure 6: Locality

Figure 7: Lot 3 SP292103

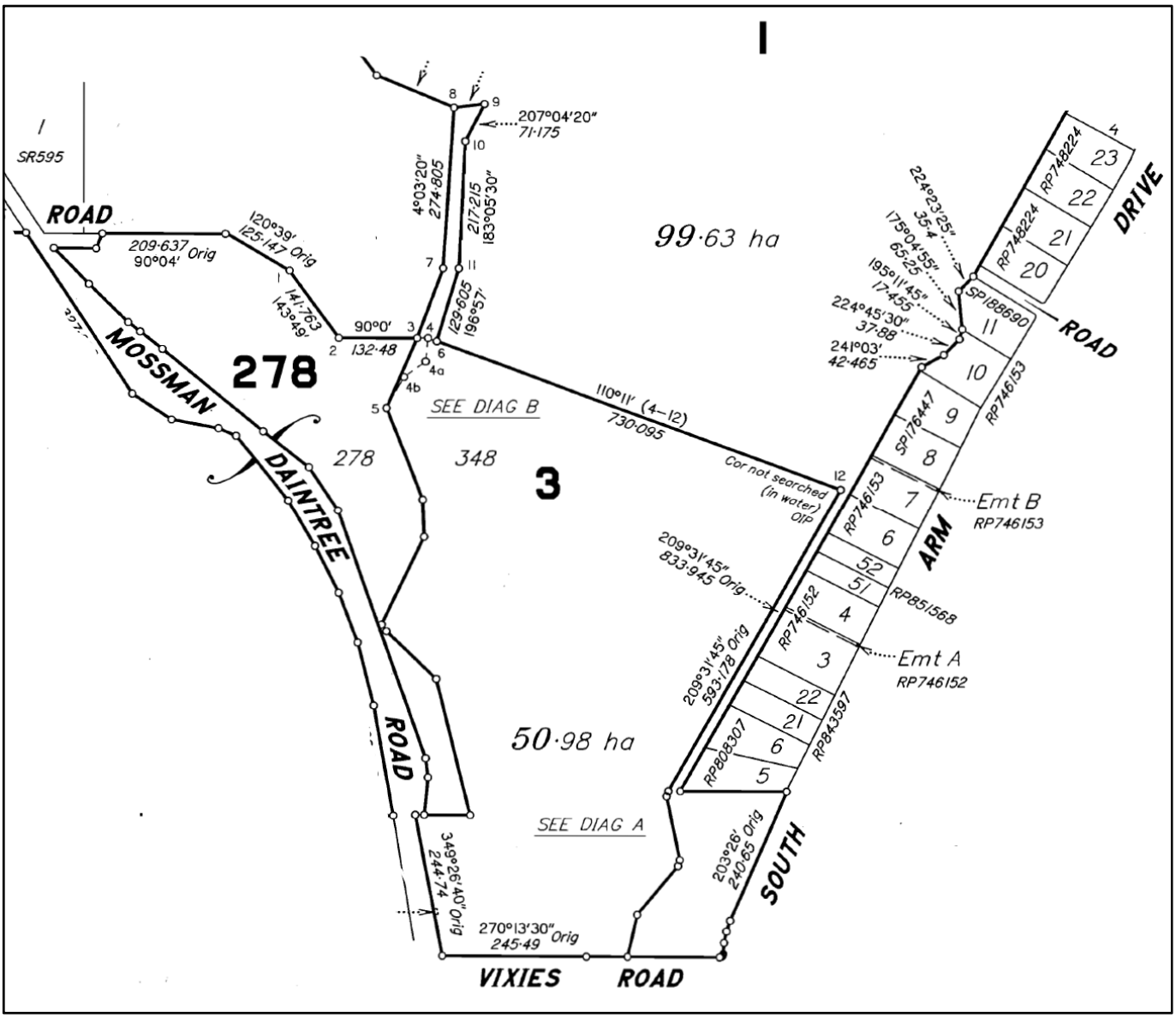


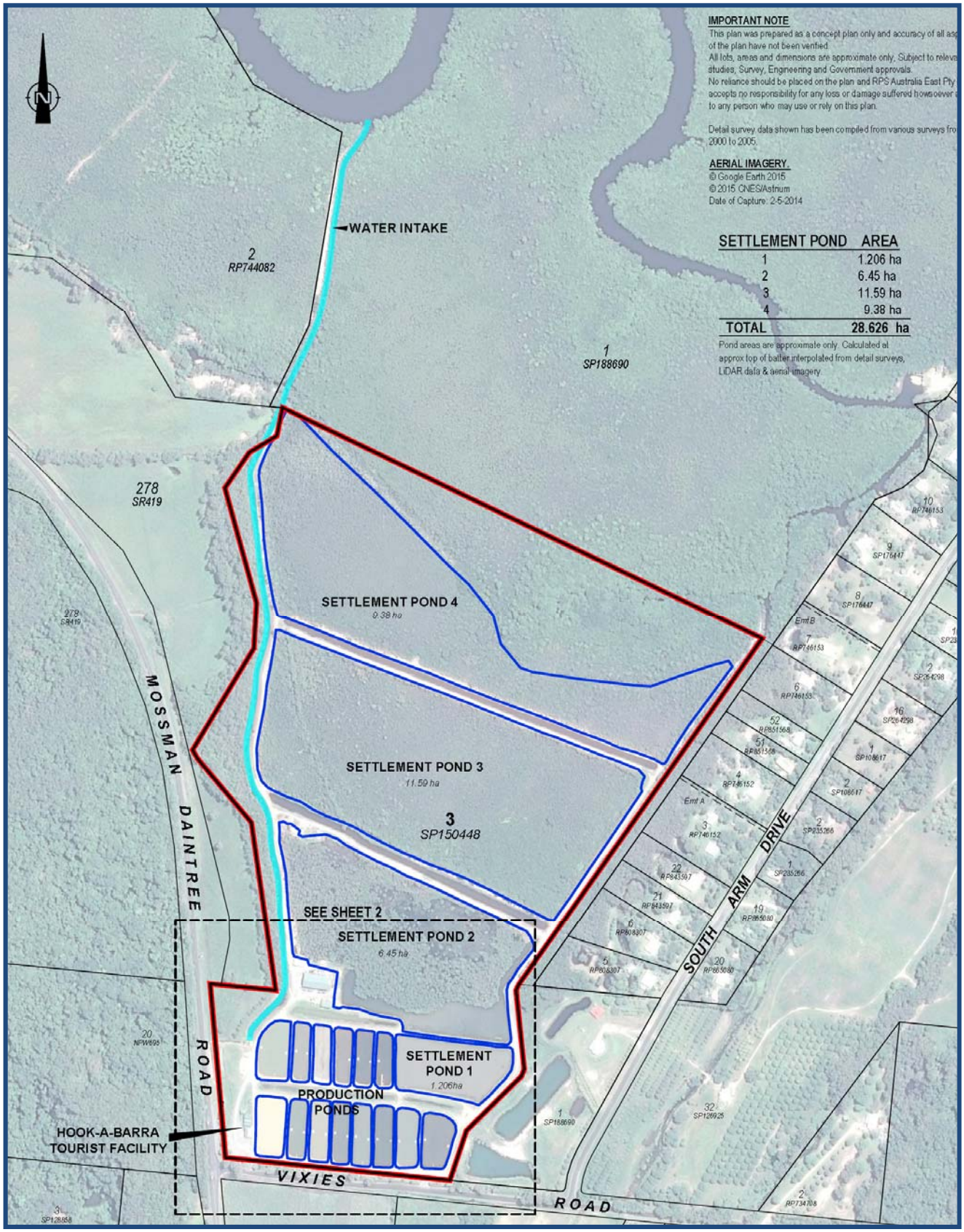
Figure 8: Surrounding Topography

Source: Qld Globe 11-3-2018

Figure 9: Adjoining Contours

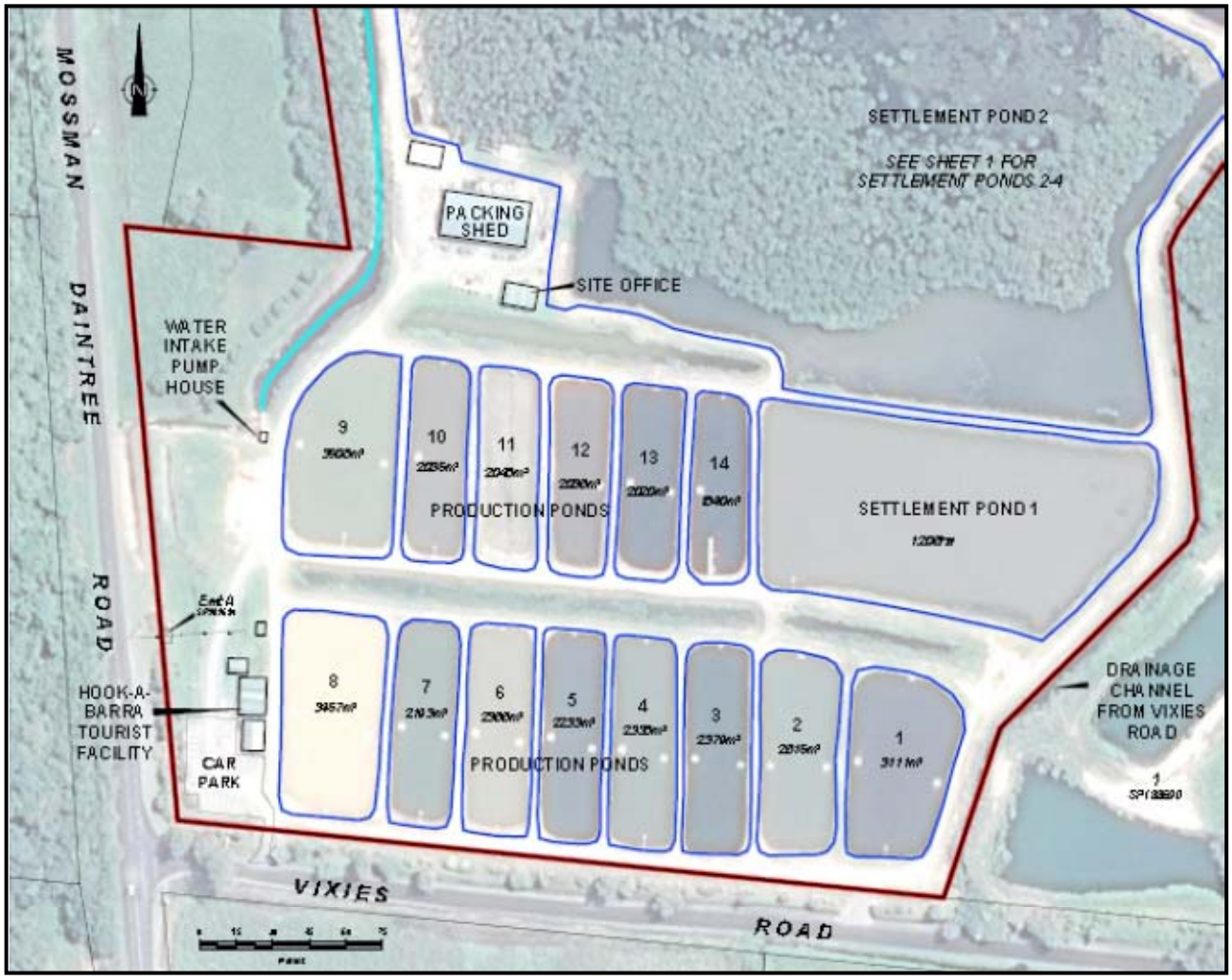
Source: QLD Atlas

Figure 10: Site Plan with Existing Ponds



From RPS. NOTE Plan does not show extension of Lot 3 SP150488 (now SP292103) along the drain. See also Plan 2.

Figure 11: Existing Production Ponds



From RPS. Lot 3 SP150488 now SP292103. See also Plan 3.

Figure 12: Site Photographs

Oblique aerial of current ponds and settlement ponds 1 and 2 (area planned for new ponds).

Intake pump with ponds behind (looking northeast).

Settlement pond 1 (looking southwest).

Settlement pond 2 (looking north)

Bund to east of settlement pond 3 (proposed treatment wetland).

Drain between settlement ponds 2 and 3.XXX

Drain between settlement ponds 3 and 4 (proposed final settlement and balancing storage).

Inlet drain looking north along eastern drain.

Tributary of South Arm if Daintree River downstream of eastern drain.

Settlement pond 2 (looking east).

Pond, aerator and feeding truck.

Intake Pump (looking north).

Intake pump.

Hook-a-Barra tourism facility, adjoining production pond 8.

Production pond, dried out, workshop behind.

Pond aerator.

Juvenile grow out.

Ponds, aerators, workshop and office behind.

Weir box outlet.

Looking east along drain between ponds 3 and 4 (proposed final settlement/balancing storage)

Looking north along main intake drain towards South Arm (of Daintree River).

Looking south along main intake drain.

Looking east along drain between ponds 2 and 3 ((proposed primary settlement pond).

Looking south along intake drain.

Looking south along main intake drain and adjacent proposed pond 27.

Looking east along the proposed primary settlement pond.

Looking west along proposed primary settlement pond.

Eastern Drain

Eastern Drain

Eastern drain looking south, settlement pond 3.

Drain settlement ;ponds 2 and 3 OR 2 and 4 ???????

Eastern drain looking south, settlement pond 3.

Eastern drain looking south, settlement pond 3.

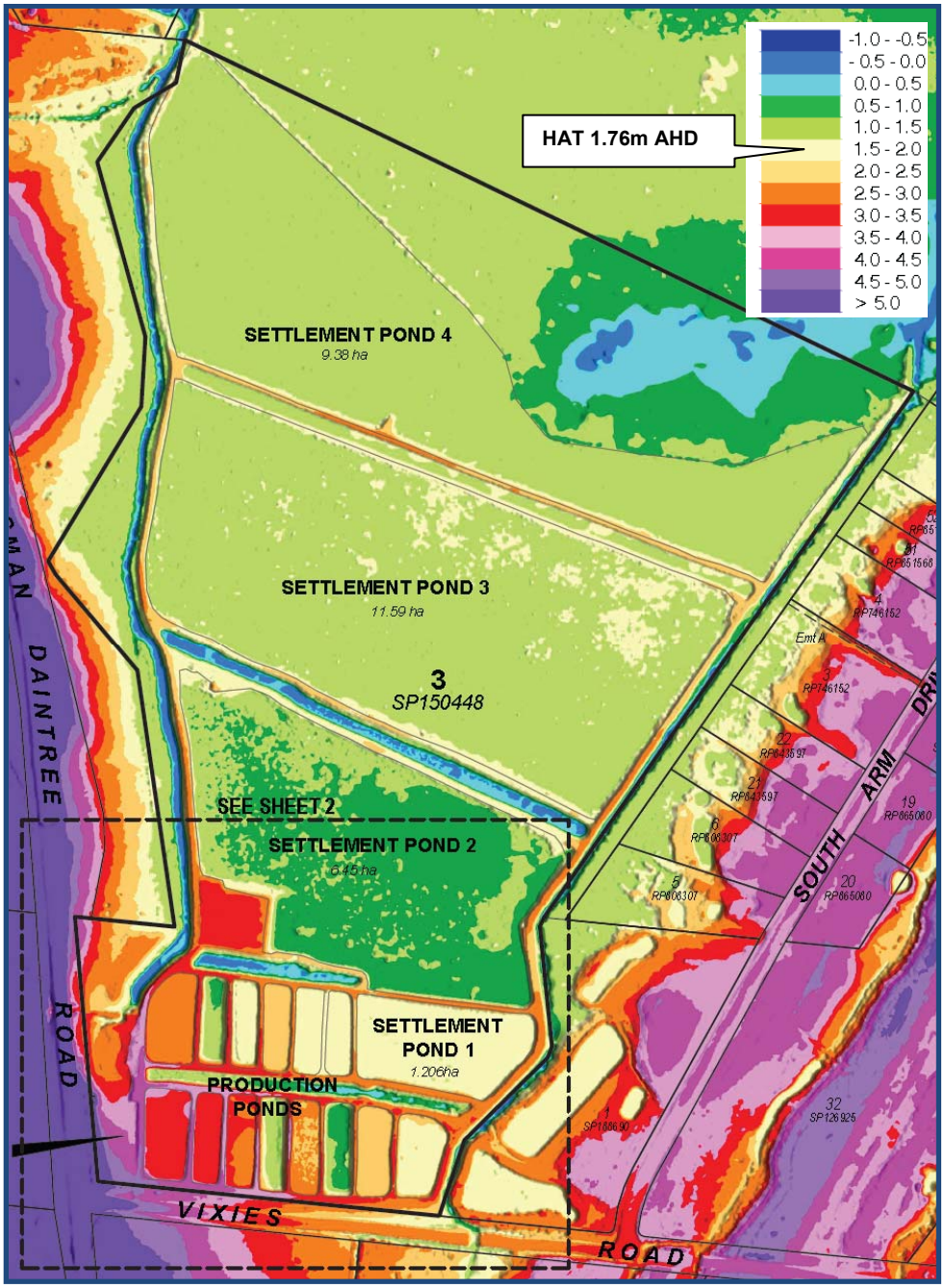
3.4 Storm Tide Level

The storm tide level for the site is 2.8m AHD based on Wonga Beach, outside the wave effects zone.

3.5 Highest Astronomical Tide

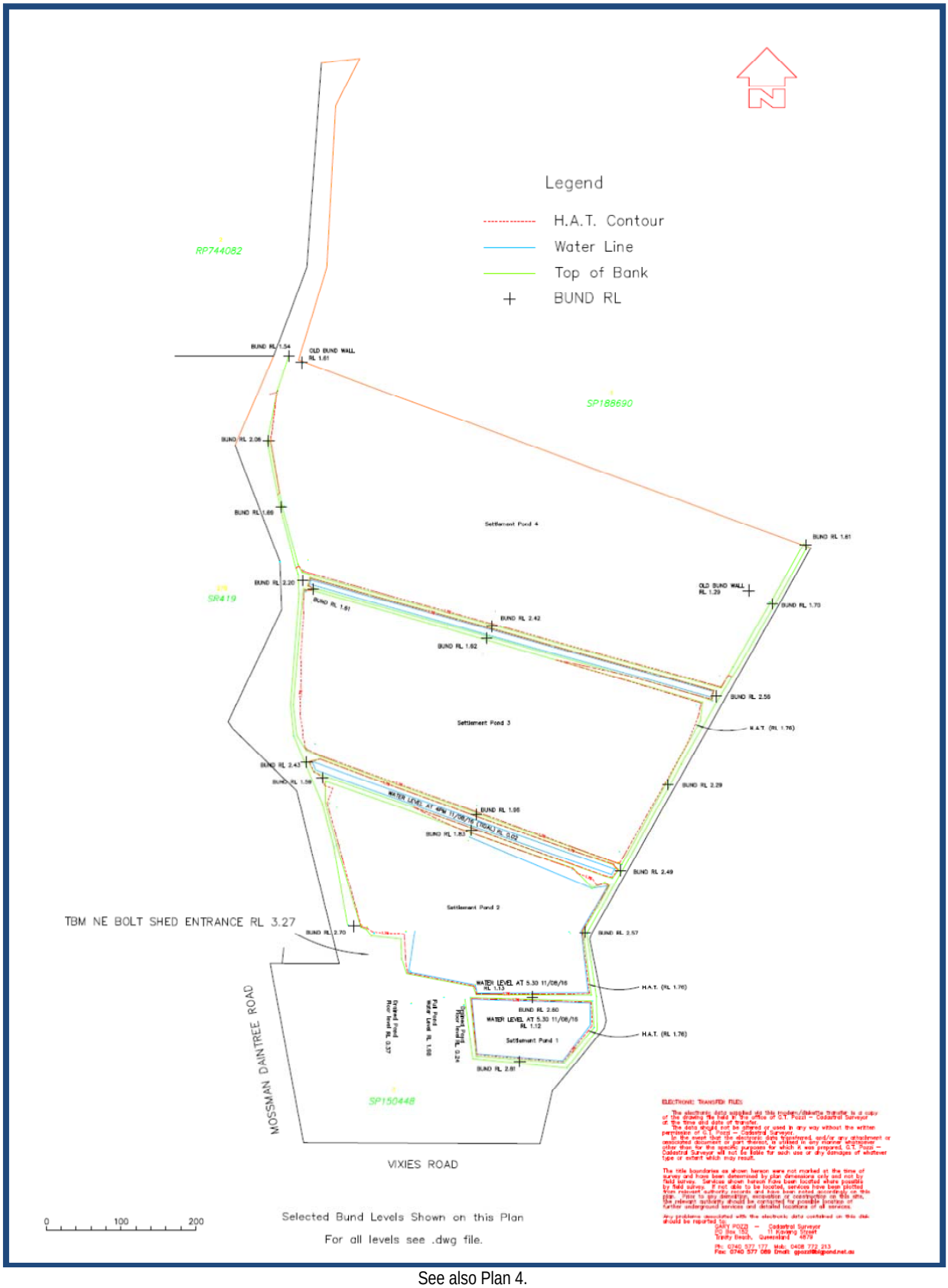
Highest astronomical tide (HAT) on Lot 3 is 1.76 m AHD. Figure 13 shows the "LIDAR" (airborne radar levels) contours, Plan 8 includes the LIDAR image and has plans with derived contours. A recent survey has been undertaken and shows spot levels for sites within Lot 3 (see Figure 14 and Plan 4).

Figure 13: LIDAR Contours



From RPS drawing 9338-10 using DNRM LIDAR information. See also Plan 8.
NOTE LIDAR does not penetrate water.

Figure 14: HAT Survey



See also Plan 4.

3.6 Habitat

The uncleared area of pond 4 and intake drain on Lot 3 is mapped as "essential habitat" (see Figure 15, Maps 1,2 and 3), this is further discussed below in the Matters of State Environmental Significance (MSES).

The essential habitat is for the endangered Southern Cassowary. The vegetation is mapped as dense lowland and highland tropical rainforest, closed gallery forest, eucalypt forest with vine forest elements, swamp forest and adjacent melaleuca swamps, littoral scrub, eucalypt woodland and mangroves; often using a habitat mosaic; will cross open eucalypt, canefields and dry ridges between rainforest patches.

The proposal has been planned to avoid disturbance of this area.

Figure 15: Essential Habitat

3.7 Vegetation Management

The uncleared area of settlement pond 4 is regulated vegetation. The far end of settlement pond 4 is included as Category B regulated vegetation (see Figures 15 and 16 and Maps 1 and 4). In summary, the Blue (category B area) is considered a Remnant vegetation areas where clearing requires a development approval, exemption, or self-assessable clearing code or area management plan notification.

The proposal has been designed to avoid disturbance of the mapped regulated vegetation.

Figure 16: Regulated Vegetation Management Map

Blue = Category B

3.8 Regional Ecosystems

The green area is Category B, of least concern. The orange area is category B containing of concern regional ecosystems, see Figure 17 and Maps 1 and 2.

The proposal has been designed to avoid disturbance of the mapped regional ecosystems.

Figure 17: Vegetation Management Supporting Map

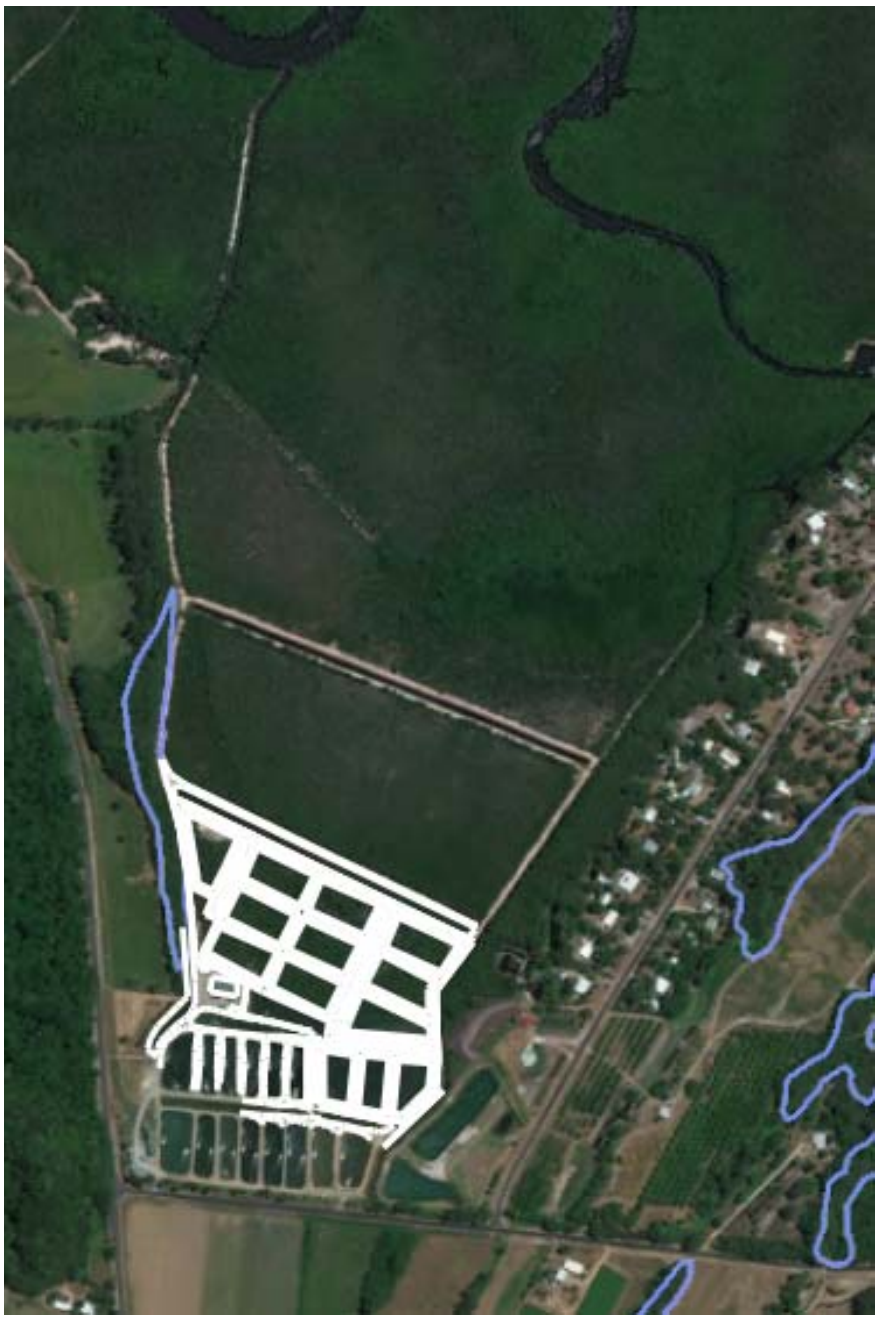
3.9 Fish Habitat

The Daintree River, South Arm is not a designated Fish Habitat Area.

3.10 Wetland Status

Lot 3 has an area of high ecological significance wetland, along the intake drain (see Figure 21 and Map 5).

Figure 18: Wetland Protection Area



Wetland Protection Area and High Ecological Significance Wetland

3.11 Coastal Management

Lot 3 is within the coastal management district, the mapped erosion prone area (areas within 40m of HAT, and high / medium storm tide hazard), these are factors considered in any material change of use application (see Maps 6 and 7)

3.12 Acid Sulfate Soils

Given the site is below 5m AHD, it has potential to contain Potential or Actual Acid Sulfate Soils. This means that testing has been undertaken to support this material change of use application and a preliminary acid sulfate soils management plan has been prepared.

Potentially some site materials may require neutralisation during pond construction and there may be specific requirements for management of drainage and stormwater during construction to treat any acidity. Site Analysis

3.13 Surrounding Land Uses

Guidance
DA Forms Guide Planning Template
Surrounding land uses are important to identify as they may affect the proposed development, or vice versa. The description of each surrounding land use can be brief, e.g. a house or shop. You may also wish to provide a number of photographs of adjoining or surrounding land uses.

Table 1: Surrounding Land Uses

Surrounding land uses	
North	Private land, unused remnant vegetation.
South	Vixies Road
East	Residential properties, South Arm Drive.
West	Rural private property and road.

4 Proposed Development Details

Guidance
DA Forms Guide Planning Template
Provide a brief overview of the proposed development. The DA forms and relevant plans attached to your development application will provide many intricate details of each aspect. This section provides an opportunity to give details not displayed in other documents, such as how the proposed development will function (e.g. operating hours) or how it will benefit the surrounding community. The section should summarise the following for each development aspect:
Describe the development aspects.
Describe what the development application is proposing.
State the purpose of the proposed development.

4.1 Overview

Table 3 below sets out the development aspects of the proposal.

4.1.1 Key Features

Lot 3 is currently operated as Daintree Saltwater Barramundi for aquaculture production and as an ancillary use operates Hook-a-Barra tourism attraction.

The proposal is to build 13 new aquaculture ponds totalling 5.84 ha and associated drains to connect to existing settlement ponds onsite.

Key aspects:

- 13 new aquaculture ponds and associated drains with a footprint of disturbance of 8.5ha.
- Area of disturbance completely within the current settlement ponds 1 and 2.
- These ponds are removed tidal influence and have previously been cleared.
- The existing settlement pond 3 will be managed as treatment wetland with on current drain used as a primary settlement pond and the northern drain a balancing storage for recirculation and occasional discharge.
- The proposal is to have a managed settlement pond/wetland treatment system to allow recirculation of pond wastewater such there is no additional intake of waters from the south arm and there is a nutrient balance between intake and discharge.
- Construction approach will involve draining currently settlement ponds 1 and 2, clearing vegetation, liming and capping with suitable fill material to make impermeable bunds and pond floors to meet QLD aquaculture pond guidelines.
- No clearing of mangroves involved.
- No disturbance to the adjoining wetland.
- No disturbance of the essential habitat to the north in current settlement pond 4.

Table 3: Summary of development aspects

DA Forms Guide Planning Template

Material change of use **(If your development application does not include a material change of use, please delete this section)**	
Building height	Not Applicable
Gross floor area (GFA)	Not Applicable
Non GFA site use area	85,200m2 (footprint of disturbance for new aquaculture ponds)
Site coverage	Provide total site area covered by the proposed development and percentage of site covered.>
Car parking	Adequate carparking available at existing office/workshop.
Site access	Using existing site access.
Proposed lots	ROL not proposed.
Proposed servicing arrangements	No new servicing required.
Building or operational work **(If your development application does not include building or operational work, please delete this section)**	
Building work	Not Applicable
Value of proposed work	Not Applicable
Operational work	Construction of 13 new aquaculture ponds totalling 4.88 ha and associated drains to connect to existing settlement ponds onsite.
Value of proposed work	Approximately $1.2m

4.2 Design

The proposal is to expand the current Barramundi aquaculture farm with increased production ponds and the use of the existing ponds on site for a treatment wetland.

4.2.1 Overall Layout

The overall layout is shown on Figure 19, the overall layout and schematic arrangement is shown on Figure 20, Figure 21 depicts the new pond layout, Figure 22 shows pond cross sections and Figure 23 shows pond dimensions. Table 2 shows the areas of proposed and existing ponds. See Plans 9 and 10.

The development comprises:

- 14 existing aquaculture production ponds;
- 13 new aquaculture production ponds (on existing ponds);
- Primary Settlement Pond (repurposed existing drain);
- Treatment Wetland (using existing settlement pond); and
- Final Settlement/Balancing Storage (repurposed existing drain).

Key element of the design are:

Existing Ponds Remain

The existing 14 ponds with a total area of 3.42 ha will remain in production.

New Ponds

13 new ponds with a total area of 5.94 ha will be constructed on the existing settlement ponds 1 and 2.

This is the main area of disturbance, being totally with the existing bunds of the two existing settlement ponds and on previously cleared land.

Total Production

In total there will be 27 production ponds totalling 8.24 ha and with a volume of 124,149 kL.

Drains and Primary Settlement

New drains will be constructed for the new ponds which will report to the existing drain to the north of current settlement pond 2. This drain will become the Primary Settlement Pond with an area of 0.69 ha. The volume (6.93 ha, 6930 kL volume) and pond turnover (daily water exchange) will allow settlement of solids in this system.

The Primary Settlement pond will be the existing drain (repurposed) and will not need any disturbance to its bed or northern bank. The southern bank of the Primary Settlement Pond will be the northern bund of the new ponds.

A pump will be installed at its western end.

Treatment Wetland

The current settlement pond 3 will be managed as a Treatment Wetland. The design is to have direct flow through the wetland and may need some internal baffles/weirs. Production pond wastewater will be pumped from the Primary Settlement Pond to the Treatment Wetland. A distribution pipe with numerous discharges into the treatment wetland along its southern bank will ensure even flow across the wetland.

Water will discharge from the northern bank of the treatment wetland across numerous lined weirs, into the existing drain between settlement ponds 3 and 4. This is to encourage even flow across the wetland. The western end of the northern bund of this treatment wetland will need some minor capping to even the level to ensure even flow across the weirs along the bund.

Final Settlement/Balancing Storage

The existing drain between ponds 3 and 4 will form a balancing storage with an area of 0.5 ha and a volume of 7,000 kL.

Recirculation

At the western end a pump will send treated wastewater back into pond recirculation (piped to area of intake pump and then to all production ponds through intake distribution pipe network.

Discharge

At the eastern end a weir box enabling controlled discharge to the adjoining drain as the discharge point.

4.2.2 Pond Design Levels

Table 4 and Figure 24 depict the levels. In summary:

- HAT 1.76 m AHD
- Storm tide levels (see section XX below) 2.8m AHD)
- New pond floors 1.8 -1.95 m AHD
- New ponds top of bund 3.9m
- Water level in ponds 3.4 m AHD
- Pond freeboard 0.5m
- Primary Settlement Pond floor remains as is (about) 0 m AHD
- Primary Settlement :Pond bund 1.8-2.0 m AHD
- Primary Settlement Pond design water level 1.0 m AHD
- Primary Settlement Pond design freeboard >0.5m
- Lift of pump from Primary Settlement Pond to Treatment Wetland 0.4m
- Treatment Wetland floor 0.9-1.1 m AHD
- Treatment wetland water level 1.4 m AHD
- Overflow weir(s) height (Treatment Wetland to Balancing Storage) 1.4 m AHD
- Final settlement/Balancing Storage water level 1.4 m AHD
- Discharge level (maximum, with tidal gate) 1.4 m AHD

Alternative for Approval - Trade off between keeping 0.5m free board and discharge below HAT....

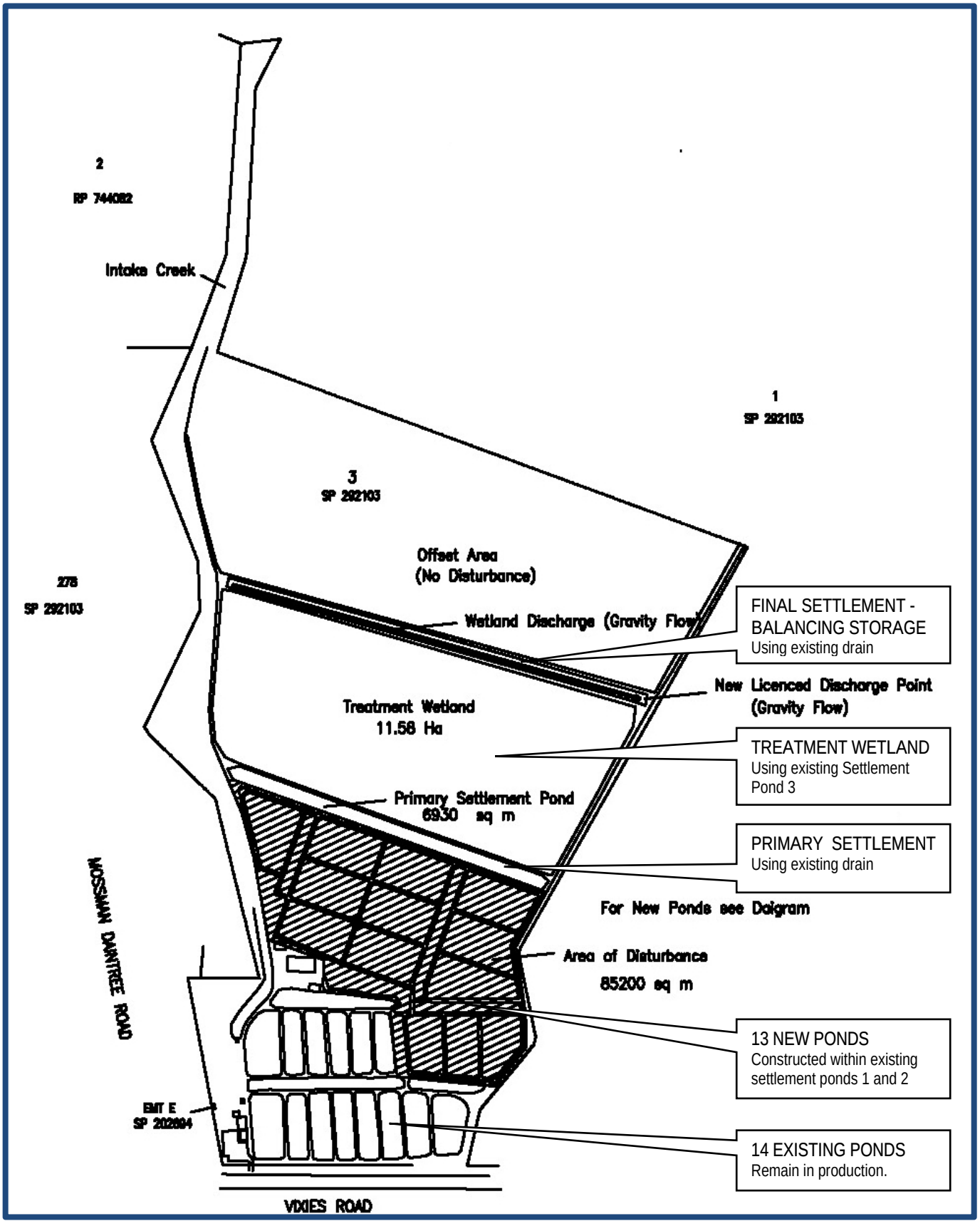
Note the design is to avoid any disturbance of the bund wall adjoining the remnant/regulated vegetation and essential habitat in the existing settlement pond 4. Given this and to meet the Aquaculture guidelines of maintaining a freeboard of 0.5 m the water level of the balancing storage is 1.4 m (and hence below HAT at 1.76 m), this will necessitate tidal gates and meaning discharge cannot occur during peak spring high tides.

As part of the approval process we seek the consideration/approval of an alternative configuration with the water level of the balancing storage up to 1.8m and the discharge point set at 1.8m. Whilst freeboard would be less than 0.5m, riprap rock or HDPE membrane protection of the bund between the Final Settlement/Balancing Storage and the remnant vegetation in old settlement pond 4 would ensure ongoing bund integrity. This is the preferred configuration for approval

4.2.3 Pond Arrangement

The ponds bunds will have a batter 2:1m and a slop on the floor of 0.15m fall toward the pond outlet point.

Figure 19: Overall Layout



SOURCE: Pozzi, see also Plan 9

Figure 20: Overall Layout and Schematic Arrangement Over Aerial Image

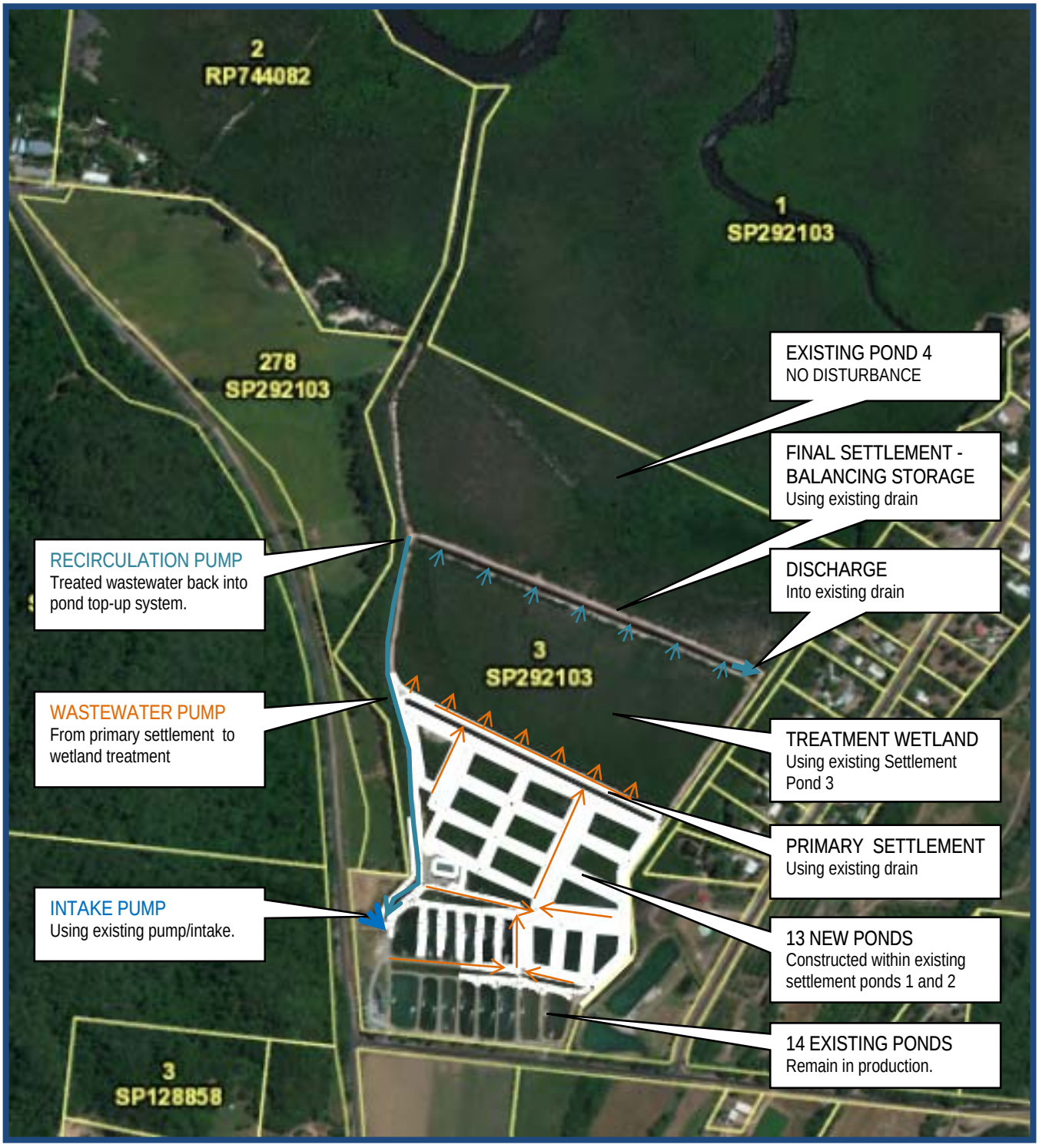
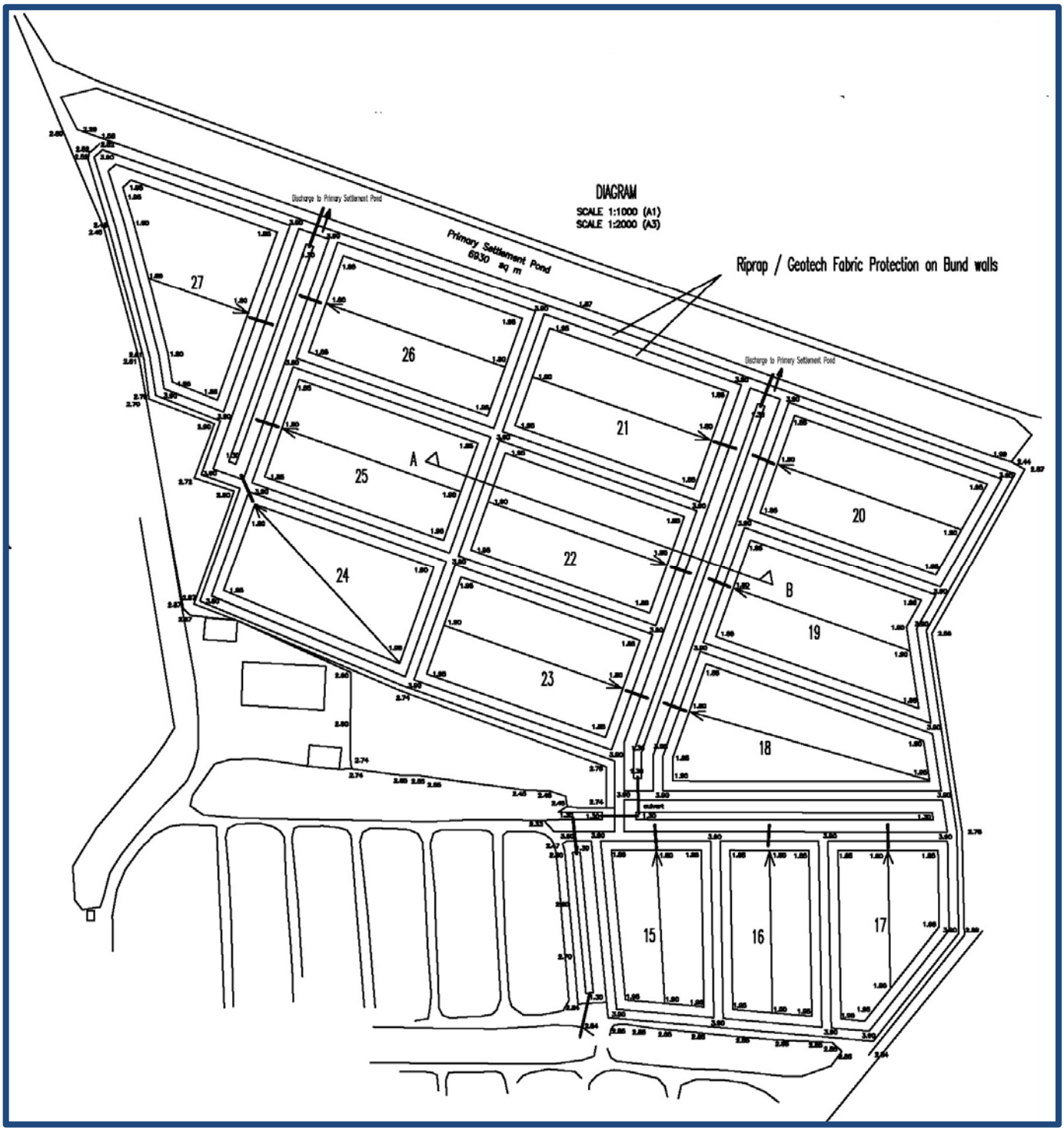
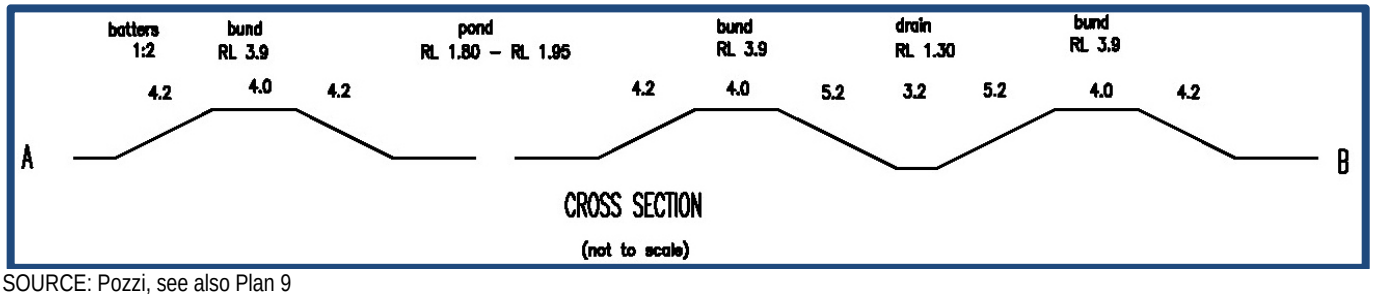


Figure 21: New Pond Layout – Design



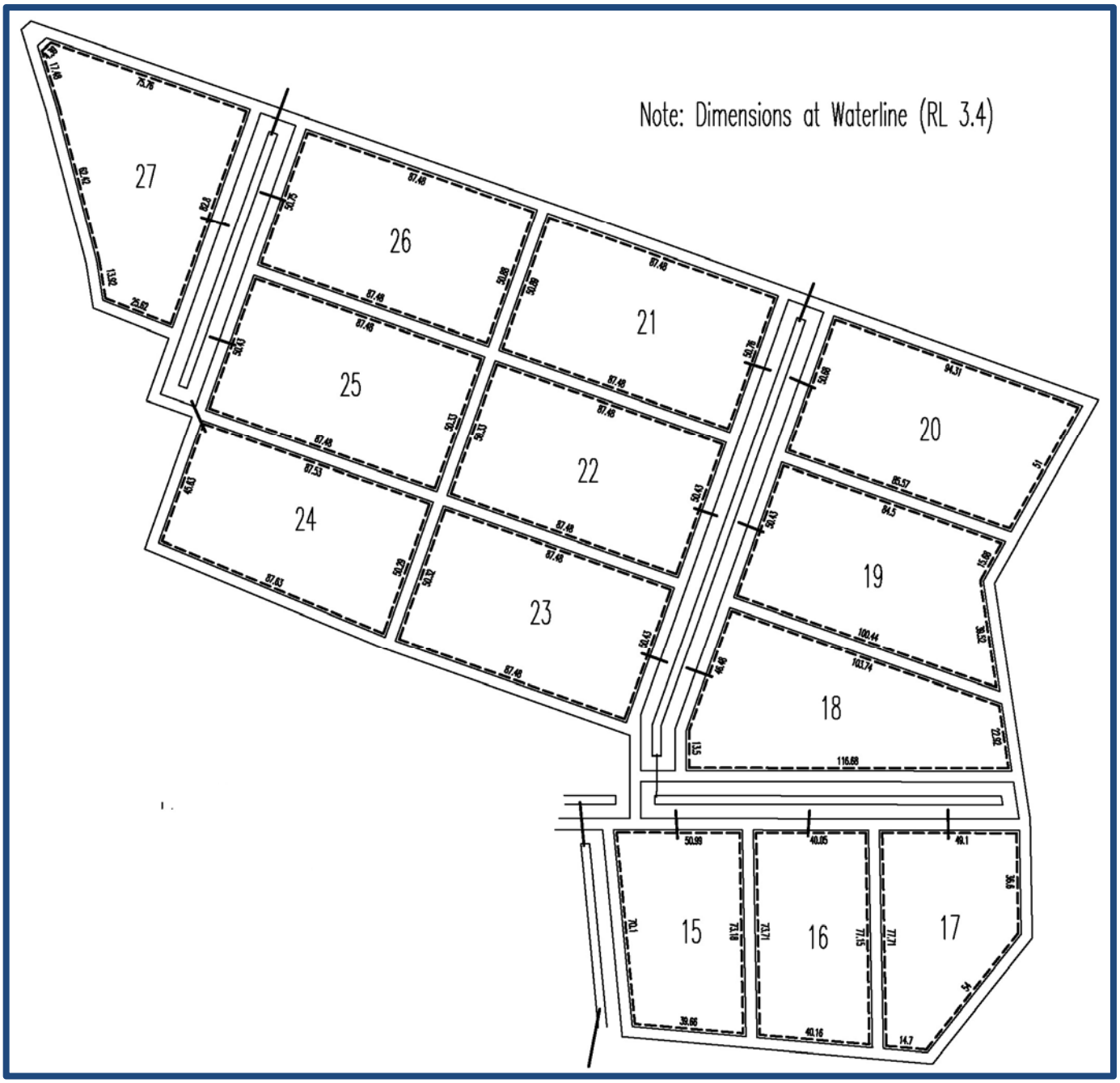
SOURCE: Pozzi, see also Plan 9

Figure 22: New Pond Design – Cross Sections



SOURCE: Pozzi, see also Plan 9

Figure 23: New Pond Layout –Pond Dimensions



See also Plan 10

Table 2: Proposed and Existing Pond Areas

Pond	Area (ha)	Volume kL (m^3)
1	0.3457	5,186
2	0.2193	3,290
3	0.2366	3,549
4	0.2233	3,350
5	0.2338	3,507
6	0.2379	3,569
7	0.2615	3,923
8	0.3111	4,667
9	0.3508	5,262
10	0.2035	3,053
11	0.2048	3,072
12	0.2036	3,054
13	0.2020	3,030
14	0.1840	2,760
Existing Ponds Total	*3.42*	51,269
15	0.3010	4,065
16	0.3015	4,060
17	0.3135	4,225
18	0.4500	6,150
19	0/4470	6,135
20	0.4540	6,255
21	0.4445	6,110
22	0.4405	6,075
23	0.4405	6,075
24	0.4195	5,765
25	0.4405	6,075
26	0.4445	6,110
27	0.4255	5,780
New Ponds Total	*4.88*	72,880
All Ponds Total	*8.29*	124,149
Primary Settlement Pond	0.6930	6,930
Treatment Wetland	11.5800	57,900
Final Settlement -Balancing Storage	0.5000	7,000
Treatment Total	12.77	
% treatment/production	154	

4.3 Design with Guidelines

The design has been based on the Aquaculture Construction Containment Structures Guidelines. The sections below summarise the guidelines then discuss the proposed approach.

4.3.1 Farm layout

Aquaculture Construction Containment Structures Guidelines

The design of aquaculture developments should consider the characteristics of the site and surrounding environment to minimise the risk of environmental harm from unsatisfactory performance of containment structures. Evaluate a number of configurations to achieve the layout with the lowest risk (in conjunction with other design considerations, such as water flow, noise, odour, flooding, stormwater runoff and acid sulfate soils). For example, site topography and the relationship to surrounding land use is an important consideration in the risk assessment. Where practical, design of containment structures should account for the risk of horizontal flow or overflow into adjacent properties.

The design has been developed to enable an increase of the current farm's production yet minimise disturbance. Key aspects of the design elements which respond to these guidelines are:

- *Risk of environmental harm* has been minimised by avoiding disturbing natural habitats and marine plants, ensuring disturbance remains within the footprint of previously cleared, drained and bunded ponds. Further environmental harm is minimised by ensuring a nutrient balance, no more nutrients will be discharged from the farm to South Arm than are taken in the intake waters.
- *Water flow* through the use of recirculation. Current drainage paths are not affected with the creek to the west of the site remaining the main outlet for stormwater on the lands to the immediate west and the eastern drain allowing for stormwater from the lands to the south and east. The structures of the new ponds and arrangements for the treatment system will not affect stormwater runoff, flooding or natural water flows.
- The current farm has been operating for over 25 years and has not had odour issues or complaints. *Odour* is not expected to be an issue with the expanded farm. There are no odour sensitive places (residences etc. immediately downwind of the new ponds (in the prevailing south east trade winds or north east sea breezes).
- The current farm has been operating for over 25 years and has not had noise issues or complaints. *Noise* is not expected to be an issue with the expanded farm.
- In regard to *Acid Sulfate Soils*, a preliminary Acid Sulfate Soils Management Plan is included at Appendix 6 and discussed in section 12. The locations of the new ponds is assumed to have actual acid sulfate soils, which will be drained, limed and capped during construction of the new ponds. The excavation of ASS has been minimised in the design. The existing drain (which will become the Primary Settlement Pond) will be used to hold any waters from within the construction area and to enable liming/treatment to reduce acidity if required prior to discharge. The area immediately to the east of the current workshop will be used to stockpile any excavated ASS material for lime treatment prior to use as underlying fill. This area will be bunded to ensure no acidic runoff.

4.3.2 Containment structures

Foundations

Aquaculture Construction Containment Structures Guidelines

A number of design solutions are available for the formation of linings with low permeability, including: • ripping and re-compaction of in situ clays • engineered imported clay liners • mixing with bentonite • synthetic geo-membranes • composite liner and leakage detection systems.

The type of low permeability lining required will depend on site properties, the sensitivity of the underlying aquifer and surrounding environment, and the level of risk reduction required to meet acceptable risk levels. Liners should be designed by a suitably qualified and experienced engineer, taking into account the seepage risks associated with the particular aquaculture and the site characteristics. In large or complex sites, a range of design solutions may be required for different areas. Further detail on these design solutions are provided below.

Ripping and re-compaction of in situ clays

In situ clays should be ploughed and ripped to the required depth, and moisture conditioned and compacted in accordance with the design specifications. Suitable lining soils should extend deeply enough to ensure that construction, harvest activity or routine pond maintenance will not cut into a water permeable layer, resulting in leakage.
It is critical to establish a positive cut-off between the embankment walls and the floor of the ponds. Typical design solutions involve 'keying' the walls into the compacted floor.
Clay lining
Containment structures can be built in soils that have high percolation rates over the full area or part of the area, provided that some type of modification is undertaken, such as a layer of compacted clay, to reduce seepage. The liner thickness needs to have sufficient depth and impermeability to achieve the required performance standard. Provide sufficient depth to allow for possible desiccation cracking, which can significantly increase permeability.
The ongoing maintenance of the liner in growout ponds must also be considered, particularly when the ponds need to be drained, tilled and cleaned. This clay should be carefully chosen as some clays contain heavy metals, which can be toxic to cultured organisms.

The approach for the construction of the new ponds will be to build up from the existing base to attain the levels of HAT for the pond floor and ensure the free board is 0.5m and the bund walls are well above storm tide heights. This also meets the acid sulfate soils approach which is to drain, lime and cap existing AASS on site. Thus fill material will be brought onsite in the form of bulk fill and then clay for liners. The bulk fill will be placed on site over lime when called for by the ASSMP. A suitable mix of clay and clayey sands will be placed and compacted on pond floors and bund walls to attain the required levels of compact and impermeability. At least 300mm of fill will be placed and then the clay liner will be at least 250mm (after compaction).

Clays will be chosen which do not have heavy metal contamination which could be toxic to Baramundi.

Bentonite is also mentioned in the Aquaculture Construction Containment Structures Guidelines howver it is not envisaged as being required.

Embankments

Aquaculture Construction Containment Structures Guidelines
Aquaculture containment structures are usually trafficable surfaces, and it is recommended that walls are wide enough to ensure strength, stability and safe vehicular access. Walls should be surfaced with an appropriate material to reduce erosion and dust, scour, and improve trafficability during wet weather.
Protect external batters against erosion by establishing vegetation (native or crop species) and/or natural regeneration. This can be encouraged through the application of topsoil (which may be stockpiled for this purpose at the commencement of construction) and irrigation. The only plant suitable for helping to hold banks together is grass or small succulents because of their small size and shallow root systems. Deep-rooted vegetation on banks should not be planted or encouraged as this destroys structure and increases the potential for leakage. In the case of salt-water aquaculture projects, select appropriate species of salt-tolerant grasses.
Internal batters are typically not steeper than 1H:2V and are not actively revegetated. Erosion of pond walls can be minimised by using rock lining (rip-rap), synthetic liners or other materials such as geotextile fabric. Erosion control systems such as geotextile fabric or synthetic lining that may degrade and/or float free need to be securely fastened and routinely inspected to minimise the risk of entanglement in equipment.
If erosion control systems are likely to prevent a person from safely exiting the containment structure (in the event that someone accidentally enters it), ensure that safe exit points are provided.
Where rock armouring is undertaken some problematic rock types are known including shales and mudstones – which may break down with time and not perform as expected – and rocks containing harmful minerals or that generate acid. It is advised that these types of armouring materials should not be used.

Embankments (bunds) will be a 4m wide, thus allowing trafficability. External batters will be protected against erosion by placing topsoil and grassing. Internal batters will be lined with 1mm HDPE sheet from near the top of bund until well below water line. NOTE this HDPE sheet is for erosion protection purposes and not intended to contribute to impermeability (thus can be overlapped, not welded and does not need to go to the toe of the batter or on the pond floor. In some locations riprap will be used instead of HDPE lining.

Specific erosion control measures will be impelmented at the drain point with concrete abutments and riprap used.

Freeboard

Aquaculture Construction Containment Structures Guidelines
An appropriate freeboard is required to minimise the risk of overtopping of containment structures. Refer to the Department of Primary Industries and Fisheries policy FAMOP001 – *Management arrangements for potentially high-risk activities in the context of Ecologically Sustainable* Development (ESD) for approved aquaculture operations. When this report was prepared, the policy stated: A freeboard height (distance from the water level to the lowest point on top of the wall) that is adequate to prevent overflow must be maintained in ponds used for aquaculture (Fig 2.2). DPI&F recommends a freeboard of at least 0.5 m.

The minimum freeboard for the new ponds and the treatment system will be 0.5m.

Inlet/outlet works

Aquaculture Construction Containment Structures Guidelines

Farm inlet and outlet works may involve a pump or gravity-based system that will allow ponds to be filled and drained. Conduits passing through ponds have the potential to result in piping failure within embankments. Therefore, the design and construction of any inlet and outlet works will need to consider: • erosion and scour around inlet • compaction around pipes and the installation of collars • protection from scour and erosion • piping through walls in small embankments.

The current intake pump and pipeline will remain in place, no upgrading is required.

The discharge point will be weir arrangement with weir boards to hold back waters for recirculation or allow discharge. The maximum height of the outlet weir will be 1.8m.

Erosion and scour at the outlet will be minimised. There will be concrete abutments on the wier and in addition riprap of > 100mm rock riprap at the outlet going down the drain bank until mean low water to ensure erosion protection when discharges occur at low tide. The weir will be installed with adequate compaction of the fill.

Each pond will have a drain which allows complete pond drainage and have weir board to adjust the level of the pond. The maximum height of these weir boards will be set to ensure 0.5m freeboard. Installation will be at the time of construction and fill material will undergo compaction during fill placement. On the pond side of these drains there will be adequate protection around the drain abutment and rip rap adjacent on the pond floor and on the toe of the batter. On the outlet, there will be a fall of about 0.5m to the drain floor and there will be rip rap placed on this slope path and on the drain floor in the vicinity of the outlet.

There will be culverts installed in the primary drain system under roadways, these will have abutments fitted and riprap protection on both sides.

4.3.3 Intake and discharge points

Aquaculture Construction Containment Structures Guidelines

Aquaculture operations may require the movement of large volumes of water around the farm. Intake and discharge points are therefore highly susceptible to erosion and scour, which may result in the loss of integrity of liners, undercutting of embankments and the suspension of sediments. A number of design solutions are available to minimise scouring and dissipate velocity. These include the use of baffles, concrete blocks, rock armouring and gabion baskets. Pay attention to the area around intake and discharge weirs, and pipes and culverts through walls where increased erosion may occur due to shear.

The discharge point will be weir arrangement with weir boards to hold back waters for recirculation or allow discharge. The maximum height of the outlet weir will be 1.8m.

Erosion and scour at the outlet will be minimised. There will be concrete abutments on the weir and in addition riprap of > 100mm rock riprap at the outlet going down the drain bank until mean low water to ensure erosion protection when discharges occur at low tide. The weir will be installed with adequate compaction of the fill.

4.3.4 Buffer zones

As the construction of new ponds is within the current footprint of the Development Approval (for Aquaculture) SPD-0515-017379 no additional buffer zones are proposed. There will however be defined "hard" boundaries (in the form of flagging and construction fencing) on the site to avoid habitat disturbance of the remnant/regulated vegetation and the wetland.

As the floors of the drains which will form the Primary Settlement and Final Settlement ponds will not be disturbed the hydrological regime from their sue will remain unchanged. Given the new ponds will be constructed within the current bunded settlement ponds 1 and 2 and they will be constructed with required impermeability there is not likely to be any affect on ground water from the operation of the new ponds. No impacts on ground water or are expected and therefore no buffer zones are required to protect groundwater resources.

4.3.5 Engineering Plans and Drawings

The design is set out in Plans 9 and 10. Once the development approval is granted pre-construction detailed design of earthworks and details of inlet/outlet structures, culverts etc. will be undertaken. Much of this depends upon the fill material source and the need for onsite mixing of clay and sand/loam to ensure requisite impermeablity and compaction. Obviously this will need to be integrated with the ASSMP.

4.4 Hydraulic Approach and Treatment

The operation of the farm will be as an expansion of the current farm with the exception of the use of recirculation of wastewater and some formal discharge.

4.4.1 Hydraulic Approach

The current farm pumps seawater from the intake drain and then pumps pond effluent from collection drains into two wetlands. There is no formal discharge from these large wetland systems.

The new operation will involve the pond discharges reporting via drains to the primary settlement pond (the existing drain between settlement ponds 2 and 3). These drains purposefully do not have much fall on them to slow flow and encourage settlement of solids where the sediments can be easily removed.

From the Primary Settlement Pond wastewater will be pumped into the Treatment Wetland. Wastewater will flow through the Treatment Wetland and overtop the bank and a number of lined outflows into the final settlement pond/balancing storage. This has an overflow/weir box at the licensed discharge point. The final settlement pond/balancing storage has a pump for recirculating effluent, which will re-enter ponds via the main intake pipeline to each pond.

4.4.2 Volumes and Turnover

The volumes are set out in table 2 and in summary are:

- Aquaculture production 152,333 kL.
- Primary Settlement pond 6,930 kL
- Treatment Wetland 57,900 kL
- Final Settlement/ Balancing Storage 7,000kL

The current annual pumped intake is 560,000 kL (1,534 kL on average daily), which is a 3% turnover.

Importantly, the farm will be operated with recirculation, such that there is not likely to be proportionally more pumped from the intake. To allow for salinity management it is likely the total intake is planned not to exceed 750,000kL.

Based on the total pond aquaculture volume of 152,333 kL, a 3% turnover is 4,567 kL. With an daily intake of 1,534 kL, 3033 kL is planned to be recirculated daily.

With this pond turnover there will be approximately 1.5 days detention time in the Primary Settlement Pond, over 12 days in the treatment wetland and 1.5 days in the Final Settlement/Balancing Storage. The allows good flexibility for ongoing management enabling the maximising of recirculation.

The large volumes in the treatment wetland means salinity will not be severely affected by all but the largest rainfall events. This again enables the maximising of recirculation.

4.4.3 Treatment Wetland and Recirculation Approach

Table 5 sets out the key hydraulic aspects. This table ignores rainfall (and evaporation). Mean annual rainfall for Port Douglas is 1964 mm and Mossman 2321mm, monthly pan evaporation rates for Port Douglas range from about 170mm to over 250mm[1]. Overall for the Wonga Beach location of Daintree Saltwater Barramundi the appears to be a balance of rainfall and evaporation overt the year. Obviously periods of high rainfall mean there are periods where stormwater in the ponds and treatment wetland will add to the daily discharge.

To account for increased evaporation in drier months and the need to occasionally refill ponds the proposal is to modestly increase the total intake to 750ML annually. Based on a 3% turnover the daily volume discharged by ponds to the settlement/treatment system will be 3724 kL. This is 54% of the primary settlement ponds useable volume and as such results in a mean retention time of 1.86 days. The daily turnover will be 6% of the treatment wetland volume and hence a retention time of over two weeks. The final settlement pond has a similar volume to the primary settlement pond with daily turnover being 53% of volume and 1.88 days retention.

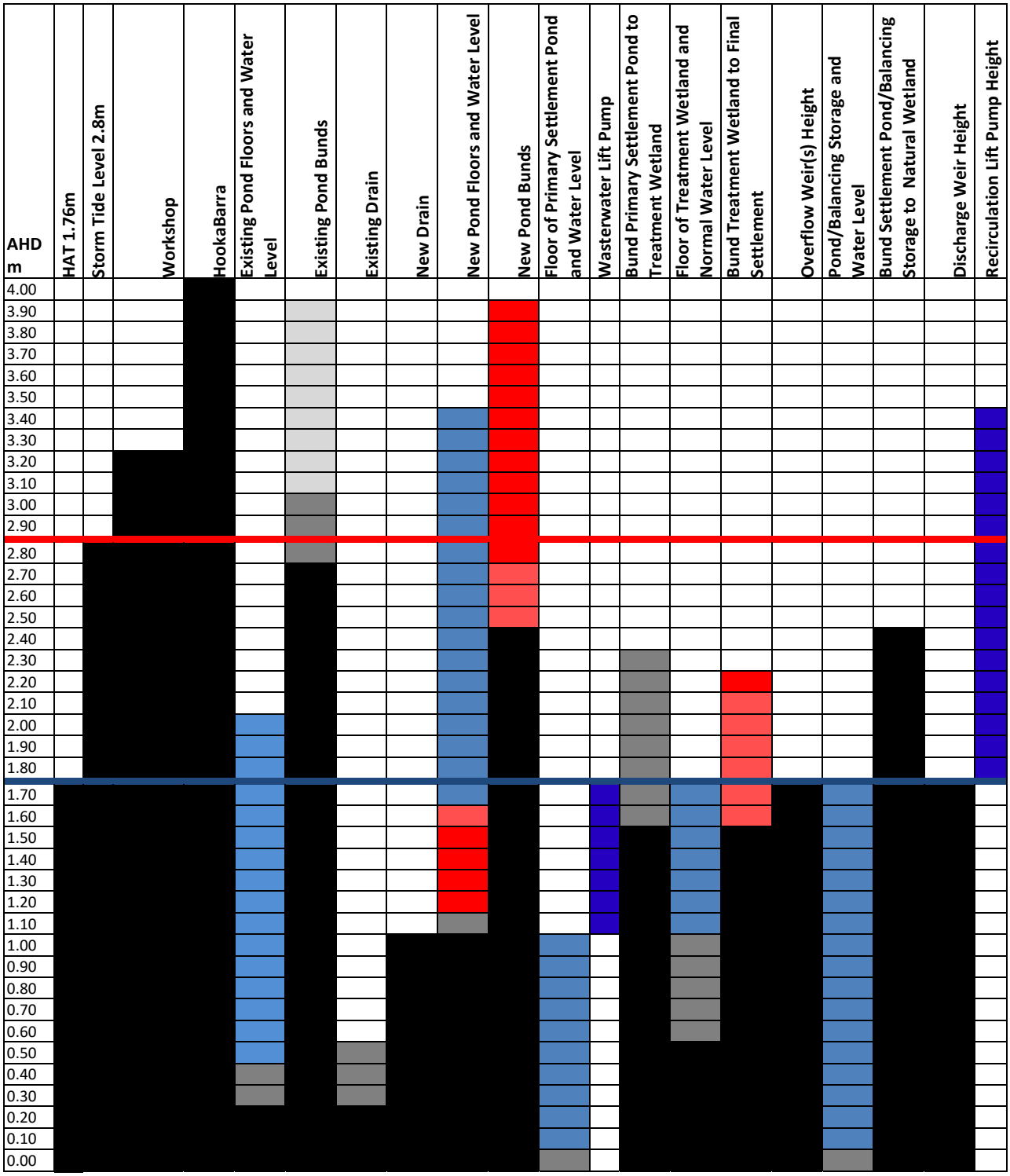
The daily recirculation is proposed to be 1669kL with a consequent daily discharge of 2055kL. This represents, on average 45% recirculation of daily pond turnover.

[1] Wilson, P.R. (1991) Agricultural Land Suitability of the Wet Tropical Coast Mossman-Julatten area, Queensland Department of Primary Industries report QO91010.

Table 3: Key Hydraulic Aspects

Current annual intake	560,000kL
Current daily intake	1534kL
Current daily turnover	3%
Proposed Annual Intake	750,000kL
Proposed daily intake	2055kL
Proposed daily pond turnover	3%
kL Proposed daily pond turnover	3724kL
Daily pond turnover % of volume of Primary settlement pond	54%
Daily pond turnover % of volume of treatment wetland	6%
Daily pond turnover % of volume of Final Settlement Pond/Balancing Storage	53%
Days detention of daily pond turnover in Primary settlement pond	1.86
Days detention of daily pod turnover in treatment wetland	15.55
Days detention of daily pond turnover in Final Settlement Pond/Balancing Storage	1.88
kL Daily intake	2055kL
kL Daily pond turnover @3%	3724kL
kL Recirculation	1669kL
kL Daily discharge	2055kL
Recirculation proportion of daily pond turnover	45%

Table 4: Design Levels



Legend

- Surface level
- Surface Level Range (allowing for fall across ponds/drains)
- Fill material (average above existing levels)
- Fill material range
- Water Level
- Lift Pump Heights

Figure 24: Hydraulic Schematic Diagram

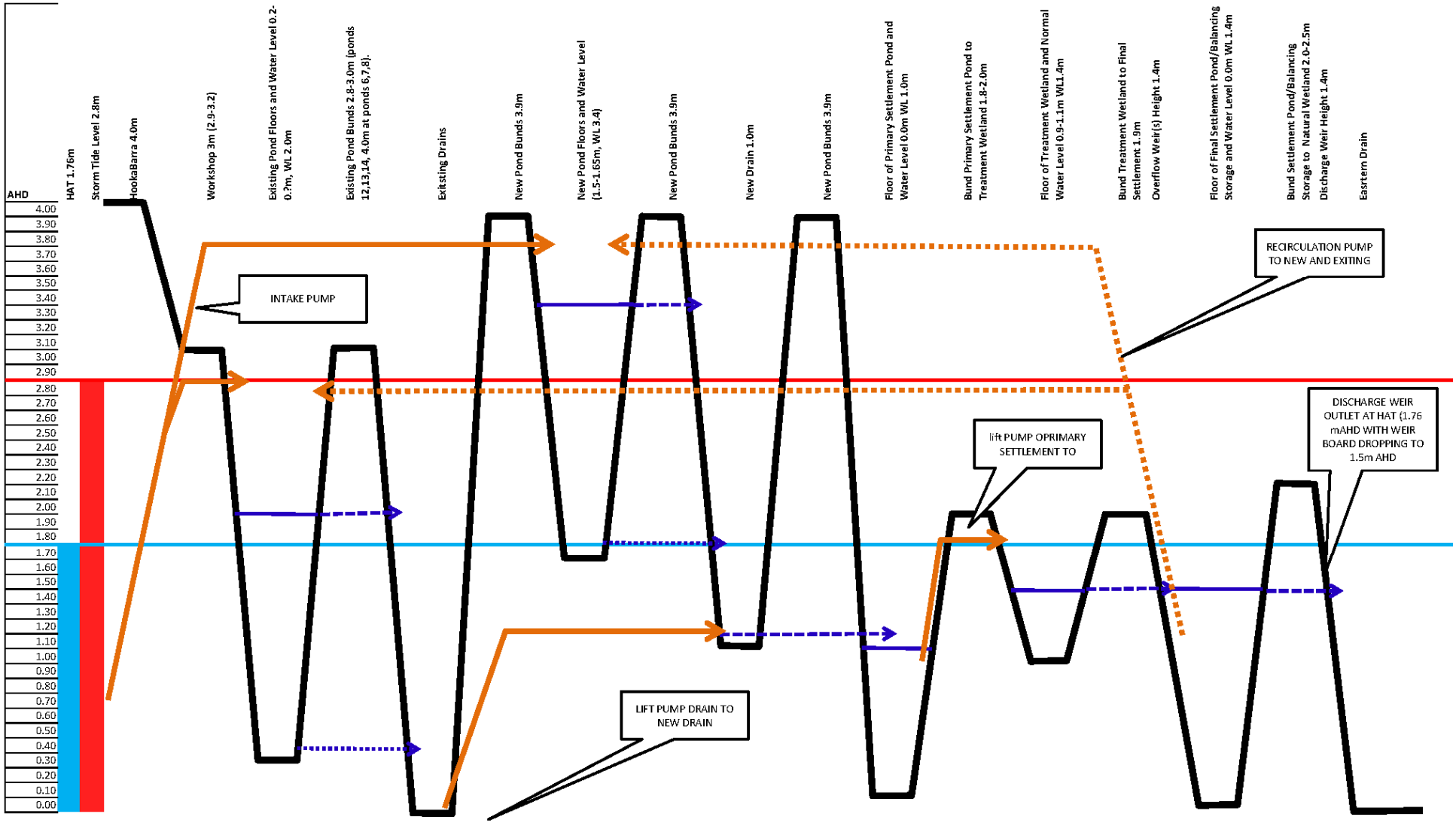
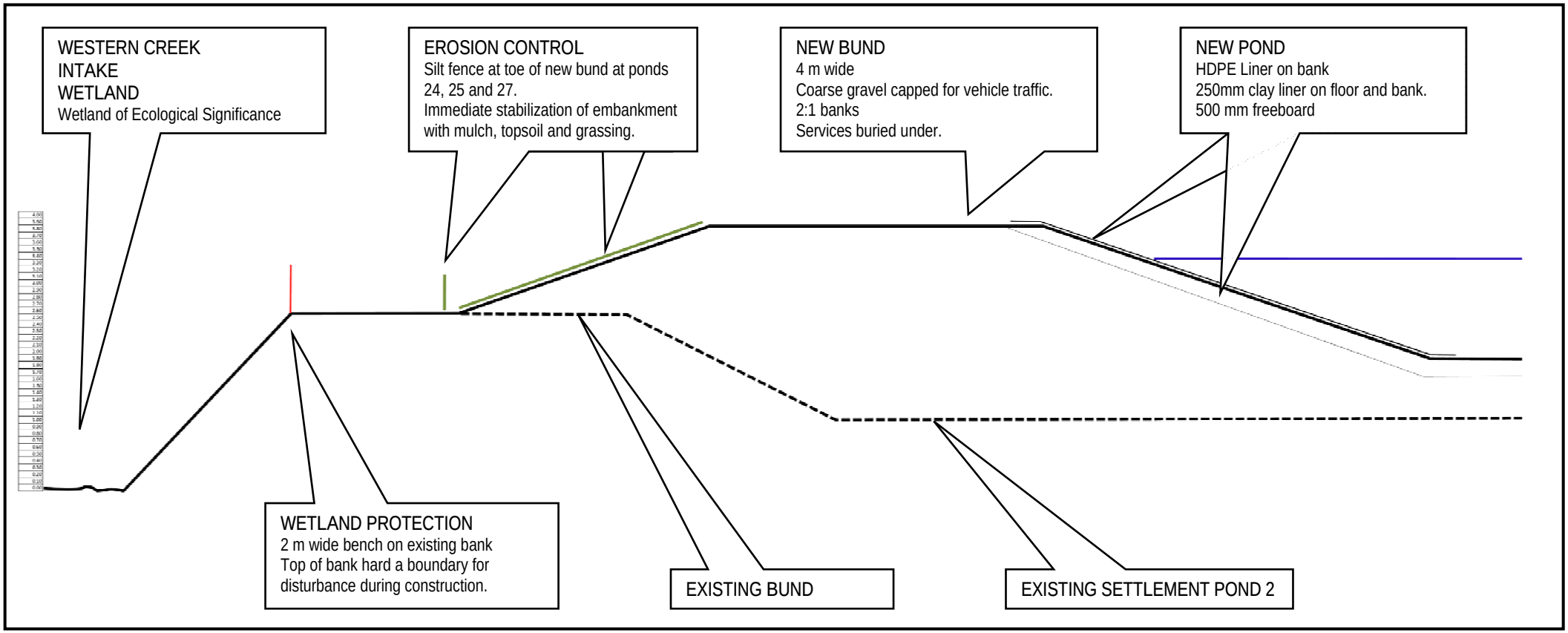


Figure 25: Protecting Wetland Integrity at Western Bund of Ponds 24, 25 and 27



4.5 Minimal Disturbance

The design has been developed to minimise disturbance to remnant vegetation, wildlife habitat, wetlands of ecological significance and marine plants. This section summarises the disturbance of habitat, sections 8 and 9 address the matters of state ecological significance and analyse residual impact considerations.

4.5.1 Remnant Vegetation

The remnant vegetation on the north of Lot 3 is in the old "settlement pond 4". This has not been used as a settlement pond and has no hydraulic connectivity to the current aquaculture production.

There will be no disturbance to this remnant vegetation.

The northern bund wall of the proposed Final Settlement/Balancing Storage will demark the extent of operations and will protect the remnant vegetation from any potential for encroachment of disturbance.

It may desirable to remove/open an old bund wall to re-establish tidal/estuarine conditions.

4.5.2 Wildlife Habitat

The wildlife habitat on the north of Lot 3 is in the old "settlement pond 4". This has not been used as a settlement pond and has no hydraulic connectivity to the current aquaculture production.

There will be no disturbance to this wildlife habitat.

The northern bund wall of the proposed Final Settlement/Balancing Storage will demark the extent of operations and will protect the wildlife habitat from any potential for encroachment of disturbance.

It may desirable to remove/open an old bund wall to re-establish tidal/estuarine conditions.

4.5.3 Wetlands of Ecological Significance

The wetland of ecological significance is the mangrove habitat along the western drainage line of the site, which also serves as the intake for the aquaculture production and is the drainage of the catchment to the immediate west of the Lot 3.

There will be no disturbance of the wetland.

The new ponds will be built by capping the existing bund walls of existing settlement pond 2. Erosion and sediment control measures are outlined in section 4.7 and the acid sulfate soils management approach is set out in section 12, these measures will protect the wetland during construction. See figure 25 for a typical cross section and the protection measures, which in summary are:

- A hard boundary at the top of the existing bund wall for construction disturbance.
- A 2 m wide bench kept on the existing bund.
- A silt fence placed along the bund (bench) just outside the toe of the new bund.
- Erosion and sediment control measures on drainage lines from new earthworks and disturbance to the wetland to reduce additional erosion and trap sediment (e/g rock dams, silt fences, riffle zones to slow flow rates and trap sediment).
- Immediate stabilisation through the use of woodchip/mulch created from the cleared vegetation.

4.5.4 Marine Plants

Whilst the site is surrounded by marine plants to the west, north and east the design has been formulated to avoid disturbance to marine plants.

Sections 7.4 and 9.4 and Appendix 7A delineate the vegetation in the existing settlement ponds. Settlement ponds 1 and 2, where new pond construction will occur do not have marine plants. There are no marine plants on the eastern bund wall and construction will involve erosion and sediment control measures (see sections 4.5 and 4.7 and an acid sulfate soils management approach (section 12),to protect the wetland during construction. Appendix 7B includes an earlier 2006 fisheries habitat assessment.

4.5.5 Ground water

There will be minimal disturbance to the groundwater system on site. The new ponds are within the bunded area and will be constructed to be impermeable with very low risk of seepage to groundwater. The Primary Settlement Pond, Treatment Wetland and Final Settlement/Balancing Storage will not be disturbed and will have similar hydraulic regime to presently, with very low likelihood of affects on groundwater.

4.6 Operation

4.6.1 Environmental Management

Section 11 sets out the proposed environmental management plan. This will be revised for the actual operation to accommodate compliance with any additional permit conditions for the Aquaculture and the environmental authority for the environmentally relevant activity.

4.6.2 Monitoring

Monitoring will be required for the environmental authority and Section 10.4 sets out a proposed monitoring regime of monthly intake and discharge water quality and quarterly receiving waters monitoring in South Arm.

4.6.3 Discharge Limits

Section 10.4.2 sets out proposed discharge limits in the form of maximum limit at any one time and long term kg per year limits.

4.6.4 Nutrient Balance

Based on the wetland treatment system and recirculation we are confident that there will be a nutrient balance between intake waters and what is needed to be discharged. Based on monthly water quality monitoring and daily recording of intake and discharges an ongoing nutrient balance will be calculated.

4.6.5 Recirculation

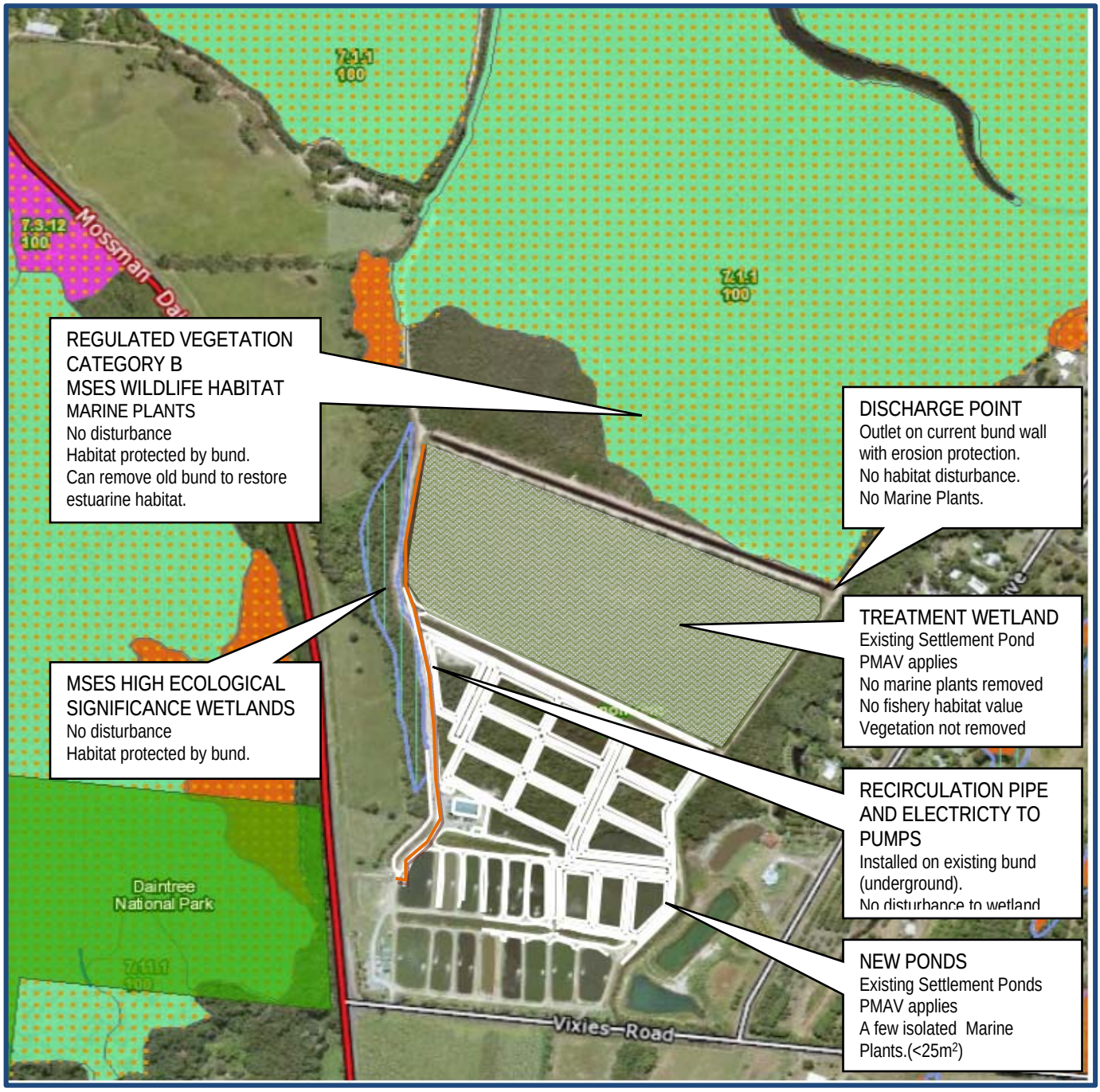
The recirculation of treated waste water will be maximised as far as possible. Water quality and effluent treatment modelling has concluded this will be effective.

4.6.6 Sediment

The drains and the primary settlement pond will act as primary settlement of solids and with vehicle access along the bund walls will allow removal of accumulated sediments (by excavator, and without bank disturbance). Where sediments are not used on site (e.g. for pond floor/wall reconditioning or topsoil for revegetation) sediments will be removed to appropriate landfill or approved re-use. It is envisaged that at least for the first decade of operation accumulated sediments will be used on site for soil conditioning on grassed banks.

NOTE: This application does not include any application for off-site beneficial re-use of pond sediments.

Figure 26: Disturbance Analysis – Habitat, Vegetation and Wetlands



4.7 Construction

This section sets out the overall construction approach. Sections 4.7.3 to 4.7.8 set out the proposed approach relevant to the respective Aquaculture Construction Containment Structures Guidelines.

4.7.1 Overall Construction Approach

The approach to construction will be to minimise disturbance outside the construction footprint and to embody best practice acid sulfate soils and erosion and sediment control(see Figure 27). Key aspects will be:

- The existing bunds around current settlement ponds 1 and 2 will be kept intact and built onto.
- Fill material will be select sandy loams and clay to ensure adequate structural properties. Fill with a high clay content will be used to create an impervious liner across the pond floors and up to the top of bunds.
- Staged layering of fill and compaction will be used to ensure structural properties.
- Fill brought on site will be checked for physical properties and contaminant (metals and ASS/PASS) status. PASS material will not be brought on site.
- Induction of all construction workers will be undertaken, particularly to ensure the need to remain entirely within the footprint of disturbance (within the defined hard boundaries) and not have any impacts on the adjoining wetland and remnant vegetation, the importance of the acid sulfate management procedures and the importance of erosion and sediment control on the outside bunds (to protect adjoining wetlands).

Basic construction staging will involve (preliminary, may be amended by detailed Construction Plan and EMP, ASSMP and erosion and sediment control plan):

Initial Construction

- Empty current production pond 14 (best) or 1 and 2 as holding/treatment pond for any collected acid leachate (see Figure 11 for pond locations).
- Pumping free standing water from pond 1 into settlement pond 2.
- After this initial pumping out of settlement pond 1, any water from groundwater seepage or stormwater to be pumped into the holding pond, tested weekly for pH and limed as required before discharge.
- Place silt fence along toe of eastern bund of settlement pond 1 (adjacent to eastern drain).
- Lime and rip the floor of pond 1 and then placing select fill the level of 155-1.65 m AHD (needs to be undertaken with a week of pond being pumped out).
- *NOTE: Presuming the floor soils are AASS the time of exposure of the bottom sediment of Pond 1 (by pumping out) until it is limed, ripped and capped with fill is critical to minimising acid leachate. This operation will be carefully planned and coordinated with lime and fill ready and available for transport to site. Ideally the operation should be planned to be completed within one week.*
- Place fill in layers and compact to create external and internal bund walls established (for ponds 15, 16 and 17.
- Place at least 250 mm liner of mostly clay layered and compacted on pond floors and bunds to top of bunds.

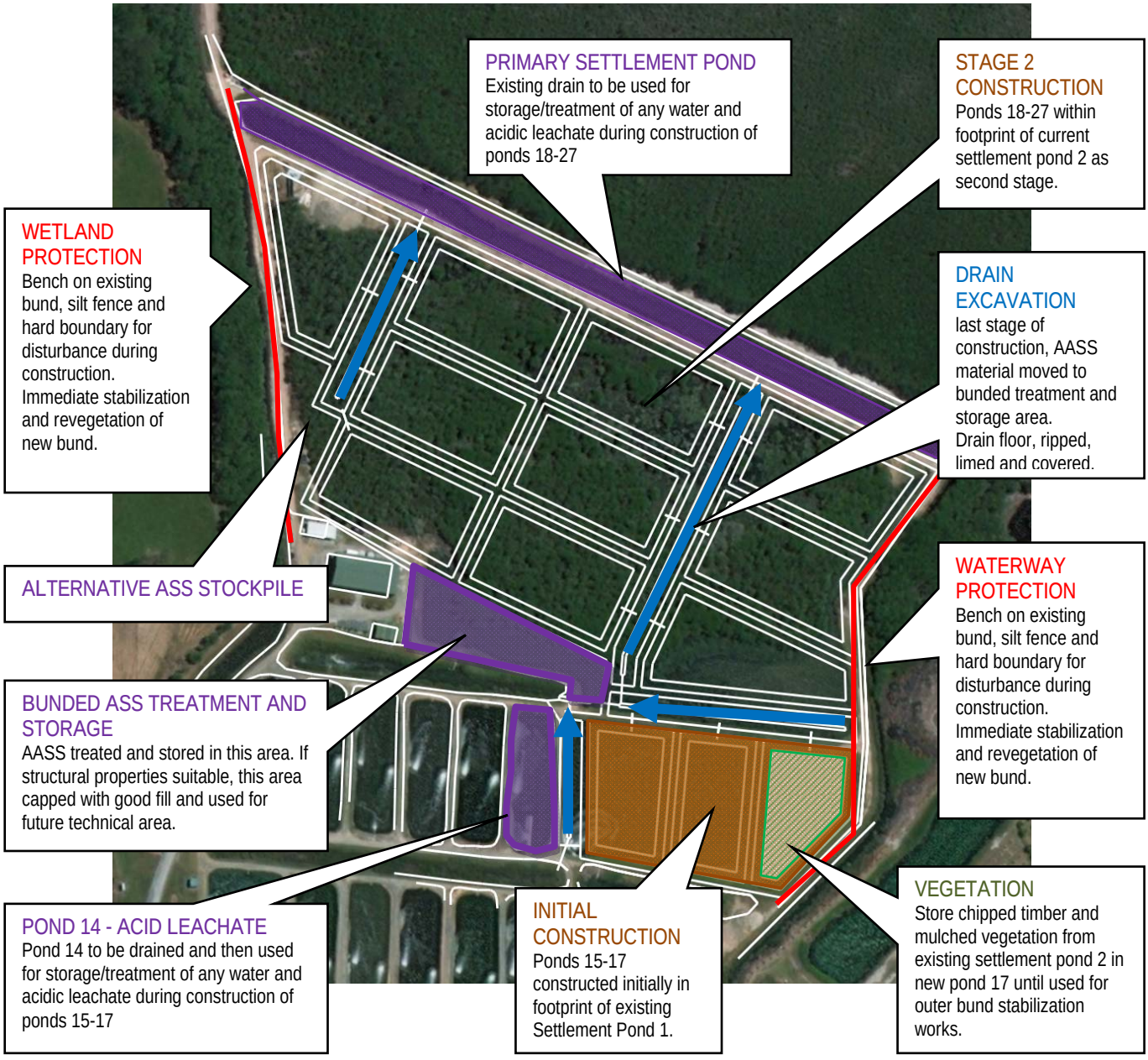
- Stabilise outer bund along eastern site boundary.
- Note: Other than to establish each pond's drain structures, do not excavate drain between existing pond 14 and new pond 15 at this stage.

Stage 2 Construction

- Stockpile lime on site and stockpile select fill (new ponds 15 and 16 can now be used for fill stockpile) such that there will be little delay in capping ASS material in settlement pond 2. Pump out settlement pond 2, clear and remove vegetation. This needs to be a quick process in case to minimise oxidation of ASS, vegetation and timber can be mulched/chipped and/or stored temporarily in new pond 17.
- Vegetation mulched and chipped on site and stored in Pond 17 for later re-use for revegetation and bank stabilisation works.
- Lime and ripping the floor of pond 2 and then placing select fill.
- *NOTE: Presuming the floor soils are AASS the time of exposure of the bottom sediment of Pond 2 (by pumping out) until it is limed, ripped and capped with fill is critical to minimising acid leachate. This operation will be carefully planned and coordinated with lime and fill ready and available for transport to site. Ideally the operation should be planned to be completed within a few weeks.*
- Place hard barrier (e.g. orange construction site mesh fence) at top of bund and a silt fence on the remaining bench (along the toe of the new bund) to the east and west of settlement pond 2.
- Create a bunded area east of workshop (for ASS stockpile).
- If there is any obvious ASS (yellow deposits on soil etc, see Section 12 and Appendix 6A), remove and stockpile in bunded ASS stockpile area with any necessary liming.
- After this initial pumping out of settlement pond 2, any water from groundwater seepage or stormwater to be pumped into the Primary Settlement Pond (the drain between current settlement pond 2 and 3), tested weekly for pH and limed as required before discharge.
- Place fill to create external and internal bunds for ponds 18-27.
- Place fill in layers and compact to create external and internal bund walls established (for ponds 15, 16 and 17.
- Place at least 250 mm liner of mostly clay layered and compacted on pond floors and bunds to top of bunds.
- Stabilise outer bund along eastern site boundary (mulch and seed/revegetate).
- Note: Other than to place each pond's drain structures, drains between ponds 27/26-25 and 21-23/18-20 15 will not be excavated at this stage.
- Excavate all drains, placing ASS material (and any PASS) in the ASS stockpile area with lime treatment and ongoing monitoring for any leachate. Sample and record structural properties of material placed. After liming the base of the drain, place at least 200mm of coarse sand/gravel at the base of each drain (for erosion and to cap any remaining ASS.
- Place culverts and abutments in drains at road crossings etc. then backfill.
- Place HDPE plastic protection on pond banks.
- Cap roadways with a 100mm layer of coarse gravel and compact.

- Place headstocks and erosion protection around culverts and pond drain outlets.
- Cap the bund at the northern side of the Treatment Wetland and place at least 6 weirs at 1.8m AHD lined with HDPE sheet and with riprap protection at their base. NOTE it is vital there is no disturbance to the wetland to the west and to the northern bund of this Final Settlement Pond/Balancing Storage in order to protect the remnant vegetation and essential habitat.
- Install Wastewater Pump and pipe with numerous outlets along southern bund of the Treatment Wetland.
- Install Recirculation Pump.
- Install discharge weir and outlet erosion protection works.

Figure 27: Construction Approach



NOTE The "ASS Stockpile" (see Figure 27 and section 9) bunded area (which will not become a pond) to the east of the current workshop can be filled with ASS material from the drain excavation and lime treated. This area can be subject to future use as additional technical area (e.g. workshop/nursery). Material will be capped in-situ initially for ASS management purposes and if material properties and compaction is acceptable can be the base fill this future technical area. It is likely that type of material will require additional compaction by surcharge (weight of fill on top) prior to any use.

In the event that there is more ASS material needing stockpiling the "alternative ASS Stockpile area" (see Figure 27 and section 9) may be used. As a contingency any pond can be used to stockpile ASS material until treatment, final storage can be arranged.

4.7.2 Construction Plan and EMP

An environmental management plan will be developed for construction. This will include the commitments made in this application for environmental management, erosion and sediment control and acid sulfate soils management. The Construction Plan and Environmental Management Plan will embody relevant aspects of the FNQROC development manual.

The Construction Plan and EMP will include:

- Construction planning, stages, set down areas, topsoils/mulch/woodchip storage, re-usable fill storage, contingency planning for major rainfall events and flooding, maintaining integrity of external bunding.
- Construction environmental management aspects (noise, dust, hazard goods storage and handling, operating hours, traffic movement, waste management, weed control, vegetation protection, non-disturbance areas, monitoring, , environmental due diligence and duty of care, site induction and training, reporting).
- An erosion and sediment control plan.
- An acid sulfate soils management plan.

4.7.3 Notification and Liaison

Aquaculture Construction Containment Structures Guidelines Section 6.1
It is recommended that the administering authorities (usually local government, Environmental Protection Agency, Department of Natural Resources and Water and Department of Primary Industries and Fisheries) are notified in writing before construction begins. Include the date on which construction will begin and the contact details of the earthworks contractor/project manager.

Daintree Saltwater Barramundi will liaise with relevant agencies prior to and during construction as required.

4.7.4 Site Preparation

Aquaculture Construction Containment Structures Guidelines Section 6.2
Before pond construction begins, the site should be cleared of trees, logs, tree roots, and brush. All woody materials should be cleared to avoid leaks in foundations or embankments that could arise as this material decomposes. Roots also provide easy tracks for some biota to tunnel along, which breaks down the integrity of the bank and should be removed, were possible.
All organic material (topsoil), loose or low density fill material, or material that may be compressible, weak or not consistent with the general soils being used to construct containment structures should be removed from foundation areas before the fill is placed. The material may be stockpiled for later use where topsoil is required for erosion control, landscaping or rehabilitation, or used for other components of the earthworks, such as core fill. In some cases, the material may be moved to a borrow pit for conditioning by blending with other materials to achieve appropriate material suitability.

All trees, roots and woody material will be removed from settlement ponds prior to liming, scarifying and covering with imported fill.

There is little topsoil *per se* however there is likely to be an fine silt/organic layer on the bottom of the settlement ponds, this will be scrapped up at the time of vegetation removal and can be stockpiled for future use as topsoil, unless, if ASS it will be managed as per the ASSMP.

4.7.5 Material suitability

Aquaculture Construction Containment Structures Guidelines Section 6.3
The material used for lining the structures should be well-graded, impervious material, classified as either CL, CI, CH, SC or GC in accordance with the soil classification system described in Appendix A (Table A1) of AS 1726 Geotechnical site investigations.
Note: The classification symbols represent inorganic clays having low, intermediate and high plasticity; and clayey sands and clayey gravels, including gravel-clay-sand mixtures, respectively.

The material imported for use as pond linings will be inorganic clays having low, intermediate and high plasticity; and clayey sands and clayey gravels, including gravel-clay-sand mixtures classified as either CL, CI, CH, SC or GC in accordance with the soil classification system described in Appendix A (Table A1) of AS 1726.

4.7.6 Placement of material

Earth material lining

Aquaculture Construction Containment Structures Guidelines Section 6.4.1
Where lining material is suitable and of sufficient depth to meet the thickness requirements determined through the risk assessment described above, the lining should be ploughed and ripped to a minimum depth of 200 millimetres (mm) and moisture conditioned and compacted in accordance with the requirements below.
Where in situ material is unsuitable (see **Section 5**), the material should be either ameliorated in situ or excavated and removed. Where earth lining materials are to be imported, the lining should be constructed in even layers. The thickness of each layer of soil being compacted should be spread to an even thickness and the compacted thickness of each layer, comprising the lining, should not exceed 200 mm. The formation of the lining by layering will improve compaction and minimise the potential a weakness in the lining to be created.
In forming the lining, it is strongly recommended that allowance be made in the depth of the compacted layer for the tilling of pond floors between crops and the scouring by water movement, such as aeration. It is recommended that the depth of the compacted layer is sufficient to provide a minimum depth of 200 mm of compacted material that will not be disturbed by future operation and maintenance of the containment structures. (This does not refer to minor activities such as posts. stakes, and pipes.) In some circumstances this can be achieved by covering the compacted layer with material such as sand. It is important that this layer is maintained at all times during the life of the pond.

Insitu material will not be used for pond lining. Pond lining material will be imported inorganic clays having low, intermediate and high plasticity; and clayey sands and clayey gravels, including gravel-clay-sand mixtures. After liming and ripping the pond floor, and placement of about 300mm fill material (depending upon pond surface and design floor levels). Select lining material will be placed, moisture conditioned and compacted using a sheeps foot roller. After compacting the clay liner will be 250mm (this allows for minor bank erosion or long term removal of material from the pond floor when cleaning dry ponds to maintain 200mm minimum liner.

Embankments

Aquaculture Construction Containment Structures Guidelines Section 6.4.2
Pond embankments should be constructed in even layers. The thickness of each layer of soil should be spread to an even thickness and the compacted thickness of each layer should not exceed 200 mm. The formation of the embankments by layering will improve compaction and minimise the potential for weakness in the compacted layer.
In forming embankments it is critical to ensure that a positive cut-off of low permeability material is created between the base of the embankment and the foundation of the containment structure. This is usually achieved by 'keying' the embankment into the floor of the containment structure to minimise the risk of structural failure or of water flowing between the join in the foundation and embankment.

The pond embankments will be constructed in even 200mm layers and compacted. Particular attention will be made to ensuring structural tie in with the existing outer pond bonds of settlement ponds 1 and 2.

Erosion control

Aquaculture Construction Containment Structures Guidelines Section 6.4.3
In most cases, local councils have developed specific guidelines for sediment and erosion control with which construction activities will need to comply. In the absence of such guidelines, use *Soil erosion and sediment control: Engineering guidelines for Queensland construction sites*, a publication of the Institute of Engineers, Australia (Queensland Div.) for guidance on minimising the risk of environmental harm from stormwater runoff during construction.

A specific construction erosion and sediment control plan will be developed (embedded within the Construction Plan and EMP). This will aim to meet relevant FNQROC Development Manual and as far as practical use standard approaches and standard drawings.

The most important erosion control is on the western bund of current settlement pond 2 (near new ponds 24,25 and 27). Given this creek is a wetland of ecological significance it is vital to ensure there is an silt fence along the toe of the existing bund and that there is no slumping of "overfill" when fill is placed on the existing bund. A 1m wide bench of the existing bund will be retained and this used as a hard boundary of disturbance (see Figure 25).

Pipes, culverts and weirs

Aquaculture Construction Containment Structures Guidelines Section 6.4.4

Particular attention should be paid to pipes, culverts and weirs during construction. These structures should be installed to ensure they do not create a weakness in the foundation or embankment. Compaction using small machinery may be required to ensure that appropriate standards of compaction are achieved in the vicinity of the structure. The installation of baffles or bentonite collars can further minimise the potential for water flow (piping) along the outside of the structure. Rock armouring or similar erosion and scour protection should be used to minimise erosion and scour around the inlets and outlets.

Pond drain pipes and the main drain culverts will be placed at the time of construction of the relevant bunds. Localized compaction of fill around the pipes, culverts and weir boxes will ensure adequate compaction. Erosion protection will be as per the design notes above (see section 4.3.2).

Correct moisture content

Aquaculture Construction Containment Structures Guidelines Section 6.1

Correct moisture content is critical to achieving compaction and low permeability. Prior to compaction, all material used for lining purposes should be conditioned. This is so that its moisture content will fall within two per cent of the optimum moisture content required to produce the maximum dry density when compacted in accordance with AS 1289 *Methods of testing soils for engineering purposes* (Standard Proctor Compaction). Any deviation from this value will require approval from a certified engineer. The fill should be placed in continuous operation so that drying out of the surface or wetting of the surface is limited to no more than two per cent variation in moisture content. If a delay in construction occurs and drying or wetting occurs, the layer should be reconditioned to the required moisture content prior to compaction.

Note: as a guide, the required moisture content is as wet as can be rolled without clogging a sheep's foot roller. Make a preliminary assessment of the required moisture content by rolling a sample of the material between your hands. If it can be rolled to pencil thickness without breaking, it should be satisfactory.

Recognising that correct moisture content is critical to achieving compaction and low permeability, prior to compaction, all material used for lining purposes will be conditioned. This is so that its moisture content will fall within two per cent of the optimum moisture content required to produce the maximum dry density when compacted in accordance with AS 1289. This will measured using the Standard Proctor compaction.

Practically, it is expected that lining material will be conditioned to be as wet as possible to be compacted without clogging the sheep's foot roller.

4.7.7 Compaction

Each layer of material should be compacted to a density greater than 95 per cent of the standard compaction density when tested in accordance with AS 1289 *Methods of testing soils for engineering purposes* (Standard Proctor Compaction).

Note: this degree of compaction may generally be achieved by rolling each layer of material, placed at the correct moisture content, with at least eight passes of an appropriate sheep's-foot or tamping roller. As a guide, compaction will generally be sufficient when there is a clearance of 100 mm between the drum of the roller and the compacted material.

Note that it is generally easier to compact and handle material which is a little below the standard optimum moisture content; however, the consequences of doing this are likely to lead to a marked increase in the leakage potential of the finished product.

Compacting will be undertaken with material with adequate moisture content (by conditioning) and rolled by at least eight passes of a sheep's foot roller or using smaller tamping plant near pipes/culverts etc.

4.7.8 Documentation

Construction supervision is an important part of building an aquaculture containment structure. Supervision ensures that the specification requirements have actually been included in the final product.

On the project's completion, a suitably qualified person should prepare a report confirming that the structure has been built to an appropriate engineering standard. (Generally, this will be consistent with the approved engineering drawings with reasons for variations from the approved drawings documented).

In order to demonstrate compliance with the construction requirements of these guidelines, the placed material will need to be tested, particularly its in situ density. This testing should be carried out in accordance with the appropriate sections of AS1289, *Methods of testing soils for engineering purposes*.

It is also strongly recommended that all earthworks are audit tested and certified by a suitably qualified person. During construction, all excavations forming part of the permanent works should be geologically mapped. All foundation levels should be recorded, so that the location of any part of the foundations is permanently known. Extensive photography of the earthworks including foundations should be retained permanently.

A site supervisor will be appointed, records kept and insitu density testing undertaken of embankment fill material and lining materials. Levels during construction will be recorded and a photographic record during construction taken.

4.8 Monitoring

4.8.1 Construction Phase - Waters

During construction in-situ monitoring of pH and turbidity will be undertaken weekly (and after any rainfall event of more than 20mm in any 24 hours) at the following locations:

- Of any standing water within the bunds comprising settlement ponds 1 and 2 and any bunded areas within this creating separate ponded areas during construction. (pH)
- Of the leachate collection/neutralization ponds (pH)
- In the final settlement pond/balancing storage (ph and turbidity as NTU)
- At three locations on the intake drain and wetland of high ecological significance to the west of new pond 27 (ph and turbidity as NTU)
- At two locations in the eastern watercourse, near the proposed discharge point) (ph and turbidity as NTU)

4.8.2 Operation Phase - Waters

For ongoing operation, the following monitoring is proposed:

- Daily recording of intake and discharge volumes (kL)
- Daily rainfall recording (mm)
- Two monthly (six per year) monitoring of intake and discharge water quality (pH, DO, TSS, TN, TP).
- Twice annual receiving water monitoring program (SADR 1, 3 and 5, see Figure 43) (pH, DO, TSS, TN, TP), to be undertaken pre and post wet season (with tidal/discharge conditions as per section 10).

5 Planning assessment

5.1 Pre-lodgement

Guidance
DA Forms Guide Planning Template
Pre-lodgement meetings or advice are highly recommended to ensure you identify all relevant planning matters, any issues surrounding the proposed development, and any supporting information requirements.
If you have completed multiple pre-lodgement meetings and received pre-lodgement advice, ensure the details of each instance are provided. If you have not undertaken a pre-lodgement meeting or received pre-lodgement advice for this development proposal, state that no pre-lodgement was undertaken as part of this development application.

5.1.1 October 2017 Pre-lodgement Advice

On 18 October 2017, EcoSustainAbility sought pre-lodgement advice from Douglas Shire Council on specific matters/ Council replied on 26 October 2018 (per email Jenny Elphinstone). The questions and Council's advice are set out below:

EcoSustainAbility Query

1 To confirm that the MCU application should be submitted to Council as the referral agency. On the basis that as per the amended 2006 to 2013 consolidated Douglas Shire Planning Scheme, Lot 3 is in the Rural Zone of Rural Areas and Rural Settlements Locality and Aquaculture is Impact Assessable development.

DSC Response

The application is lodged under the Planning Act 2016 with Council as the Assessment Manager.
Council issues a Confirmation notice requiring the applicant to forward a copy of the application to referral agencies, as listed on the Confirmation Notice.
The Confirmation Notice also provides detail of public notification requirements.

EcoSustainAbility Query

2 We understand that the top of pond structures must be above Q100, but cannot find a published level of Q100 (1% AEP) for L3 SP292103. Is there a published flood study Council relies on for determining this? If so could you please advise where this can be obtained or even email a copy. Otherwise could Council please advise what it considers the Q100 (1%AEP) level for L3 SP292103.

DSC Response

The proposed planning scheme has some flood mapping and storm tide mapping – see extract of mapping attached.
There has been a storm tide study that includes Port Douglas, the 2012 BMTWBM storm tide inundation study commissioned by Cairns Regional Council to guide finished floor level levels for habitable rooms. Tables 5-1 and 5-2 from the BMT Storm tide report are attached below.
The tables indicate projected storm tide of 2.7m AHD outside the wave zone and 3.87m AHD within the wave effects zone with the .8m SLR.

Council provided mapping with the response, which is included at Map 16.

5.1.2 March 2017 Advice

In response an enquiry by Daintree Saltwater Barramundi, DSC responded via email on 22 March 2017 (per Jenny Elphinstone)

In regards to your enquiry today for the construction of barramundi ponds in the HAT area please note the following Council concerns:

1. *Issues of loss of marine plants – this is usually the consideration of DAF re fish habitat;*

2. *The construction of any works in an area will not, due to their location, result in a loss of property or issues of safety for persons – as no dwelling or similar structure is involved there should be no issue;*
3. *The location of the bunds does not detrimentally impact on any drainage flows to upstream, downstream or surrounding land; and*
4. *The impact of fill for the development of the bunds and whether this will push out acid sulphate in the surrounding area.*

This third issue may also be considered by DAF.

5.2 Douglas Shire Superceded Planning Scheme 2006-2013

The application is requested to be made under superceded 2006 to 2013 consolidated Douglas Shire Planning Scheme.

5.2.1 Assessable Development

Lot 3 is within the Rural Zone. Aquaculture in Rural Area is Impact Assessable development.

5.2.2 Documents Reviewed

In the preparation of this MCU Application Report the following documents have been reviewed:

- Douglas Shire Planning Scheme 2006-2013
- Key Map Identifying the 6 Localities within the Shire
- Rural Areas Rural Settlements Locality Tables of Assessment Maps
- World Heritage Areas and Environs Locality Tables of Assessment Maps
- Planning for Localities Maps and Tables of Assessment
- Acid Sulfate Soils Code
- Aquaculture and Intensive Animal Husbandry Code
- Filling and Excavation Code
- Landscaping Code
- Natural Areas and Scenic Amenity Code
- Natural Hazards Code
- Primary Industry Code
- Rural Areas and Rural Settlements Locality Guide
- Rural Planning Area Code
- Sustainable Development Code
- Vegetation Management Code
- World Heritage and Environs Locality Code
- Policy No 1 Acid Sulfate Soils
- Policy No 10 Reports Information the Council May Request
- Policy No 5 Erosion Sediment Control
- Policy No 7 Landscaping
- Policy No 8 Natural Areas Scenic Amenity
- FNQROC Development Manual

5.2.3 Aquaculture in Rural Zone

Lot 3 is in the Rural Zone and Rural Areas and Rural Settlements Locality Aquaculture is Impact Assessable development.

The following codes apply.

- Rural Area and Rural Settlements Locality Code (Lot 3 in Rural Planning Area)
- Rural Planning Area Code
- Aquaculture and Intensive Animal Husbandry Code
- Acid Sulfate Soils overlay and Code,
- Cultural Heritage overlay
    - No sites identify for Lot 3 on mapping),
- Natural Hazards Code
    - Lot 3 mapped as Low and medium risk fire hazard
- Advertising Code

  - No analysis below, not a key issue for Lot 3.
- Filling and Excavation Code
- Landscaping Code
- Natural Areas and Scenic Amenity Code
- Vehicle Parking Code
  - No analysis below, not a key issue for Lot 3.
- Vegetation Code
- Sustainable Development Code

5.3 Responses to Planning Scheme

Following review of all potentially relevant planning scheme provisions the following sections summarise the responses to provisions which may be an issue or are considered relevant to this aquaculture MCU on Lot 3.

5.3.1 Rural Area and Rural Settlements Locality Guide

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P11 Development does not adversely impact on areas of sensitive natural vegetation, foreshore areas, Watercourses and areas of tidal inundation which contribute to the Scenic Amenity and natural values of the Locality23.	No Acceptable Solution. (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 10 – Reports and Information the Council May Request, for code and impact assessable development).	The proposal has been planned and designed to avoid disturbance to natural vegetation, matters of state environmental significance and minimise impacts on local amenity. The proposal is considered to have no significant residual impact on MSES matters. Specific environmental protection and monitoring measures are proposed during construction to ensure disturbance does not occur to key conservation values on site and adjoining the site. See Sections 6, 7, 8 and 9 of this MCU Application for further information. See also the Attachments for relevant SDAP tables.

5.3.2 Rural Planning Area Code

Buffering Incompatible Land Uses

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P3 A buffer is provided to separate agricultural activities that create odour, excessive noise or use agricultural chemicals, (including Aquaculture and Intensive Animal Husbandry), from residential development.	A3.1 A buffer is provided in accordance with the requirements of State Planning Policy 1/92 and Planning Guidelines – Separating Agricultural and Residential Land Uses (DNR 1997).	The vegetation of the wetland between Lot 3 and South Arm Drive residential properties provides a buffer. The proposal will not involve a change to the noise or odour from the farm compared to at present. There have been no complaints of noise or odour from the farm from South Arm residents to date. See Sections 6, 7.7, 8 and 10 of this MCU Application Report for further information. See also the Attachments for relevant SDAP tables.

Protecting and Enhancing Native Vegetation and Adjacent Environmentally Sensitive Area

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P7 Native vegetation existing along Watercourses and in or adjacent to areas of environmental value or areas of remnant vegetation of value is protected25.	No Acceptable Solution (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 10 – Report and Information the Council May Request, for code and impact assessable development).	SARA has confirmed that the proposal will not involve clearing of Native Vegetation and the PMAV prevails (see Appendix 1D for the pre-lodgement advice). In summary, the only vegetation clearing will be of vegetation within current Settlement Ponds 1 and 2 for the construction of new production ponds. This is neither remnant vegetation nor involving clearing significant marine plants. Specific protection measures are proposed to ensure that there is not disturbance of wetland vegetation which has ecological values and/or is remnant vegetation. See section 4.5, 6, 7, 8, 9 and 12 of this MCU Application Report for further information.

5.3.3 Aquaculture and Intensive Animal Husbandry Code

Purpose

The purpose of this Code is to ensure that:

- *Aquaculture and Intensive Animal Husbandry are established on suitable Sites;*
- *Aquaculture, Intensive Animal Husbandry and associated activities do not adversely affect the amenity of residential areas or residential uses; and*
- *Aquaculture and Intensive Animal Husbandry do not have adverse impacts on the environment.*

Applicability

This Code applies to assessable development for a Material Change of Use for Aquaculture or Intensive Animal Husbandry.

Site Location and Suitability

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	*Comment*
P1 The Site has sufficient area to accommodate the Aquaculture or Intensive Animal Husbandry facility and to achieve adequate Setbacks.	No Acceptable Solution. (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 10 – Reports and Information the Council May Request, for code and impact assessable development).	The proposal to build additional production ponds in settlement ponds 2 and 3 and re-purpose drains and settlement pond 3 is entirely within the existing approved aquaculture facility and therefore has sufficient area. With an over 150% ratio of managed treatment system to production pond area and almost 50% recirculation proposed, this allows additional intensity of production on the same footprint.. See sections 3 and 4 of this MCU Application Report for further information.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	*Comment*
P2 The establishment of Aquaculture or Intensive Animal Husbandry does not interfere with coastal processes or affect native vegetation.	A2.1 The area of the Site containing the Aquaculture or Intensive Animal Husbandry facility is not located below Highest Astronomical Tide. A2.2 The establishment of the Aquaculture or Intensive Animal Husbandry facility does not involve the removal of littoral, riparian or other remnant endemic vegetation.	A2.1 The floors of the new production ponds will be above HAT. See Sections 2 and 3 of this MCU Application for further information. A2.2 The proposal has been planned and designed to avoid disturbance to natural vegetation, matters of state environmental significance and minimise impacts on local amenity. The proposal is considered to have no significant residual impact on MSES matters. The development of new aquaculture production ponds in old settlement ponds 1 and 2 and repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing aquaculture structures and has been planned and designed to minimise impacts on the natural environment though: • avoiding disturbance to the regulated vegetation and essential habitat in settlement pond 4 on the north of the site (and offering to open and old bund to restore tidal connectivity). • avoiding disturbance to the wetland to the west of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. • avoiding disturbance to the wetland to the east of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. • avoiding water quality impact by ensuring a net nutrient (contaminant) balance between intake waters and discharge, with a majority recirculation system minimising actual discharge volumes. Specific environmental protection and monitoring measures are proposed during construction to ensure disturbance does not occur to key conservation values on site and adjoining the site. See Sections 6, 7, 8 and 9 of this MCU Application Report for further information. See also the Attachments for relevant SDAP tables..

P3 The establishment of Aquaculture or Intensive Animal Husbandry does not result in the alienation of GQAL unless there is a lack of alternative Sites and an overriding need for the development.	A3.1 The area of the Site containing the Aquaculture or Intensive Animal Husbandry facility is not classified as GQAL under the State Planning Policy.	A3.1 he proposal is entirely within the area of the existing approval for Aquaculture and does not involve any alienation of good quality agricultural land.
P4 The topography of the Site is suitable for the intended use.	A4.1 The area of the Site containing the Aquaculture or Intensive Animal Husbandry facility has a slope less than 10%. A4.2 The area of the Site containing the Aquaculture or Intensive Animal Husbandry Facility is located above the Q100 flood level.	A4.1 The area has minimal slope. See Sections 3 of this MCU Application Report for further information. A4.2 The area top of the bunds is at 3.9 m AHD. The storm tide level is 2.8m AHD (Wonga Beach, outside wave effects zone).The area is not within the mapped Q100 (see Map 16, provided by Douglas Shire Council October 2017). The top of bunds, at 3.9m AHD is well above the local flood levels in the adjoining watercourses.
P5 The Site is provided with appropriate Access so that the use may operate effectively and efficiently.	A5.1 Access to the Aquaculture or Intensive Animal Husbandry Facility is provided via a Road constructed to a rural all weather standard, as a minimum standard.	Access is via the existing access on Vixies Road. There will be little additional traffic during operation. See Sections 3, 3, 4, 6.3 and 7.1 of this MCU Application Report for further information. See Attachments for SDAP 1.
P7 The establishment of Aquaculture does not adversely affect existing or planned residential or community uses.	A7.1 The Site is not less than 300 metres from any Residential 1, Residential 2, Tourist and Residential or Rural Settlement Planning Areas or any community facility where people gather such as community halls or schools.	Lot 3 is within 300 m of Rural Settlement Planning Area, however the proposal is to build additional production ponds in settlement ponds 2 and 3 and re-purpose drains and settlement pond 3, this is entirely within the existing approved aquaculture facility and therefore does not involve any additional area near the Rural Settlement area. P7 is met, the development of additional production ponds within the existing aquaculture facility on Lot 3 will not adversely affect any existing or planned residential or community uses. There are no noise, odour, visual amenity, flooding, traffic or other impacts on the South Arm Drive residences from the proposal.

Site Management

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	*Comment*
P8 Buildings, pens, other structures, ponds and waste disposal areas are sited, constructed and managed so that the maximum number of animals intended to be kept or processed on the Site can be accommodated without having any significant adverse environmental impacts outside the Site.	A8.1 Barriers are provided and maintained to prevent the escape of animals. A8.2 Waste disposal areas are situated only where there is minimal risk of contaminating any groundwater supply or surface water resource, and are of an adequate size to provide for the amount of waste generated on the Site.	P8 The management will be similar to the ongoing operation. There are no waste issues presently and there are no additional issues expected from the additional; production ponds. A8.1 The pond bunds, with HDPE liner on pond banks, 0.5m freeboard and 4m wide roadway on each bund will prevent the overland escape of Barramundi. Screens on each pond outlet, the discharge weir and the intake of the wetland treatment pump will ensure that no farmed barramundi can escape from the farm. Given the pond bunds will be at 3.9m AHD, this will ensure that storm tide and floods will not inundate the ponds. See Sections 2 and 3, 7.6 and 11 of this MCU Application Report for further information about the management and operation. See Attachment 9, for SDAP 17 - Aquaculture.

Amenity

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS	*Comment*
P9 Buildings/structures, ponds and waste disposal areas are designed and sited so that the Aquaculture or Intensive Animal Husbandry facility does not impact on the amenity of the area and does not have significant adverse environmental impacts outside the Site.	A9.1 Buildings, pens, other structures, ponds and waste disposal areas are sited clear of any Watercourse or any environmentally sensitive area.	A9.1 The development of new aquaculture production ponds in old settlement ponds 1 and 2 and repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing aquaculture structures and has been planned and designed to minimise impacts on the natural environment though: • avoiding disturbance to the regulated vegetation and essential habitat in settlement pond 4 on the north of the site (and offering to open and old bund to restore tidal connectivity). • avoiding disturbance to the wetland to the west of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. • avoiding disturbance to the wetland to the east of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. See Sections 2, 3, 6, 7, 8 and 9 of this MCU Application Report for further information. See Attachment 9, for SDAP 17 - Aquaculture.

5.3.4 Acid Sulfate Soils overlay and Code

Lot 3 is within the Acid Sulfate Soils Overlay.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P1 The release of acid and associated metal contaminants into the environment are avoided either by: not disturbing Acid Sulfate Soils; or by preventing the potential impacts of any disturbance through appropriate Site planning, treatment and ongoing management.	A1.1 The disturbance of Acid Sulfate Soils is avoided by: not excavating or removing more than 100 m3 of material identified as containing or potentially containing Acid Sulfate Soils; not permanently or temporarily extracting groundwater that results in the aeration of previously saturated Acid Sulfate Soils; and demonstrating that any filling in excess of 500 m3 of material to depths greater than an average depth of 0.5 metres will not result in ground water extrusion from Acid Sulfate Soils and the aeration of previously saturated Acid Sulfate Soils from the compaction or movement of those soils. A1.2 Site planning, treatment and ongoing management are undertaken so that: acid and metal contaminants are not generated and acidity is neutralised; untreated Acid Sulfate Soils are not taken off-Site unless this is to an alternative location for treatment; and surface and groundwater flows from areas containing Acid Sulfate Soils do not release leachate containing acid or metal contaminants into the environment.	A1.1 and A1.2 See Section 12 and Appendix 6A of the MCU Application Report. A preliminary acid sulfate soils management plan has been6A developed (Appendix XX) and this will be upgraded to a final ASSMP prior to construction. The location of the new ponds is assumed to have actual acid sulfate soils, which will be drained, limed and capped during construction of the new ponds. The excavation of ASS has been minimised in the design. The existing drain (which will become the Primary Settlement Pond) will be used to hold any waters from within the construction area and to enable liming/treatment to neutralise (reduce acidity) if required prior to discharge. The area immediately to the east of the current workshop will be used to stockpile any excavated ASS material for lime treatment prior to use as underlying fill. This area will be bunded to ensure no acid runoff.
P2 The location and extent of Acid Sulfate Soils are identified on the development Site and appropriately management so as to avoid the release of acid and associated metal contaminants into the environment.	A2.1 No Acceptable Solution (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 9 – Reports and Information the Council May Request, for code and impact assessable development).	See Section 12 and Appendix 6A of the MCU Application Report. A preliminary acid sulfate soils management plan has been developed (Appendix 6A) and this will be upgraded to a final ASSMP prior to construction. The location of the new ponds is assumed to have actual acid sulfate soils, which will be drained, limed and capped during construction of the new ponds. The excavation of ASS has been minimised in the design. The existing drain (which will become the Primary Settlement Pond) will be used to hold any waters from within the construction area and to enable liming/treatment to neutralise (reduce acidity) if required prior to discharge. The area immediately to the east of the current workshop will be used to stockpile any excavated ASS material for lime treatment prior to use as

		underlying fill. This area will be bunded to ensure no acid runoff.

Policy No 9 – Reports and Information the Council May Request
Land included on an Acid Sulfate Soils Overlay
A report which ensures sampling and analysis is carried out in accordance with the procedures described in Guideline for State Planning Policy 2/02 Planning and Managing Development Involving Acid Sulfate
Soils and includes information on the presence, extent and intensity of Acid Sulphate Soils (ASS) and Potential Acid Sulphate Soils (PASS).
Where PASS or ASS is identified, a Management Plan is to be prepared by a suitably qualified and experienced person which includes, but is not necessarily limited to:
• an ASS map or maps;
• a detailed description of the depth and location of all ASS identified;
• the methodology used for sampling and analysis (both field and laboratory);
• the ASS management practices to be implemented that will achieve any or all of the following:
- details of any pilot project of field trial to be undertaken to prove the effectiveness of any new technology or innovative;
- the monitoring and reporting procedures to be established and implemented;
- a contingency plan and accident/emergency response procedures;
- performance criteria to be used to assess the effectiveness of the ASS management and monitoring measures.

Regarding Policy No 9, please see Section 12 and Appendix 6A of this MCU Application Report.

5.3.5 Cultural Heritage Overlay

No sites identified for Lot 3 on mapping).

5.3.6 Natural Hazards Code

Lot 3 mapped as Low and medium risk fire hazard

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P1 Development does not compromise the safety of people or property from bushfire.	A1.1 Any development on land identified as High Risk Hazard on any Natural Hazards Overlay on any Locality Map complies with the relevant requirements of State Planning Policy 1/03 – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide. AND Development complies with a Bushfire Management Plan prepared for the site.	P1 The nature of the site, surrounded by wetlands and being open aquaculture ponds and treatment wetlands results in a very low onsite bushfire risk.

5.3.7 Filling and Excavation Code

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P1 All filling and excavation work does not create a detrimental impact on the slope stability, erosion potential or visual amenity of the Site or the surrounding area.	A1.1 The height of cut and/or fill, whether retained or not, does not exceed 2 metres in height. AND Cuts in excess of those stated in A1.1 above are separated by benches/terraces with a minimum width of 1.2 metres that incorporate drainage provisions and screen planting. A1.2 Cuts are supported by batters, retaining or rock walls and associated benches/terraces are capable of supporting mature vegetation.	A1.1 The cut and fill of the outer bund has a bench of 2m width. A1.2 The bund batters will be revegetated on their outer side. On the inside (pond side) they will be lined with HDPE sheet. The drain batters will be grassed and have riprap rock protection near their outlets and the drain floor will have erosion protection. A1.3 The outer bund walls of the new production ponds will be revegetated, this will provide screening from view. A1.4 The topsoil will be retained as will mulched vegetation to ensure

	A1.3 Cuts are screened from view by the siting of the Building/structure, wherever possible. A1.4 Topsoil from the Site is retained from cuttings and reused on benches/terraces. A1.5 No crest of any cut or toe of any fill, or any part of any retaining wall or structure, is located closer than 600 mm to any boundary of the property, unless the prior written approval of the adjoining landowner and the Council, has been obtained. A1.6 Non-retained cut and/or fill on slopes are stabilised and protected against scour and erosion by suitable measures, such as grassing, Landscaping or other protective/aesthetic measures.	prompt and effective revegetation of pond batters. A1.5 The toe of the existing bunds will remain the outer limit of the on-site structures and will not further impinge toward adjoining property boundary with Lot 1. A1.6 There will be revegetation and erosion control as per Section 4. See Sections 2, 3, 4, 5, 6, 7 and 8 of the MCU Application Report.

5.3.8 Landscaping Code

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P1 Landscape design satisfies the purpose and the detailed requirements of this Code.	A1.1 Landscaping is undertaken in accordance with a Landscape Plan drawn to scale which complies with and illustrates all the relevant requirements of this Code and Planning Scheme Policy No 7 – Landscaping. AND Landscaping is maintained in accordance with the requirements specified in this Code and Planning Scheme Policy No 7 – Landscaping.	A1.1 the new bund outer walls will be revegetated (grasses and shrubs, trees may naturally recruit). The inner pond walls will be lined with HDPE as erosion protection. See Section 4 the MCU Application Report.
P2 Landscaping contributes to a sense of place, is functional to the surroundings and provides dominant visual interest and form.	A2.1 A minimum of 80% of the proposed landscape area is open to the sky for sunlight and ventilation. A2.2 The percentage of native or endemic species utilized in the Landscaping is as specified in the Locality Code. OR Where not specified in the Locality Code, in accordance with Planning Scheme Policy No. 7 – Landscaping. A2.3 Landscaping includes planting layers comprised of canopy, middle storey, screening and groundcovers, with palm trees used as accent plants only.	A2.1 The revegetation as proposed will exhibit a continued sense of place as lowland wetlands. A2.2 The revegetation will initially use mulch and seeded grass for urgent erosion stabilisation. Trees and shrubs will naturally recruit. See Section 4 of the MCU Application Report.
P3 Landscaping is consistent with the existing landscape character of the area and native vegetation existing on the Site is to be retained wherever possible and integrated with new Landscaping47	A3.1 Existing native vegetation on Site is retained and incorporated into the Site design, wherever possible. A3.2 Any mature vegetation on the Site which is removed or damaged during development of the Site is replaced with advanced native species. A3.3 Where there is an existing landscape character in a street or locality which results from existing vegetation, similar species are	A3.1 The vast majority of natural vegetation on Lot 3 will be retained. Lot 3 is 50.98 ha, the new area of construction disturbance will be 8.5 ha, with the existing pond and workshop area of about 5 ha, this leaves approximately 35 ha of existing vegetation undisturbed. Only vegetation which is regrowth in settlement pond 2 will be removed for

	planted on Site or on the street. A3.4 Street trees are 100% native species which enhance the landscape character of the streetscape, with species chosen from the Plant Species Schedule in Planning Scheme Policy No 7 – Landscaping.	construction of the new ponds. A3.2 The revegetation will initially use mulch and seeded grass for urgent erosion stabilisation. Trees and shrubs will naturally recruit. A3.3 The landscape character of Lot 3 from Vixies Road and from the Highway will be retained. The foreground will remain the grassed ponds and the background will include the new ponds and their revegetation bund walls. A3.4 N/A. See Sections 3 and 4of the MCU Application Report.
P9 The environmental values of the Site and adjacent land are enhanced.	A9.1 Landscaping using similar endemic or native species, is planted on-Site on land adjoining an area of natural environmental value.	A9.1 The revegetation will initially use mulch and seeded grass for urgent erosion stabilisation. Trees and shrubs will naturally recruit.

5.3.9 Natural Areas and Scenic Amenity Code

NOTE The northern bund of Settlement Pond 3 will need some work to raise the western end and establish low weirs. Further the new discharge will be works near the remnant vegetation and watercourse. Therefore the development area will be within the required 50m buffers to remnant vegetation and a watercourse.

48 The boundary and the extent of Remnant Vegetation and the boundary of any Watercourse on a development Site will be ground-truthed by Council at no cost to the landowner – refer to Planning Scheme Policy No. 8 – Natural Areas and Scenic Amenity.

Development in Areas of Natural and Scenic Amenity Value

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P1 Where a development within a DDA triggers this Code, the natural and environmental values of the areas of Remnant Vegetation and/or Watercourse/s are protected from inappropriate development.	A1.1 Buildings/structures Access Roads/car parking, infrastructure and landscape/recreation facilities are constructed within the DDA identified on a Site Plan drawn to scale. A1.2 Where internal Roads are required to service the development, the Roads are located within a DDA identified on a Site Plan drawn to scale. (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 8 – Natural Areas and Scenic Amenity and Planning Scheme Policy No 10 – Reports and Information the Council May Request, for code and impact assessable development).	A1.1/A1.2 The access road on the bund will be considered internal roads, therefore the DDA (the development area will include the bunds, therefore right against watercourse and remnant vegetation.
P2 Development does not adversely impact on the natural and environmental values and Scenic Amenity of areas identified as Remnant Vegetation and/or Watercourse/s.	A2.1 Where development occurs, it is located on that part of the Site which poses the least threat to the natural and environmental values and Scenic Amenity, for example: □ adjacent to existing development; □ within an existing cleared area; □ within a disturbed area with little potential for rehabilitation; □ within an area close to an Access	A2.1 The whole planning and design has been developed to does not adversely impact on the natural and environmental values and Scenic Amenity of areas identified as Remnant Vegetation and/or Watercourse/s. The development of new aquaculture production ponds in old settlement ponds 1 and 2 and repurposing of two drains for settlement and

	Road; □ removed from an identified area of important habitat. A2.2 Development within the DDA is sited to minimise visual intrusion on the Site and the surrounding landscape. A2.3 No continuous boundary fence lines or barriers are Erected on an approved development Site within a DDA identified on a Site Plan drawn to scale. A2.4 Infrastructure, such as water mains, sewers, electricity and telecommunication services, is sited underground, wherever reasonable, to protect Scenic Amenity, and is located within a DDA on a Site Plan drawn to scale. A2.5 Internal Roads associated with the development are designed and constructed to achieve a low speed environment. A2.6 Roads and infrastructure services do not cross the Setback area/riparian corridor; or if this is not possible, the number of crossings is minimised. A2.7 Setback areas/riparian corridors are provided in accordance with A4.1, A4.2, A4.3 and A4.4 below; AND The lowest intensity of development occurs adjacent to any Setback area/riparian corridor, and in the case of reconfiguration, larger lots are located adjacent to any Setback area/riparian corridor. A2.8 There is no fragmentation or alienation of any Remnant Vegetation. A2.9 Any natural, environmental or Scenic Amenity value of any balance area outside the	repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing aquaculture structures and has been planned and designed to minimise impacts on the natural environment though: • avoiding disturbance to the regulated vegetation and essential habitat in settlement pond 4 on the north of the site (and offering to open and old bund to restore tidal connectivity). • avoiding disturbance to the wetland to the west of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. • avoiding disturbance to the wetland to the east of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. A2.2 The design is sited to minimise visual intrusion on the Site and the surrounding landscape. A2.3 There will be no continuous boundary fence lines or barriers. A2.4 The intake water distribution to ponds, electricity and telecommunication services, are sited underground, A2.5 The bund walls from internal roads, these are low speed! A2.6 There are no crossings or the adjoining wetlands and riparian areas. A2.7 See responses to A4.1, A4.2, A4.3 and A4.4 below. A2.8 There is no fragmentation or alienation of any Remnant Vegetation. A2.9 There will be minimal short term impacts on the scenic amenity during construction and none once outer bund walls are revegetation. See Sections 3 and 4 of this MCU Application Report.

P3 Any development involving filling and excavation minimises detrimental impacts on any aquatic environment.	No Acceptable Solution. (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 8 – Natural Areas and Scenic Amenity and Planning Scheme Policy No 10 – Reports and Information the Council May Request, for code and impact assessable development).	P3 The development is entirely within existing bund walls and will not have any direct impact on the aquatic environment. The development of new aquaculture production ponds in old settlement ponds 1 and 2 and repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing aquaculture structures and has been planned and designed to minimise impacts on the natural environment though: • avoiding disturbance to the regulated vegetation and essential habitat in settlement pond 4 on the north of the site (and offering to open and old bund to restore tidal connectivity). • avoiding disturbance to the wetland to the west of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. • avoiding disturbance to the wetland to the east of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. • avoiding water quality impact by ensuring a net nutrient (contaminant) balance between intake waters and discharge, with a majority recirculation system minimising actual discharge volumes. See Sections 3 and 4 of this MCU Application Report..

Setback Areas/Riparian Corridors

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P4 Setback areas/riparian corridors adjacent to Watercourses are provided/maintained or re-established and revegetated with species endemic to the local area.	A4.1 For residential reconfiguration (Residential 1, Residential 2 or Rural Settlement Planning Area), Aquaculture, Tourist Activities, Industrial Activities and other large scale developments or development likely to have an impact on water quality of adjacent Watercourse/s any degraded sections of the Setback area/riparian corridor are revegetated with endemic species typical of the riparian corridor in the area. A4.2 Revegetation occurs in accordance with a Landscape Plan prepared by a suitably qualified professional in compliance with the requirements of Planning Scheme Policy No 8 – Natural Areas and Scenic Amenity, Landscaping Code and Planning Scheme Policy No 7 – Landscaping. A4.3 The minimum width of the Setback area/riparian corridor, measured out from the shoulder of each high bank, for the respective categories of Watercourses, where a riparian corridor of vegetation already exists is: □ Category 1 – Major Perennial Watercourse – 30 metres □ Category 2 – Perennial Watercourse – 20 metres □ Category 3 – Minor Perennial – 10 metres, AND buildings are sited clear of the Setback area/riparian corridor, in accordance with the relevant Setbacks outlined above. OR The minimum width of the Setback area/riparian corridor, measured out from the shoulder of each high bank, for the respective categories of Watercourses, where no riparian corridor of vegetation already exists is: □ Category 1 – Major Perennial Watercourse – 10 metres □ Category 2 – Perennial Watercourse – 5 metres	A4.1 The outer bund walls adjoining the wetlands and watercourses will be re-established and revegetated. The revegetation will initially use mulch and seeded grass for urgent erosion stabilisation. Trees and shrubs will naturally recruit. A4.2 The outer bund walls adjoining the wetlands and watercourses will be re-established and revegetated. The revegetation will initially use mulch and seeded grass for urgent erosion stabilisation. Trees and shrubs will naturally recruit. A4.3 The development is entirely within the existing bunds of settlement ;ponds 1 and 2 and thus there is no new construction outside of the existing approved area of disturbance. I leiu of a spatial setback there are specific measures to ensure the disturbance to the adjoining watercourses and wetlands is avoided through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall. A4.4 The existing native vegetation within the adjoining riparian corridors, watercourse and wetlands will be retained.

	Category 3 – Minor Perennial – 2.5 metres, AND buildings are sited clear of the Setback area/riparian corridor, in accordance with the relevant Setbacks above. A4.4 Native vegetation within the Setback area/riparian corridor, other than identified noxious and environmental weeds, is retained.	
P5 Any use of a Setback area/riparian corridor does not adversely affect the integrity of the Setback area/riparian corridor.	A5.1 Only low key, passive, low impact recreational facilities, including pedestrian and cycle paths or boardwalks, are located within the Setback area/riparian corridor. A5.2 The location of low key, passive, low impact recreational facilities, including pedestrian and cycle paths or boardwalks within the Setback area/riparian corridor, does not affect the connectivity function and landscape/environmental or Scenic Amenity values of the Setback area/riparian corridor.	N/A

Use of Setback Areas/Riparian Corridors

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTION	COMMENT
P6 Any development sited wholly or partially on land with a slope greater than 15% protects the Scenic Amenity values of the land from inappropriate and visually prominent development.	A6.1 Land with a slope greater than 15% and including Remnant Vegetation remains undeveloped and in its natural state. A6.2 Any development remains unobtrusive and sited below the tree line and ridge line. (Information that the Council may request to demonstrate compliance with the Performance Criteria is outlined in Planning Scheme Policy No 8 – Natural Areas and Scenic Amenity and Planning Scheme Policy No 10 – Reports and Information the Council May Request, for code and impact assessable development).	N/A

5.3.10 Vehicle Parking Code

No analysis below, not an applicable key issue for Lot 3.

5.3.11 Vegetation Code

NOTE Text from this code is not extractable. Tables inserted below as pictures (poor quality, best possible from document available from Douglas Shire Council).

Please see the Pre-lodgement advice at Appendix 1D, and note the application of the PMAV for the site. Please refer to sections 4, 6, 7, 8 and 9 of this MCU Application Report.

Key points regarding vegetation on site:

- P1 The scenic amenity of the area will be maintained. There will be no fragmentation of habitat. Only regrowth vegetation in settlement ponds 1 and 2 will be affected. There will be no affect on wetlands of ecological significance nor remnant vegetation on site and hence no impact on the biodiversity and ecological values of the region. Vegetation within the existing wetlands and riparian areas will be retained for erosion protection (and habitat values!), revegetation on the outer bund walls will implemented to avoid erosion.
- P2 There will be no nuisance from the vegetation removed in settlement ponds 1 and 2.
- P3 There will be no removal of a healthy significant tree from a streetscape.
- P4 The vegetation in settlement ponds 1 and 2 are no mapped as part of the heritage overlay.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
P1 Vegetation must be protected to ensure that - a) The character and amenity of the local area is maintained; and b) Vegetation damage does not result in fragmentation of habitats; and c) Vegetation damage is undertaken in a sustainable manner; and d) The regions biodiversity and ecological values are maintained and protected; and e) Vegetation of historical, cultural and / or visual significance is retained; f) Vegetation is retained for erosion prevention and slope stabilisation.	A1.1 The vegetation damage occurs on a lot, other than a lot in the Flagstaff Hill Special Management Area, and has a lot size equal to or less than 800m². OR A1.2 The lot is within an Urban Area or Rural Settlement Planning Area, other than the Flagstaff Hill Special Management Area, and the vegetation damage is within six (6) metres (measured from the centre of the tree's trunk, at ground level, to the nearest edge of the structure) of an existing or approved building or structure or within three (3) metres of a boundary fence. OR A1.3 The lot is within a Conservation Planning Area or the Flagstaff Hill Special Management Area and the vegetation damage is within three (3) metres (measured from the centre of the tree's trunk, at ground level, to the nearest edge of the structure) of an existing or approved building or structure. OR

	A1.4 The vegetation damage occurs within the path of, or within three (3) metres (measured from the centre of the tree's trunk, at ground level, to the nearest edge of the structure/infrastructure) of the path of an approved road, water supply, sewerage or drainage works. OR **A1.5** The vegetation damage is essential for carrying out work authorised or required under another Act. OR **A1.5** The lot is within a Rural Planning Area and the vegetation damage is within ten (10) metres (measured from the centre of the tree's trunk, at ground level, to the nearest edge of the structure) of an existing or approved building or structure or within three (3) metres of a boundary fence. OR **A1.7** The lot is within the Rural or Rural Settlement Planning Area and the vegetation damage is for Routine Management, Essential Management or in accordance with a regular maintenance program in conjunction with an existing lawful rural pursuit. OR **A1.8** The vegetation damage is considered to be one or more of the following: a) actually or potentially dangerous as a result of being dead, dying or diseased, structurally unsound, or having a growth form or habit which is hazardous and is presenting a threat to the safety of persons or property; b) is the removal of vegetation which was planted for landscaping purposes. OR **A1.9** The vegetation damage is essential for the survey of a property boundary by a licensed cadastral surveyor. OR **A1.10** The vegetation damage is to maintain an existing fire break; OR **A1.11** The vegetation is damaged as the result of pruning essential to prevent interference to overhead service cabling. OR **A1.12** The vegetation is damaged as the result of a regular maintenance program to remove part of the vegetation (e.g. fronds or seeds or deadwooding). OR **A1.13** The vegetation damage is the removal and disposal, at an approved site, of a declared pest; OR **A1.14** The vegetation is damaged as the result of an approved Forest Practice, where the lot is subject to a scheme approved under another law; OR **A1.15** The vegetation is damaged in association with a traditional Aboriginal or Torres Strait Islander cultural activity, other than a commercial activity. (For assistance in clarification please contact Council's Development Assessment team on 4044 3044.)

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
P2 Vegetation damaged on a lot does not result in a nuisance.	**A2.1** Damaged vegetation is removed and disposed of at an approved site. OR **A2.2** Damaged vegetation is mulched or chipped and used onsite. OR **A2.3** On a lot in the Rural Planning Area vegetation is disposed of by burning, approved by an appropriate authority.

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
P3 Vegetation damage does not result in the removal of a healthy, significant tree from the streetscape.	**A3.1** Vegetation damaged does not result in the removal of a significant tree from between the forward building line and the sites frontage or within six (6) metres of the sites frontage (if not building exists on-site).

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
P4 Vegetation damage on a lot identified on a Local Heritage Overlay or on a lot identified on the Queensland Heritage Register does not result in a negative impact on the sites heritage values.	A4.1 The vegetation damage results in the removal of vegetation that is one or more of the following: a) actually or potentially dangerous as a result of being dead, dying or diseased, structurally unsound, or having a growth form or habit which is hazardous; b) a threat to the safety of persons or property; c) restricting the habitability of the dwelling on the lot or a neighbouring lot.

5.3.12 Sustainable Development Code

No applicable.

Whislt the code is not directly applicable, the proposal has been planned and designed to achieve the most sustainable practicable development of aquaculture on the site.

6 State Assessment and Other Matters

6.1 State Interests

6.1.1 Matters established in the Planning Regulation

Guidance

DA Forms Guide Planning Template

This section should detail any matters established in the Planning Regulation 2017 that are relevant to this development application. Note that the previous State Planning Regulatory Provisions no longer exist. You will need to check the Planning Regulation for the relevant development assessment requirements.

6.1.2 State Planning Policy

Guidance

DA Forms Guide Planning Template

This section should detail the relevance of Part E of the SPP (State interest policies and assessment benchmarks) to your development application. Assessment benchmarks have been prepared for certain state interests to ensure that the state's interests are appropriately considered by local governments when assessing development applications where the local government planning scheme has not appropriately integrated the state interests in the SPP. Generally, a local government planning scheme will detail which state interests have been considered in preparing the planning scheme.

Assessment benchmarks have been provided for the following state interests:

Liveable communities

Mining and extractive resources

Water quality

Natural hazards, risk and resilience

Strategic airports and aviation facilities.

Identify below which state interests are relevant to your development application and provide commentary on how your development application complies or does not comply with the assessment benchmarks.

If a local government has reflected all the state interests in its planning scheme, the assessment benchmarks are not applicable.

6.1.3 Mapping Layers

The following state interests have been identified though the DILGP SPP Mapping System, Mapping Layers for Matters of Interest for Lot 3SP292103 (see also Maps 2 and 8):

AGRICULTURE

Agricultural land classification – class A and B

BIODIVERSITY

MSES – Wildlife habitat

MSES – Regulated vegetation (category B)

MSES – Regulated vegetation (category R)

MSES – Regulated vegetation (essential habitat)

MSES – Regulated vegetation (wetland)

MSES – Regulated vegetation (intersecting a watercourse)

MSES – High ecological significance wetlands

COASTAL ENVIRONMENT

Coastal management district

NATURAL HAZARDS RISK AND RESILIENCE

Flood hazard area – Level 1 – Queensland floodplain assessment overlay*

Bushfire prone area

Erosion prone area

Medium storm tide inundation area

High storm tide inundation area

TRANSPORT INFRASTRUCTURE

State-controlled road

Further using the DILGP DA Mapping System the following development assessment mapping layers were identified (see Maps 2, 8 and 9).

COASTAL PROTECTION
Coastal management district
Coastal area – erosion prone area
Coastal area – medium storm tide inundation area
Coastal area – high storm tide inundation area
FISH HABITAT AREAS
Queensland waterways for waterway barrier works
WETLAND PROTECTION AREAS
Wetland protection area trigger area
Wetland protection area wetland
NATIVE VEGETATION CLEARING
Regulated vegetation management map (Category A and B extract)
STATE TRANSPORT CORRIDOR
State-controlled road
AREAS WITHIN 25M OF A STATE TRANSPORT CORRIDOR
Area within 25m of a State-controlled road

6.2 Referral Agency

It is understood that the following referrals are required (see pre-lodgement advice 1709-1202 SPL, Appendix 1C).

Department of Infrastructure, Local Government and Planning's jurisdiction (as referral agency):

- Schedule 10, Part 3, Division 4, Table 3, Item 1 – Clearing native vegetation (if applicable)
- Schedule 10, Part 5, Division 4, Table 2, Item 1 – Non-devolved environmentally relevant activities
- Schedule 10, Part 6, Division 1, Subdivision 3, Table 1, Item 1 – Aquaculture
- Schedule 10, Part 6, Division 3, Subdivision 3, Table 2, Item 1 – Removal, destruction or damage of marine plants
- Schedule 10, Part 9, Division 4, Table 2, Item 4 – State transport corridor or that is a future State transport corridor
- Schedule 10, Part 17, Division 3, Table 6, Item 1- Tidal works or work in a coastal management district (if applicable)
- Schedule 10, Part 20, Division 4, Table 3, Item 1 – Premises in a wetland protection area (if applicable)

6.3 State Planning Policy Benchmarks

The SPP includes assessment benchmarks that may be applicable where a local government planning scheme does not adequately reflect the SPP. Table 5 identifies State Planning Policy assessment benchmarks which are applicable with a response of the achievement of the benchmark. Some state interests have further discussion in the following sections.

Maps 1-15 depicts the various state planning policy aspect maps relevant to Lot 3.

Table 5: State Interests – Analysis of State Planning Policy Benchmarks

State interest	Assessment against assessment benchmark
Agriculture	(2) Agricultural Land Classification (ALC) Class A and Class B land is protected for sustainable agricultural use by: (a) avoiding fragmentation of ALC Class A or Class B land into lot sizes inconsistent with the current or potential use of the land for agriculture. Lot 3 is AALC Class A and B the further development of aquaculture on the land is consistent with the benchmark. (4) Growth in agricultural production and a strong agriculture industry is facilitated by: (a) promoting hard to locate intensive agricultural land uses, such as intensive animal industries, aquaculture, and intensive horticulture in appropriate locations (b) protecting existing intensive agricultural land uses, such as intensive animal industries, aquaculture, and intensive horticulture, from encroachment by development that is incompatible and/or would compromise the safe and effective operation of the existing activity Given Lot 3 is already a thriving aquaculture facility the further development of aquaculture on the land is consistent with the benchmark. (d) facilitating opportunities for co-existence with development that is complementary to agricultural uses that do not reduce agricultural productivity (e.g. on-farm processing, farm gate sales, agricultural tourism etc) Given Lot 3 already has a agricultural tourism product the further development of aquaculture, including the best practice wetland treatment and circulation as a demonstration of sustainability is consistent with this benchmark.

State interest	Assessment against assessment benchmark
<Biodiversity	(1) Development is located in areas to avoid significant impacts on matters of national environmental significance and considers the requirements of the *Environment Protection and Biodiversity Conservation Act 1999*. The development of additional aquaculture ponds within the current footprint of disturbance in existing settlement ponds does not affect any matters of national environmental significance. (2) Matters of state environmental significance are identified[2] and development is located in areas that avoid adverse impacts; where adverse impacts cannot be reasonably avoided, they are minimised[3]. Section 8 sets out the MSES matters and addresses the minimisation of impacts. Sections 9 sets out an consideration of residual impacts. (3) Matters of local environmental significance are identified and development is located in areas that avoid adverse impacts; where adverse impacts cannot be reasonably avoided, they are minimised[4]. Section 8 sets out the MSES matters (which are also local environmental significance) and addresses the minimisation of impacts. Section 9 sets out an consideration of residual impacts. (4) Ecological processes and connectivity is maintained or enhanced by avoiding fragmentation of matters of environmental significance. The development of additional aquaculture ponds within the current footprint of disturbance in existing settlement ponds does not affect the integrity of ecological process, and does not involve any habitat fragmentation.
Coastal Environment	(1) Coastal processes and coastal resources statewide, including in the Great Barrier Reef catchment, are protected by: (a) concentrating future development in existing urban areas through infill and redevelopment (b) conserving the natural state of landforms, wetlands and native vegetation in the coastal management district (c) maintaining or enhancing the scenic amenity and aesthetic values of important natural coastal landscapes, views and vistas Section 7.2 sets out more detailed considerations. The development of additional aquaculture ponds within the current footprint of disturbance in existing settlement ponds on Lot 3 does not affect the integrity of coastal process, and does not impact on the scenic amenity. The estuarine vegetation and wetland of ecological significance adjoining Lot 3 will not be affected by the development.

State interest	Assessment against assessment benchmark
Water Quality	(1) Development facilitates the protection or enhancement of environmental values and the achievement of water quality objectives for Queensland waters. See section 10.7 which addresses the water quality objectives and environmental values (including modelling of the efficacy of the treatment wetland/recirculation system). The development of additional aquaculture ponds within the footprint of existing bunded settlement ponds on Lot 3, in concert with the repurposing of existing drains to primary settlement and final settlement/balancing storage roles, the repurposing of a settlement pond to an actively managed treatment wetland and the recirculation of treated waste water ensures that there will be a net nutrient balance. Given the net nutrient balance between the intake of the key nutrients nitrogen and phosphorous from the South Arm of the Daintree River and the discharge of similar amounts of these nutrients there will be no net residual impact on water quality. (3) Development is located, designed, constructed and operated to avoid or minimise adverse impacts on environmental values of receiving waters arising from: (a) altered stormwater quality and hydrology The proposed development of additional aquaculture ponds is within the bunded area of two existing settlement ponds. Existing stormwater drainage and groundwater recharge will remain in place. Aquaculture production ponds will be constructed in accordance with the QLD guidelines for aquaculture pond impermeability (based on risk assessment, planned to be better than $1x\ 10^{-9}$ m/s). Stormwater from the site will be passed through the treatment wetland and to settlement ponds, ensuring minimal contamination. Affects on stormwater quality and hydrology are unlikely.

State interest	Assessment against assessment benchmark
	(b) waste water (other than contaminated stormwater and sewage) See section 10.7 which addresses the water quality objectives and environmental values (including modelling of the efficacy of the treatment wetland/recirculation system). The development of additional aquaculture ponds within the footprint of existing bunded settlement ponds on Lot 3, in concert with the repurposing of existing drains to primary settlement and final settlement/balancing storage roles, the repurposing of a settlement pond to an actively managed treatment wetland and the recirculation of treated waste water ensures that there will be a net nutrient balance. Given the net nutrient balance between the intake of the key nutrients nitrogen and phosphorous from the South Arm of the Daintree River and the discharge of similar amounts of these nutrients there will be no net residual impact on water quality. (c) the creation or expansion of non-tidal artificial waterways The proposed aquaculture production ponds, settlement ponds and treatment wetland are all within the footprint of the existing bunded settlement ponds 1, 2 and 3. Thus there is no creation or expansion of non-tidal artificial waterways. The offer to open the old bund in existing settlement pond 4 will reconnect an area to the tidal regime. (d) the release and mobilisation of nutrients and sediments. See section 10.7 which addresses the water quality objectives and environmental values (including modelling of the efficacy of the treatment wetland/recirculation system). The development of additional aquaculture ponds within the footprint of existing bunded settlement ponds on Lot 3, in concert with the repurposing of existing drains to primary settlement and final settlement/balancing storage roles, the repurposing of a settlement pond to an actively managed treatment wetland and the recirculation of treated waste water ensures that there will be a net nutrient balance. Given the net nutrient balance between the intake of the key nutrients nitrogen and phosphorous from the South Arm of the Daintree River and the discharge of similar amounts of these nutrients there will be no net residual impact on water quality. (4) At the construction phase, development achieves the applicable stormwater management design objectives in table A (appendix 2). An erosion and sediment control plan will be developed including the relevant aspects of the FNQROC Development Manual. (5) At the post-construction phase, development: (a) achieves the applicable stormwater management design objectives on-site, as identified in table B (appendix 2); Design has taken into account on site stormwater generation within the capacities of the settlement ponds and treatment wetland.

State interest	Assessment against assessment benchmark
Natural Hazards Risk and Resilience	(4) Development in bushfire, flood, landslide, storm tide inundation or erosion prone natural hazard areas: (a) avoids the natural hazard area; or (b) where it is not possible to avoid the natural hazard area, development mitigates the risks to people and property to an acceptable or tolerable level. The development will not involve any change to the fuel loads or fire regime, nor need additional firebreaks. The development will not have an affect on bushfire hazard. Regarding flooding, the development will not restrict the hydraulic capacity of the two drainage lines to the east and west of the site, affects on flooding are unlikely. See section 3.4 regarding storm tide inundation. The new aquaculture ponds will be constructed to be well above the local storm tide inundation level. The primary settlement pond, final settlement pond/balancing storage and the treatment wetland have bunds below the storm tide level, however they will remain unaffected by inundation and can return to full functionality after any likely storm tide. See section 7.2 regarding the erosion prone area. Lot 3 is over 1 km from Wonga beach and its fore dune and there are five chenier dune/swale systems and four active water courses running parallel to the beach in the dune/swale system. There is a developed urban roadway (South Arm Drive) and residential development on the chenier to the east between Lot 3 and the beach. Lot 3 is well away from the active beach erosion area. Erosion prone areas within a coastal management district: (8) Development does not occur unless the development cannot feasibly be located elsewhere and is: (a) coastal-dependent development; or The development does not involve any additional disturbance to coastal processes, not cause erosion nor likely to be affected by erosion. Saltwater Barramundi farming relies on access to tidal waters for intake. (9) Development permitted in policy 8 above, mitigates the risks to people and property to an acceptable or tolerable level. The risk to the proposed development on Lot 3 from coastal processes or erosion are minimal and commercially acceptable to Daintree Saltwater Barramundi. The risk of any consequential impact on coastal processes or erosion resulting from the additional aquaculture production ponds is negligible.

State interest	Assessment against assessment benchmark
	A development application for a material change of use, reconfiguration of a lot or operational works on premises in any of the following: (1) bushfire prone areas (2) flood hazard areas (3) landslide hazard areas (4) storm tide inundation areas (5) erosion prone area.7 All of the following requirements are assessment benchmarks for the development: Erosion prone areas within a coastal management district8: (1) Development does not occur in an erosion prone area within a coastal management district unless the development cannot feasibly be located elsewhere and is: (a) coastal-dependent development; or (b) temporary, readily relocatable or able to be abandoned development; or (c) essential community infrastructure; or (d) minor redevelopment9 of an existing permanent building or structure that cannot be relocated or abandoned. The development does not involve any additional disturbance to coastal processes, not cause erosion nor likely to be affected by erosion. Saltwater Barramundi farming relies on access to tidal waters for intake. This is (1) (a), coastal dependent development. (2) Development permitted in (1) above, mitigates the risks to people and property to an acceptable or tolerable level. The risk to the proposed development on Lot 3 from coastal processes or erosion are minimal and commercially acceptable to Daintree Saltwater Barramundi. The risk of any consequential impact on coastal processes or erosion resulting from the additional aquaculture production ponds is negligible. Bushfire, flood, landslide, storm tide inundation, and erosion prone areas outside the coastal management district: (3) Development other than that assessed against (1) above, avoids natural hazard areas, or where it is not possible to avoid the natural hazard area, development mitigates the risks to people and property to an acceptable or tolerable level. Regarding bushfire, the development will not involve any change to the fuel loads or fire regime, nor need additional firebreaks. The development will not have an affect on bushfire hazard. Regarding flooding, the development will not restrict the hydraulic capacity of the two drainage lines to the east and west of the site, affects on flooding are unlikely. See section 3.4 and 7.2 regarding storm tide inundation. The new aquaculture ponds will be constructed to be well above the local storm tide inundation level. The primary settlement pond, final settlement pond/balancing storage and the treatment wetland have bunds below the storm tide level, however they will remain unaffected by inundation can return to full functionality after any such storm tide. See section 7.2 regarding the erosion prone area. Lot 3 is over 1 km from Wonga beach and its fore dune and there are five chenier dune/swale systems and four active water courses running parallel to the beach in the dune/swale system. There is a developed urban roadway (South Arm Drive) and residential development on the chenier to the east between Lot 3 and the beach. Lot 3 is well away from the active beach erosion area.

State interest	Assessment against assessment benchmark
	All natural hazard areas: (4) Development supports and does not hinder disaster management response or recovery capacity and capabilities. The development of additional aquaculture ponds, settlement ponds and treatment wetland within existing settlement ponds on Lot 3 will not hinder disaster management response or recovery capacity and capabilities (5) Development directly, indirectly and cumulatively avoids an increase in the severity of the natural hazard and the potential for damage on the site or to other properties. The development of additional aquaculture ponds, settlement ponds and treatment wetland within existing settlement ponds on Lot 3 will not hinder indirectly or cumulatively cause an increase in the severity of the natural hazard and the potential for damage on the site or to other properties (6) Risks to public safety and the environment from the location of hazardous materials and the release of these materials as a result of a natural hazard are avoided. The development of additional aquaculture ponds, settlement ponds and treatment wetland within existing settlement ponds on Lot 3 will not cause risks to public safety and the environment from the location of hazardous materials and the release of these materials as a result of a natural hazard. (7) The natural processes and the protective function of landforms and the vegetation that can mitigate risks associated with the natural hazard are maintained or enhanced. The development of additional aquaculture ponds, settlement ponds and treatment wetland within existing settlement ponds on Lot 3 will allow natural processes and the protective function of landforms and the vegetation that can mitigate risks associated with natural hazards.

6.4 Pre-lodgement Meetings and Correspondence

Guidance
DA Forms Guide Planning Template
Attending a pre-lodgement meeting or requesting pre-lodgement advice from any applicable referral agency is highly recommended because it will ensure you identify all relevant referral requirements and are aware of any issues surrounding the proposed development and supporting information.
If you have completed multiple pre-lodgement meetings and received pre-lodgement advice, ensure the details of each instance are provided. If you have not attended a pre-lodgement meeting or received
pre-lodgement advice for this development proposal, state that no pre-lodgement occurred as part of this development application.
If your development application does not require any referral, you can delete this section.

Various pre-lodgement meetings and correspondence was undertaken with the following referral agenc ies.

- 22 December 2016 meeting held with SARA, issues addressed include marine plants, habitat assessments, offsets policy and assessing significant residual impacts (see Appendix 1A).
- 1 June 2017 further advice from SARA via email regarding HAT and PMAV (see Appendix 1B).
- 28 September 2017 pre-lodgement correspondence with SARA, confirmed referral agency and departmental jurisdiction, issues addressed regulated vegetation, native vegetation clearing, environmentally relevant activities, aquaculture, marine plants, offsets, state transport corridor, tidal works and work in a coastal management district, wetland protection area, application requirements, SDAP, fees and further permits (see Appendix 1C).
- 1 March 2018 further pre-lodgement correspondence with SARA regarding clearing of native vegetation (see Appendix 1D).

Relevant extracts of these advices are included in the relevant sections of this MCU Application.

On 17 May 2017 EcoSustainAbility sought advice from SARA further to SPL-1216-035627:

We wish to clarify two matters which were briefly discussed but not included in the minutes:

1. *Richard Stewart made the comment that the fact that the floor of some ponds is currently below HAT will not be an impediment to obtaining approval. Can you please confirm this.*
2. *There is a previous PMAV in place (see attached), Mark Hober raised this with the question as to whether it minimised the need for offsets in relation to disturbance of Category X areas. Can you please confirm.*

On 1 June 2017, SARA responded (per email Brett Nancarrow):

In relation to the floor of the ponds being below HAT, providing the top of the pond walls are above the 1:100 flood level, it will meet Module 3, PO13 with regards to flood immunity. Acid sulphate soils may be an issue though and will have to be managed (PO8).

In relation to the PMAV, the category X areas are not mapped as remnant vegetation and therefore this will not influence any offset.

6.4.1 Confirmation of GBRMPA Requirements

On 5 September 2017, EcoSustainAbility sought advice from the Great Barrier Reef Marine Park Authority:

> *We write on behalf of our client Daintree Saltwater Barramundi. A modest farm extension is proposed, with a treated discharge into an arm of the Daintree River well upstream of the state marine park and not within the GBR world heritage area or GBR Marine Park.*
>
> *We wish to confirm that the delegation to Queensland under the GBRMP Aquaculture Regulations 2000 remains in place (see attached). Further we seek confirmation that the QLD Integrated Development Assessment System applies and no further direct correspondence is required with GBRMPA.*

On 5 September 2017, the Great Barrier Reef Marine Park Authority responded (per email Rean Gilbert):

> *Yes the accreditation is still in force, so no requirement to apply under GBRMP Aquaculture Regulations. We cannot confirm what Queensland legislation applies so you'll have to double check that with Queensland. Please be aware however of your obligations under the EPBC Act. For more information on the EPBC Act please refer to the website of the Department of Environment and Energy. Any action that could have a significant impact on a matter protected by the EPBC Act must be referred to the Department. See: www.environment.gov.au.*

7 Assessment of Referral Requirements

Guidance
DA Forms Guide Planning Template
This section should detail how the development proposal responds to each referral requirement that is the subject of the development application. This should include:
A statement of whether the development proposal complies with the relevant provisions in SDAP; and
Any variation to SDAP, including justification for the variation.

7.1 Development on a State-controlled Road Environment

7.1.1 SDAP - State Code 1

An assessment against the relevant SDAP code is contained in Attachment 5, see also Figure 28 and Map 10. The proposal fully meets the relevant performance outcomes of the SDAP with the key points being:

- No buildings will be constructed as part of the proposal.
- No fill or excavation proposed or services in the state controlled road
- The excavation and fill proposed to build the new aquaculture ponds is downhill of the state controlled road and with sufficient buffer . There will not be any blasting. As the nearest construction of ponds is over 100m from the road, and most compaction will be by sheep's foot roller, with only small (handheld plant) used for localised compaction near culverts, there is not likely to be any resultant ground movement or vibration affects on the state controlled road.
- Import of fill will be only during the construction phase and will be over many months. Trucks will be subject to normal load limits for the use of the road and will not damage the pavement of the state-controlled road.
- There is not likely to be any need to remove excavated material from the Lot 3.
- There will be no filling or excavation of the drainage structures on the state controlled road. The site is downstream of the state controlled road and there will be no construction within these drainage lines.
- Imported fill will be tested prior to acceptance to ensure it is not PASS or AASS material and is free of heavy metal contaminants. The construction site is downstream of the state controlled road. The import and placement of fill material used will not result in contamination of the state-controlled road.
- Imported fill will be compacted in accordance with AS1289 2000. The construction site is downstream of the state controlled road. The import and placement of fill material used will not result in contamination of the state-controlled road.
- Imported fill will be conditioned (moistened) to achieve adequate compaction and impermeability in accordance with AS1289 2000 and the QLD Aquaculture Construction Containment Structures Guidelines. Filling and excavation will be managed to avoid dust and will not cause wind-blown dust nuisance in the state-controlled road.
- The construction site is downstream of the state controlled road. There is no impacts on the hydraulics of the drainage lines downstream of the state controlled road and the development of the aquaculture ponds will not have flooding impacts on state controlled road. Stormwater from the site goes downstream toward South Arm of the Daintree River.
- The proposed development does not create any new points of discharge to a state-controlled road.
- Development does not require new or changed access to a limited access road. Vehicular access is provided from a local road (Vixies Road)

Figure 28: State Controlled Road

- No new vehicular access is proposed, the existing approved vehicular access will be used. The development will only involve a few extra staff/contractors during operation and there are not likely to be any consequent traffic impacts on the state controlled road.
- Vehicular access and associated road access works are not located within 5 metres of existing public passenger transport infrastructure.
- Development is not located on land identified by the Department of Transport and Main Roads as land required for the planned upgrade of a state-controlled road.

7.2 Coastal Development and Tidal Works (to SARA]

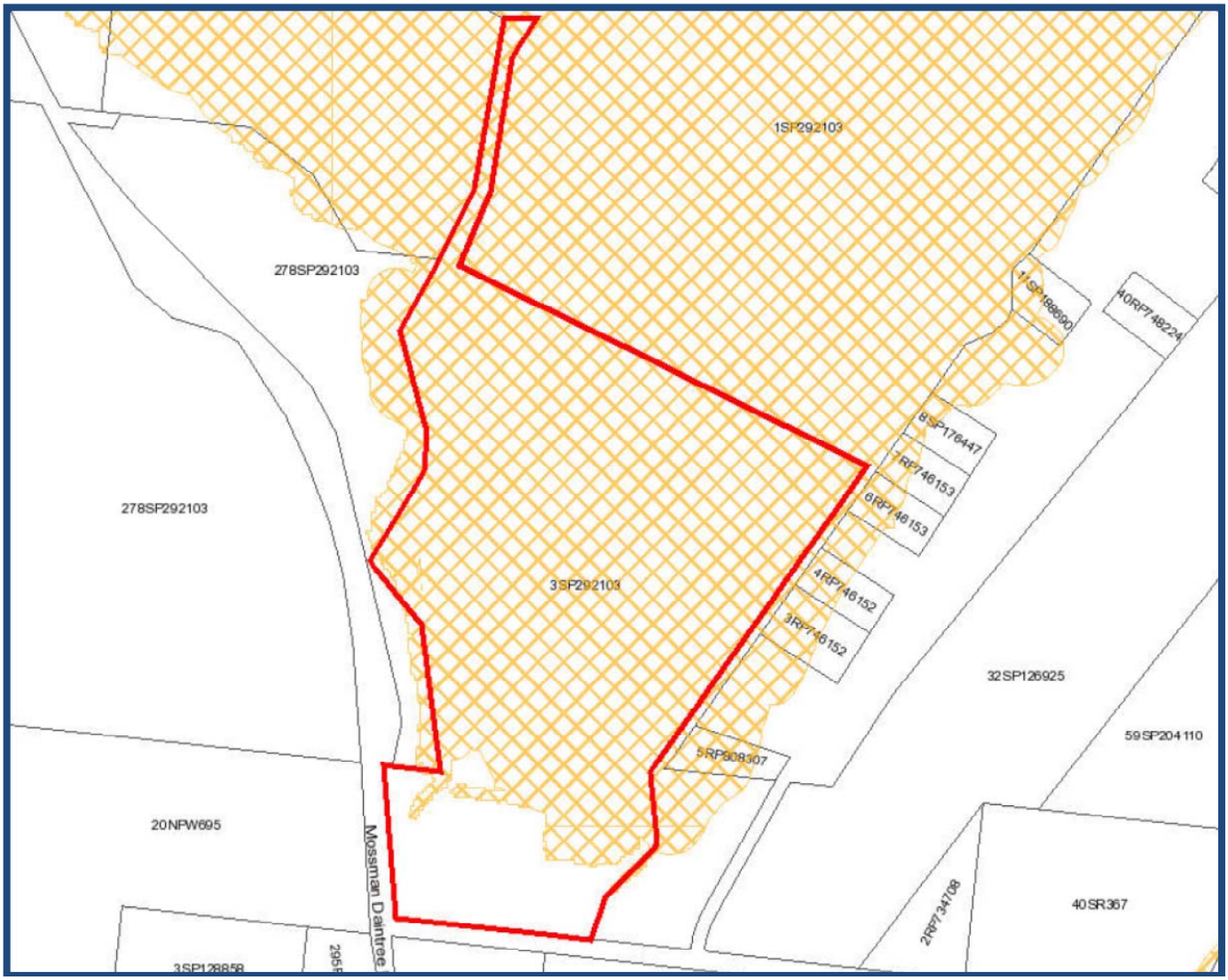
7.2.1 SDAP - State Code 8

An assessment against the SDAP code is contained in Attachment 6, see also Figures 29 and 30, and Maps 6, 7 and 11). The proposal meets the relevant performance outcomes of the SDAP with the key points being:

- The expansion of the aquaculture production ponds within the footprint of the existing approved aquaculture facility cannot feasibly be undertaken elsewhere by Daintree Saltwater Barramundi. The operation of the aquaculture requires access to saltwater intake. NOTE: Whilst Lot 3 is within the mapped erosion prone area it is more than 1 km from the beach and with five cheniers (relict dunes not part of the active coastal processes) and with residential blocks, a road (South Arm Drive) and mapped future residential land to seaward.
- The expansion of the aquaculture production ponds within the footprint of the existing approved aquaculture facility is within existing bunded ponds removed from coastal processes. No landforms or vegetation outside of this area will be affected.
- The proposal has been designed to avoid impacting on coastal processes. The proposal has been designed to ensure that the protective function of landforms and vegetation is maintained.
- Whilst Lot 3 is within the mapped erosion prone area it is more than 1 km from the beach and with five cheniers (relict dunes not part of the active coastal processes) and with residential blocks, a road (South Arm Drive) and mapped future residential land to seaward. There are negligible risks posed by coastal; erosion. The development does not significantly increase the risk or impacts to people and property from coastal erosion. The development does not directly or indirectly increase the severity of coastal erosion either on or off the site.
- Discharge will have net nutrient balance with the intake waters. In addition, maximum contaminant concentrations at any one time are proposed to ensure. The water quality objectives will be maintained.
- There is category R vegetation along the drain/waterway along the eastern boundary. The vegetation along the waterway will not be affected by the construction of aquaculture production ponds within the existing bunded settlement ponds 1 and 2.
- There is category R vegetation along the drain/waterway within the western boundary of Lot 3. The vegetation along the waterway will not be affected by the construction of aquaculture production ponds within the existing bunded settlement pond 1.
- Specific protection measures out outlined in Section 4 of the MCU Application Report.
- To avoid any doubt, with the protection measures proposed, impacts on the category R vegetation are unlikely.
- All proposed development is within the existing bunded settlement ponds and within the footprint of previous disturbance. There is no reclamation.
- The new aquaculture ponds will have a top of bank of 3.9m AHD. The storm tide level is 2.8m AHD (Wonga Beach, outside wave effects zone), see Map 11..
- The bunds on the Primary Settlement Pond, Treatment Wetland and Final Settlement/Balancing Storage at 2.0-2.7 m AHD. These settlement and treatment ponds can be overtopped without impact and without any safety issues. They can go back into functionality immediately after a storm tide event.

Figure 29: Coastal Management District

Figure 30: Erosion Prone Area



7.3 Great Barrier Reef Wetland Protection Areas Development (to SARA]

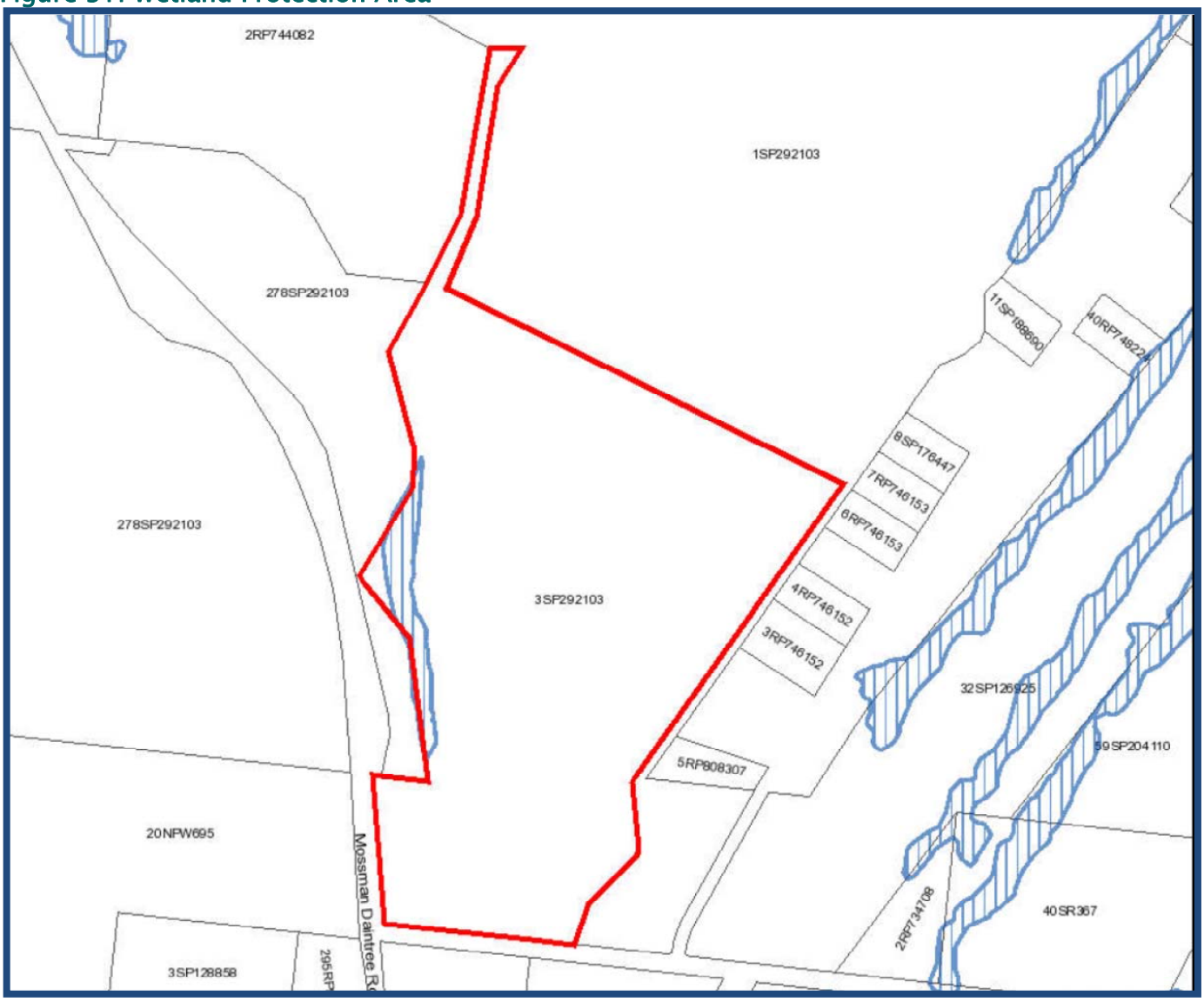
7.3.1 SDAP State Code 9

An assessment against the SDAP code is contained in Attachment 7, see also Figure 31 and Map 1. Section 8 sets out the MSES considerations for the high ecological value wetland and section 9 concludes there is no significant residual impact.

The proposal meets the relevant performance outcomes of the SDAP with the key points being:

- The proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds. The development is not within the wetland protection area to the west of proposed ponds 24,25 and 27. Specific protection measures are proposed to ensure there a no impacts on the wetland (see Section 4 of the MCU Application Report), these include:
    - An undisturbed 2m bench along the existing bund.
    - Silt fence and erosion control during construction of the new pond bund.
    - Immediate erosion stabilisation/revegetation of the new pond bund.
    - Ensuring the existing bund demarks all disturbance during construction (i.e a hard boundary).
- Offsite discharge will be to the tributary of South Arm to the east of the site and hence not through the wetland.
- NOTE: Given the hard disturbance boundary and constraining the development to within the existing bunded area (which has been previously cleared and drained) a buffer is not proposed.
- The proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds., the protection measures described above (and refer to Section 4 of the MCU Application Report) will ensure that wetland the development maintains and protects wetland environmental values; and avoids adverse impacts on native vegetation within the wetland.
- Given the ponds are to be constructed within the existing bunded settlement ponds, the development has been designed to avoid adverse impacts on the existing surface and groundwater hydrology in the wetland protection area.
- The proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds. The development is not within the wetland protection area to the west of proposed ponds 24,25 and 27.
- Stormwater discharge will not be through the wetland protection area.
- The proposed development has been designed to ensure the ongoing protection of wetland fauna from any impacts associated with noise, light or visual disturbance. The proposal does not affect the movement of wetland fauna within and through a wetland protection area; and does not introduce pest plants, pest animals or exotic species into a wetland and its buffer.

Figure 31: Wetland Protection Area



7.4 Removal Destruction or Damage of Marine Plants (to SARA]

7.4.1 Pre-lodgement Advice

Pre-lodgement advice was received see Appendix 1A (SPL-1216-035627):

> *Department of Agriculture and Fisheries*
> *2. Marine plants*
> *Marine plants are protected under the Fisheries Act 1994, regardless of whether they are re-growth.*
> *3. Habitat assessments*
> *In relation to the proposed offset the following assessments will be required to justify the proposal:*
> *- Settlement pond 3: A habitat condition assessment to ascertain a grading for the marine plants.*
> *- Settlement pond 4: A marine plant and habitat assessment to identify the species, diversity and general community structure. Include an option that will serve to improve the area, for example removing the wall that is currently obstructing tidal access within Settlement Pond 4.*
> *4. Supporting information*
> *Demonstrate how impacts to marine plants will be avoided, and include details on how mitigation measures will be implemented to assist with the protection of remaining values.*

NOTE: Whilst an offset was discussed at the pre-lodgement meeting, the proposal has been planned and designed to avoid impacts on marine plants and thus there is no significant residual impact and thus no offset is proposed.

7.4.2 Marine Plants on Lot 3

In regard to marine plants on Lot 3, a habitat assessment was undertaken by environmentPACIFIC, please see Appendix 7A. FRC undertook an earlier survey, at Appendix 7B for historical reference.

The following text in italics are extracts from environment PACIFIC's report, followed by a discussion of the disturbance of marine plants:

Settlement Pond 4

> *Settlement pond 4 is characterised by previously established freshwater tolerant vegetation (e.g. Melaleuca quinquenervia freshwater wetlands) being rapidly displaced by more tidally dependent species. In particular the bund wall historically established to maintain a barrier between tidal areas and newly cleared areas has deteriorated to the position where daily tidal influxes are resulting in dieback of freshwater vegetation and the reinstatement of mangrove vegetation more typical of the original communities, i.e. those of the lower Daintree River tidal area.*

There will be no disturbance of marine plants on settlement pond 4.

Settlement Pond 3

Conversely, settlement pond 3 is displaying the opposite i.e. reverting from a mangrove/salt tolerant marine community to a non-tidal dependent community more typical of freshwater wetlands. Halophytic species such as Excoecaria agallocha, Lumnitzera racemosa and Acrostichum speciosum have historically been well established owing to the original saline conditions of the construction site. However this community can be considered to have been in an arrested state of succession as the lack of any tidal regime has not favoured further development of this community. Lumnitzera racemosa has died out in most areas, and Excoecaria agallocha remains the only dominant halophyte. Changes in edaphic site conditions over the last decade (notably drainage and salinity) have resulted in more freshwater reliant species becoming well established, and these appear to be rapidly recruiting. While though E agallocha and A speciosum remain locally abundant, their dominance is being challenged by the recruitment of Melaleuca leucadendra (in particular) and Melaleuca quinquenervia and Melaleuca cajuputi to a lesser extent. A characteristic of the changing soil conditions is illustrated by two key factors: 1) lack of faunal activity associated with tidal and intertidal areas (e.g. sesarmid crab activity), and 2) dominance of the ground stratum by sedges and grasses. The freshwater climbing fern, Stenochlaena palustris, was notable by its abundance, whereas elsewhere it was restricted to dieback areas of Melaleuca quinquenervia, where it also was in retreat as result of increasing salinity (settlement pond 4).

There will be no physical disturbance of marine plants in settlement pond 3. With its repurposing as the treatment wetland there will be flow across the wetland (south to north), this will most likely increase the salinity in the area, and increase marine plant /mangrove productivity.

Settlement Pond 2

Settlement pond 2 is a freshwater system, with no obvious evidence of a tidal regime and comprised of species that are generally intolerant of tidal saline conditions. Typically this community is dominated by Melaleuca cajuputi, and most of the settlement pond is permanently inundated with freshwater with various areas of shallower water and/or areas regularly exposed, dominated by Melaleuca quinquenervia. Halophytic species persist: Acrostichum speciosum is present as isolated clumps with shallow water in the wetlands, but does not occur as a component of the various Melaleuca spp communities. Excoecaria agallocha is present as isolated individuals growing on the margins of the settlement pond but nowhere does it form a community.

Settlement Pond 2 will be the site of construction of new ponds 18-27. The only permanent removal of marine plants will be a few *Excoecaria agallocha* isolated individuals growing on the margins of the settlement pond 2 for the construction of production ponds 18-27, this will be a total of less than 25m^2, therefore is no likely significant residual impact.

South Arm Creek

There is a complex tidal mangrove community along South Arm Creek This area (approximately 4.2 ha) is representative of some of the most complex mangrove associations in the lower Daintree River, with a wide representation of mangrove species genera, and multiple species representation within some genera. The presence of a large crocodile resulted in only the most cursory of inspections on the ground however aerial overfly did confirm the complexity of this system. Taller mangroves (Rhizophora stylosa and R apiculata) exceeded 15 m in height, and many larger tree genera (Heritiera, Xylocarpus, Brugiera spp) were prominent. Understorey species association was complex on the edges of the taller zone, and the substrate was marked by a very high level of general sesarmid activity (a high density of burrows present) and numbers of arboreal mangrove snails (which were not observed anywhere else during the 2017 survey).

There will be no disturbance of the complex mangrove community along South Arm creek. The mangrove community extends along the western border of the site (the intake drain and wetland, and also along the eastern boundary watercourse.

Figure 32: Settlement Pond 4 Vegetation

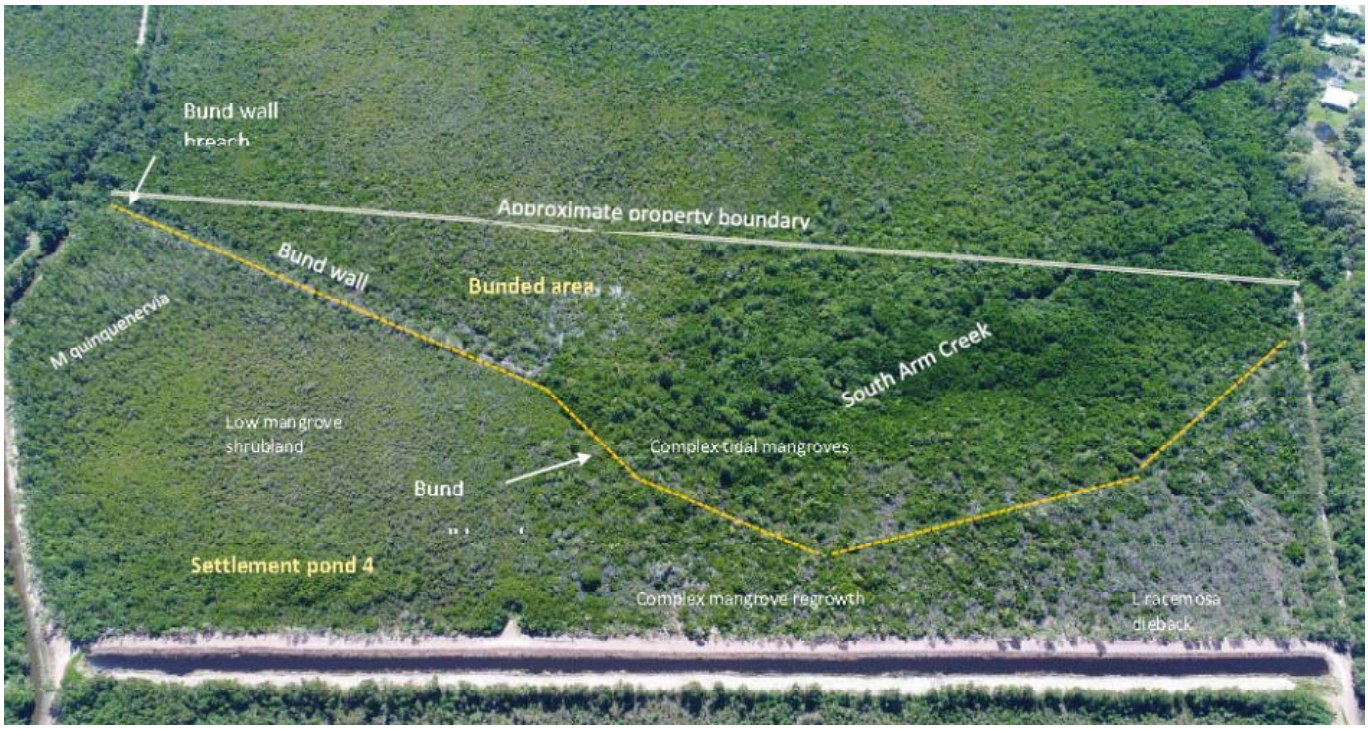


Figure 33: Settlement Pond 3 Vegetation

Figure 34: Settlement Pond 2 Vegetation

7.4.3 Fisheries Value Assessment

In regard to marine plants on Lot 3, a habitat assessment was undertaken by environmentPACIFIC, please see Appendix 7A, relevant extract are presented below:

> *The productivity of mangrove communities is amongst the highest of any community in the world (aquatic or terrestrial) and is essential to the maintenance of a range of ecosystem services, e.g. as nursery areas to a host of aquatic marine/intertidal guilds, nutrient cycling, and water quality management. Mangrove communities are known to contribute to fisheries values through the provision of food supplies (both primary and secondary production), as nurseries proving shelter from predators and also as providing a barrier to physical stress, e.g. currents and wave action turbulence.*
>
> *Detailed long term monitoring studies were beyond the scope of this survey, and the only quantitative information able to be collected related to the general abundance and distribution of sesarmid crab activity. Sesarmid crab activity is generally regarded as one of many surrogates that can be used to estimate the productivity of a mangrove area and qualitative comparisons across various habitats may provide a raw indication of the contribution of the habitats to general fisheries values. Of more use in assessing fisheries values on a small temporal survey scale is a site assessment of edaphic factors that may significant impact on ecosystem processes and hence productivity and fisheries values. In the case of this survey the primary indicator of impacts on ecosystem processes is the connection between tidal water ingress, frequency of inundation and subsequent salinity conditions. All of the successional processes and ecosystem stressors were identified in the field to be directly related to these conditions of salinity and tidal associations.*

Settlement Pond 4 - Bunded Area

The bunded survey area of 9.38 ha exhibits a range of fisheries values that vary from low to high, dependent on the vegetation community, the current status of succession, and the regularity of the tidal influence into this area. As noted previously breaches in the bund wall have allowed a more persistent tidal inflow into the settlement pond and this is resulting in rapid successional changes in vegetation communities. There are three key successional processes occurring in settlement pond 4 impacting on fisheries values. These include:

Dieback of Melaleuca quinquenervia in the north west, being replaced by Brugiera and Ceriops dominated woodland.

Low mangrove shrubland dominated by Lumnitzera racemosa and Excoecaria agallocha representing a previously arrested state of succession owing to the tidal restricting influence of the bund wall, and now subject to an increasing regular tidal input and establishment of more complex mangrove species. This is particularly evident in the area adjacent to the bund wall breach and general bund deterioration adjacent South Arm Creek.

An increasing expansion in tidal influence in the south-east corner, resulting in extensive Lumnitzera racemosa dieback, with more typical regularly inundated genera such as Rhizophora and Brugiera recruiting into these areas.

Successional changes noted above all favour an increase in the general fisheries values within the bunded area of settlement pond 4. Primarily:

- *a regular tidal regime improves ecosystem function, particularly in relation to tidal flushing and nutrient cycling.*
- *negating and reversing the effect of arrested succession will improve general biomass and productivity with a more diverse and functional mangrove ecosystem,*
- *reinstatement of a regular tidal regime will improve opportunities for faunal guilds that contribute to nutrient cycling e.g. sesarmid crabs.*
- *the reestablishment of a functional mangrove community contiguous with the existing communities in the South Arm Creek area will now include the full upper tidal reaches of South Arm Creek and improve fish passage and utilisation within the bunded area of settlement pond 4.*

Faunal activity within settlement pond 4 was noted primarily through the observation of crab activity (primarily sesarmid crabs) and other opportunistic observations of mangrove dependent fauna (e.g. arboreal snails, mud whelks etc). A known large crocodile presence precluded the establishment of formal plots. Not withstanding sesarmid crab observations based on a 4m^2 quadrats (2m x 2m plots) were used at four locations in settlement pond 4, and at two locations in settlement pond 3. Due to the sensitivity of sesarmid crabs to the effects of siltation (clogging of respiratory mechanisms) and dry conditions (direct dessication as these species can only survive in a moist environment), these are useful indicators of site conditions.

Simple counts of active burrows i.e. those in obvious use, were used to estimate sesarmid crab activity at each site. There are no formally identified thresholds that quantitatively relate crab activity to productivity in the Wet Tropics area, and essentially the use of crab burrow counts was to only provide an indicative utilisation of the area and likely contribution to productivity and hence fisheries values.

Settlement Pond 4 - external bund area to property boundary

The area of settlement pond 4 external to the bund wall represents a marine vegetation community that is characteristic of the lower Daintree River/South Arm Creek tidal areas. As noted there are two key communities north of the bund, with these both contiguous with the extensive areas of mangroves beyond the property boundary. The fishery values of the Daintree River marine and tidal vegetation are regarded as extremely high, and a declared fish habitat area is present over much of South Arm Creek.

Subsequently no attempt was made to formalise a fisheries values assessment of these mangrove communities within settlement pond 4 other than to verify the natural state and high integrity of these systems as noted in earlier sections of this report. The mangrove communities within settlement pond 4 outside of the bunded area are representative of those immediately adjacent to and contiguous with the property, and are of high integrity and have a very high contribution to fisheries values in the upper section South Arm Creek. With the deterioration of the bund wall, and further development in the complexity of the mangrove community within settlement pond 4 overall, these values are expected to expand to include the previously bunded areas.

Settlement Pond 3

As noted in early sections, settlement pond 3 represents a community dominated by halophytes (Excoecaria agallocha) representing an arrested succession state which is now subject to ongoing recruitment and succession owing to the increasing influence of freshwater inputs and lack of tidal regimes.

The majority of the E agallocha areas are now co-occurring with a number of Melaleuca species, primarily M leucadendra in open areas, and M quinquenervia dense regrowth is actively displacing E agallocha with the formation of a closed canopy particularly along the freshwater drain to the west of the settlement pond. A distinctive feature of the successional processes is the prevalence of sedges in open areas, the majority of which are not tolerant of tidal saline conditions and are reliant on freshwater flows for their maintenance.

The successional processes occurring within the settlement pond 3 are resulting in a diminution of the values of this area to general marine fisheries values. This is occurring through a number of ecosystems processes including:

- *Truncation of a tidal regime: there is no longer any tidal connection (which previously was tenuous at best) between this settlement pond and the upper reaches of South Arm Creek and associated habitats. This precludes any translocation or migration of tidally dependent aquatic species.*
- *Halophytic species representative of the interface between freshwater systems and marine systems are being displaced by species typical of freshwater systems. This is resulting in changes community wide across the settlement pond, the rapidity of which is directly related to increasing freshwater inputs (e.g. retention of overland flow from rainwater events) and decreasing saline influence.*
- *Mangrove community productivity decreasing as a consequence of the halophyte species displacements and no nutrient cycling pathway (e.g. presence of sesarmid crabs, tidal connections) present.*
- *Lack of typical intertidal faunal activity contributing to productivity; as noted, no sesarmid crabs were observed within this settlement pond in two replicated sites.*

Settlement Pond 2

Settlement pond 2 is a freshwater wetland with no marine connection. The original drain no longer connects with a tidal environment and there is no corridor of exchange between this wetland and mangrove habitat that support fisheries in settlement pond 4 and beyond the bund wall to the tidal communities of South Arm Creek.

It is acknowledged that freshwater wetlands can be an important contributor to fisheries values i.e. in the provision of ecosystem services such as water quality management, interception of nutrient loads, and in providing nurseries for catadromous species of fish that migrate into freshwater as juveniles before returning to saltwater. These contributions are only significant where there is a direct connection between the wetlands and the tidal/marine environment. In the case of settlement pond 2 this connection is not present, and the contribution of these dislocated wetlands to fisheries values is tenuous at best, with the wetlands serving primarily as a nutrient settlement pond that has an indirect contribution to downstream fisheries values.

7.4.4 SDAP State Code11

An assessment against the SDAP code is contained in Attachment 8. The proposal meets the relevant performance outcomes of the SDAP with the key points being:

- The construction of new aquaculture ponds within the footprint of existing settlement ponds 1 and 2 will involve removal of a few *Excoecaria agallocha* isolated individuals growing on the margins of the settlement pond 2. This will be a total of less than 25m^2, therefore no likely significant residual impact.
- Existing settlement pond 3 will be managed as a treatment wetland. It does have marine plants within, but these will not be cleared, damaged or disturbed. Rather, they will have a more (nutrient rich) constant saline flow which may encourage more recruitment and productivity. This pond has no connection to fisheries habitat owing to the bunds, there are presently no crab burrows.
- To avoid any doubt the design, construction and operation has been planned to ensure the avoidance of impacts on marine plants.
- The only disturbance of tidal land will be the construction of the discharge point being a weir outlet and erosion protection on the outlet side.
- See Appendix 7A for maps of marine plants and Section 3 for the location of tidal planes on the site.
- The proposal avoids the loss, degradation or fragmentation of fish habitats and their values and the loss of fish movement. It does not increase the risk of mortality, disease or injury, or compromise the health, productivity, marketability or suitability for human consumption of fisheries resources.
- There is an offer to open an old bund on the northern boundary of settlement pond 4, this will iincrease tidal connectivity in this area and allow some recovery of productive fish habitat.
- Section 12 of the MCU Application sets out a preliminary Acid Sulfate Soils Management Plan. The footprint of disturbance of ASS during construction is entirely within the existing bunded settlement ponds. Importantly there are plans for the bunded storage and treatment of any leachate and the bunded storage and treatment of any stockpiled ASS/PASS material that is excavated. The overall approach is to "drain, lime treat and cover" the ASS within the settlement ponds. Excavation will be restricted to the new drains.
- There are contingency plans for storage and treatment of leachate at all stages of construction to avoid any likely release which could affect fisheries resources and fish habitats.
- The development of new aquaculture production ponds within the footprint of two existing bunded settlement ponds will not affect the tidal and freshwater inundation and drainage patterns, extent and timing. Ecological processes in the waterways (with marine plants) to the east and west of the site will continue and associated fish habitat values and condition are maintained.

- The site is already modified with bunds which were created decades ago along old drainage lines. The construction of new aquaculture production ponds within the footprint of two the existing bunded settlement ponds will not affect natural processes of erosion and accretion; and will not result in increased risk of waterway bed or bank scour or erosion.
- Section 4 sets out the erosion and sediment control approach.
- The maintenance of the bunds around the perimeter of the developed site will ensure ongoing access to the water ways and marine plants. The areas of trimming required are as per existing approval Appendix 4A.
- No dredging will be required. There are currently no warning signs or protective structures and these are unlikely to be required.
- The development does not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access.
- The development does not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities.

7.5 Native Vegetation Clearing

We have not included an assessment under the SDAP code as there will not be any clearing of native vegetation as part of the proposal.

7.5.1 Pre-lodgement Advice

Pre-lodgement advice was sought 25 February 2018 (please see Appendix 1D for the plans referred to)..

> *"I write further to the Departments letter dated 28 September 2017, your reference 1709-1202 SPL. Re Item 9, regulated vegetation. Please see attached maps which show the footprint of disturbance of the proposed new aquaculture ponds. The new ponds are 300m away from the regulated vegetation. There will be no work for new ponds within 300m of the regulated vegetation. The operational areas will be the are of new ponds and management vehicles will drive on the existing cleared bund walls around the settlement pond (all outside of the regulated vegetation. There is no need for any firebreaks near the regulated vegetation. There will be no disturbance to the regulated vegetation during the construction or operation of the proposed expanded aquaculture facility. In accordance with Item 10 of the Departments letter dated 28 September 2017, your reference 1709-1202 SPL. Please see attached the proposed design as a "development plan". This pre-lodgement advice request is intended to address item 10 as the information request is to ask the department to: "...confirm if the proposed development will require referral agency assessment and if there is any requirement to obtain a Section 22A relevant purpose determination under the Vegetation Management Act 1999 from the Department of Natural Resources and Mines."*

The following pre-lodgement advice was received (Appendix 1D, 1902-4138 SPL)

Clearing of native vegetation

1. The provision of this pre-lodgement advice is conditional upon the extent of the development shown in the proposal plan referenced as "Proposed Pond Layout Lot 3 on SP292103, Mossman Daintree Road, Wonga Beach, Drawing number 18/03, Revision: A, Dated Jan 2018" (Attachment 1).

2. Due to the location of the proposed development in relation to the Category B area mapped on Lot 3 on SP292103, no clearing of native vegetation will occur as a result of the proposed development and no new clearing exemptions are created by the proposal.

The current proposal will not trigger referral agency assessment under Schedule 10, Part 3,Division 4, Table 3, Item 1 – Clearing native vegetation of the Planning Regulation 2017.

Should the location of the proposed development be amended, this pre-lodgement advice may be invalid and the applicant will need to reconsider if any amended proposal triggers referral for clearing of native vegetation.

Figure 35: PMAV

SOURCE QLD Globe

7.6 Aquaculture

7.6.1 SDAP State Code 17

An assessment against the relevant SDAP code is contained in Attachment 9, see also Section which discusses the design and construction and the compliance with the QLD Aquaculture Construction Containment Structures Guidelines. The proposal fully meets the relevant performance outcomes of the SDAP with the key points being:

- The development of new aquaculture production ponds in old settlement ponds 1 and 2, the repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing development permit for aquaculture SPD-0515-017379.
- The development of new aquaculture production ponds in old settlement ponds 1 and 2, the repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland has been planned and designed to minimise impacts on the natural environment though:
    - avoiding disturbance to the regulated vegetation and essential habitat in settlement pond 4 on the north of the site (and offering to open and old bund to restore tidal connectivity).
    - avoiding disturbance to the wetland to the west of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall.
    - avoiding disturbance to the wetland to the east of the new ponds through no vegetation or stream bed disturbance, best practice erosion and sediment control, best practice acid sulfate soils management and establishing a firm disturbance boundary on the along existing bund wall.
    - avoiding water quality impact by ensuring a net nutrient (contaminant) balance between intake waters and discharge, with a majority recirculation system minimising actual discharge volumes.
- The proposed new aquaculture ponds and repurposed drains and settlement ponds within the existing footprint of disturbance and within the area of the existing development permit for aquaculture SPD-0515-017379 entirely within the privately owned Lot 3 SP292103 will not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access.
- The proposed new aquaculture ponds, repurposed drains and settlement ponds within the existing footprint of disturbance and within the area of the existing development permit for aquaculture SPD-0515-017379 will not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities.
- The proposed new aquaculture ponds will be managed in accordance with current practices undertake on the existing farm development permit for aquaculture SPD-0515-017379.
- The new ponds will not disturb habitat (see comments on PO2 above), will not involve any additional use or any release of toxic substances and as the new ponds are within the existing bunded are and not disturbing water courses will not trap or strand fish.
- A preliminary acid sulfate soils management plan has been developed and this will be upgraded to a final ASSMP prior to construction.

- The location of the new ponds is assumed to have actual acid sulfate soils, which will be drained, limed and capped during construction of the new ponds. The excavation of ASS has been minimised in the design. The existing drain (which will become the Primary Settlement Pond) will be used to hold any waters from within the construction area and to enable liming/treatment to neutralise (reduce acidity) if required prior to discharge. The area immediately to the east of the current workshop will be used to stockpile any excavated ASS material for lime treatment prior to use as underlying fill. This area will be bunded to ensure no acid runoff.
- The extension of ponds is planned for the Barramundi aquaculture. The species grown will be as per with existing development permit for aquaculture SPD-0515-017379.
- The operation of the farm will be as per the existing development permit for aquaculture SPD-0515-017379. Daintree Saltwater Barramundi uses net and drain harvesting and has full food safety certification for its packing facility (see Attachment 11).
- The operation of the farm will be as per the existing development permit for aquaculture SPD-0515-017379. Daintree Saltwater Barramundi has compliant processes in place for handling mortalities and has contingency plans for the management of disease.
- Section 4 of the MCU sets out the design and construction and reviews the proposal against the QLD Aquaculture Construction Containment Structures Guidelines. In summary, ponds will be lined with an impermeable clay liner to ensure no leakage.
- The new ponds will be constructed entirely within the existing bunds of existing settlement ponds. Key points are:
    - The floor of the new ponds is above HAT (HAT is 1.76 n AHD, pond floors are 1.8-1.85, AHD.
    - The top of the bunds is at 3.9m AHS with the local storm tide level being 2.8m AHD)
    - The ponds do not encroach on the waterways to the west or east of the existing farm.
    - The discharge water will be treated though a Primary Settlement Pond, Treatment Wetland, Final Settlement/Balancing Storage to ensure to control discharge water quality.
    - Pond drains will be screened to ensure no escapes.
- The farm has been planned and designed to ensure control at all times over the containment and release of water from all ponds, tanks and drainage systems within the approved aquaculture area. Releases will be managed though a Primary Settlement Pond, Treatment Wetland, Final Settlement/Balancing Storage to ensure to control discharge water quality. A majority recirculation system is proposed.
- The development is not within the Q100 mapping area as per the Douglas Shire Planning Scheme.
- The top of the bunds of production ponds is at 3.9 m AHD, this is over 1 meter above the storm tide level and well above site flood levels.
- The bunds of the Primary Settlement Pond, Treatment Wetland and Final Settlement Pond are at 1.8 m AHD which is above HAT and above local flood levels and which will prevent the ingress of stormwater run-off.
- The intake is screened to prevent the introduction of juvenile or adult wild fauna into the aquaculture development.
- The pond bunds, with HDPE liner on pond banks, 0.5m freeboard and 4m wide roadway on each bund will prevent the overland escape of Barramundi.
- The Primary Settlement Pond, Treatment Wetland and Final Settlement Pond will be the bioremediation process for treatment of recirculation and discharge waters. As these areas are not currently estuarine systems and do not have tidal connectivity, this will not have any effect on fisheries resources.

- The extension of ponds is planned for Barramundi aquaculture, the species grown will be as per with existing development permit for aquaculture SPD-0515-017379. Fingerlings are sourced from hatcheries with appropriate genetic stock. That said, there is no likely release of the cultured barramundi.
- The new ponds will be constructed with the floor above HAT (HAT is 1.76 n AHD, pond floors are 1.8-1.85 m AHD) and the top of the bunds is at 3.9 m AHD with the local storm tide level being 2.8 m AHD.
- The pond bunds will have an HDPE liner on pond banks, 0.5m freeboard and 4m wide roadway on each bund will prevent the overland escape of Barramundi.
- The proposed ponds are designed and will be constructed and operated to prevent the escape or release of aquaculture fisheries resources under the full range of conditions that could be expected on Lot 3.
- The only additional "aquaculture furniture" will be the discharge weir, this will not interfere with natural ecosystems, such as seagrass communities, marine plants or other fisheries resources such as coral. The discharge weir will be of concrete steel and may have timber weir boards, which are chemically inactive and of a non-hazardous nature.

7.7 Environmentally Relevant Activities (to SARA]

7.7.1 SDAP 22

An assessment against the relevant SDAP code is contained in Attachment 10, see also Section 10 which discusses the Environmental Authority Considerations. The proposal fully meets the relevant performance outcomes of the SDAP with the key points being:

- The development will not cause noise nuisance or environmental harm. The aquaculture operation involves very quiet pumps and aerators and vehicles. There are no large tonal or impulsive noises. The nearest sensitive receptors are residential properties to the east along South Arm Drive. In more than two decades of operation of the current aquaculture farm there has never been a noise complaint from South Arm Drive residents. The Environmental objective will be met as the aquaculture operation will be operated in a way that protects the environmental values of the acoustic environment. The performance outcome is met as sound from the activity is not audible at sensitive receptors.
- The operation of the aquaculture farm does not involve any significant air emissions. When ponds are emptied they are dried out, however there have not been dust issues in the existing ponds operation and none are expected with the new ponds. There are backup diesel generators and farm vehicles with exhaust emissions. The activity will be operated in a way that protects the environmental values of air. The proposal meets the Performance outcomes. There is no discharge to air of contaminants that may cause an adverse effect on the environment from the operation of the activity.
- The operation of the aquaculture farm does not involve any significant odour emissions. When ponds are emptied they are dried out, however there have not been odour issues in the existing ponds operation and none are expected with the new ponds. The nearest sensitive receptors are residential properties to the east along South Arm Drive. In more than two decades of operation of the current aquaculture farm there has never been an odour complaint from South Arm Drive residents.
- Importantly the proposal is to have net nutrient (contaminant) balance between the intake waters a discharge (See section 10 of the MCU Application Report).
- The farm does have 2000L of diesel and 500 L of petrol stored on site. These are in overhead tanks which are bunded and stored in accordance with AS 1940.
- Complies with PO6. The fuel store is on the workshop which is at 3.27 m AHD, well above local flood level and above the storm tide level of 2.8m AHD.
- Importantly the proposal has been planned and designed to have minimal impacts on state environmental significance and is considered to have no significant residual impacts on matters of state environmental significance (see Sections 8 and 9).
- There will be no disturbance to category C or R areas of vegetation.

8 Matters of State Environmental Significance

Map 8 sets out the MSES matters report (see also Figure 36), the matters of state environmental significance are:

- MSES - Wildlife Habitat
- MSES - Regulated Vegetation (Essential Habitat)
- MSES - Regulated vegetation (category B)
- MSES - Regulated vegetation (category R) Reef Regrowth Watercourse Vegetation
- MSES - Regulated vegetation (wetland)
- MSES - Regulated vegetation (intersecting a watercourse)
- MSES - High ecological significance wetlands

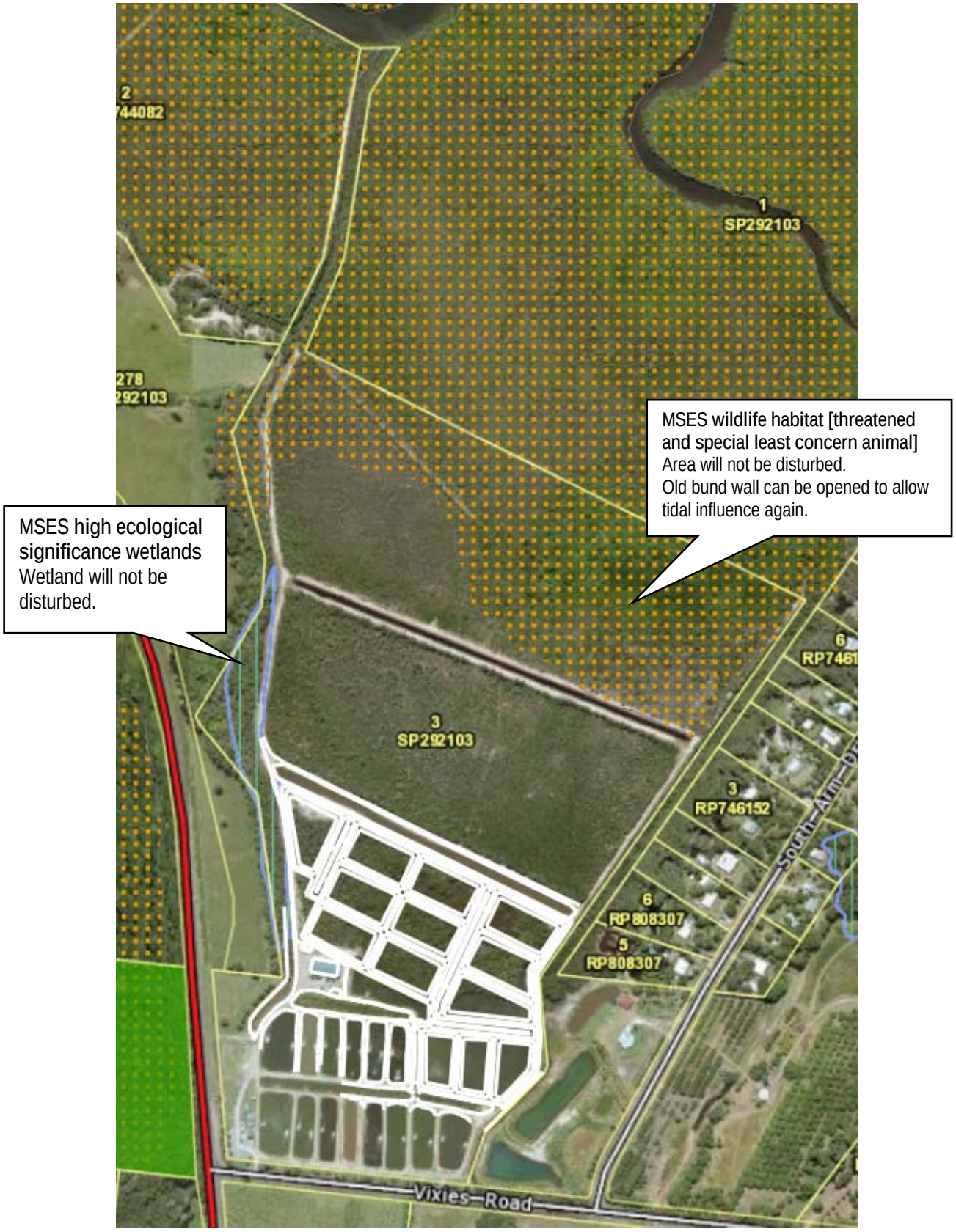
The following sections discuss each matter of state significance and review potential impacts upon them.

8.1.1 Pre-lodgement Advice

Pre-lodgement advice was received, see Appendix 1C (SPL-1216-035627).

> *3. The proposed site is located within and adjacent to areas that are mapped as matters of State environmental significance MSES including:*
> - *Essential habitat for Casuarius casuarius johnsonii (southern cassowary - southern population);*
> - *Wetland of high ecological significance (HES wetland); and*
> - *Marine plants.*
>
> *4. In accordance with the Environmental Offsets Act 2014 (EO Act) it will be required that information to demonstrate how impacts to each MSES above has been avoided to the greatest extent possible. Where impacts cannot be reasonably avoided, it must be demonstrated that the impacts have been mitigated to the greatest extent possible. In some instances it can be possible to ensure a significant residual impact is not had on a prescribed environmental matter by avoidance and mitigation measure. This can remove any possible requirements to provide an environmental offset.*

Figure 36: MSES



SOURCE QLD Globe

8.2 MSES - Wildlife Habitat

Figure 37 shows the essential habitat identified for Lot 3 (see also Map 3). Appendix 7A and Appendix 7B discuss the habitat value, existing plants and indeed fisheries values of the settlement ponds and including the eastern area mapped as wildlife habitat.

Neither area is within the footprint of disturbance of the proposed development. The proposed discharge into the eastern drain and consequently the South Arm of the Daintree River passes through the mapped essential habitat but is not considered to have any consequential impact on the habitat values.

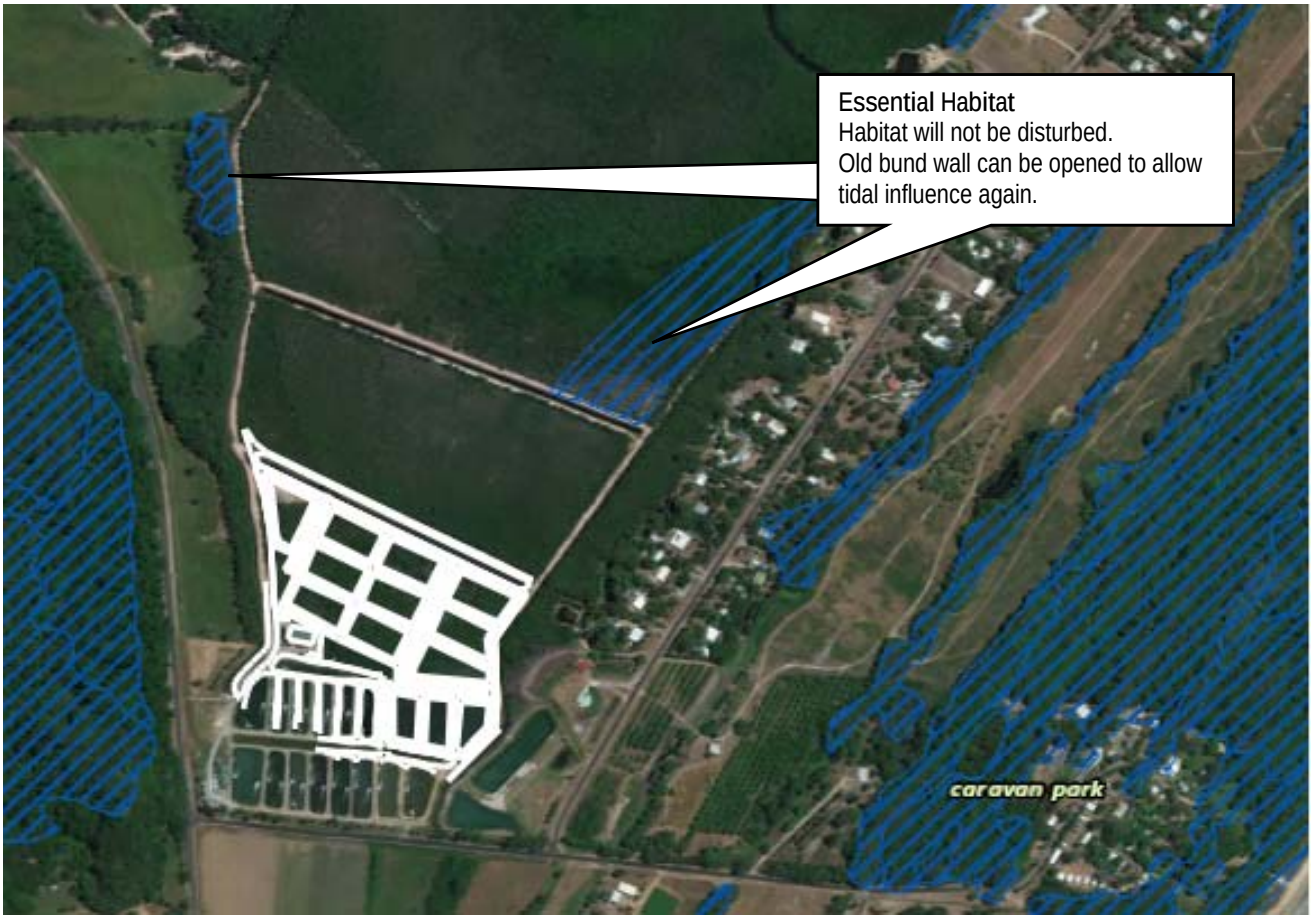
Vegetation will not be disturbed. The hydrological regime will not be adversely affected. The habitat connectivity to the wildlife habitat areas to the north, east and west will not be affected.

The drain between existing settlement ponds 3 and 4, which will become the Final Settlement Pond/Balancing Storage, will act as a disturbance buffer to ensure no disturbance to the essential habitat. During construction the northern bund of the final settlement pond will form the utmost boundary of disturbance. Indeed, no construction is proposed along this bund. The construction of the discharge weir at the eastern end of this final settlement pond will require no clearing of vegetation or disturbance of the mapped wildlife habitat. Particular attention will be paid to ensure the footprint of disturbance avoids the existing settlement pond 4 where it is mapped as essential habitat.

It is concluded that the proposed development avoids the mapped essential habitat and there are no likely significant residual impacts on essential habitat.

NOTE: Section 9 sets out the Significant Residual Impacts Analysis and concludes that there will not be any significant residual impacts. Given this, a formal offset is not proposed. That said, in recognition of the habitat value in settlement pond 4 it is proposed to breach the old bund wall in, say six places to allow greater tidal connectivity.

Figure 37: Essential Habitat



Source QLD Globe 11 March 2018

8.3 MSES - Regulated vegetation

8.3.1 MSES - Regulated vegetation (category B) Essential Habitat

The mapped area of Regulated vegetation (category B) Essential Habitat is the Least concern regional ecosystem 7.1.1. Appendix 7A and Appendix 7B discuss the habitat value, existing plants and indeed fisheries values of the settlement pond and including the area mapped as category B (see figures 38 and 39, and Map 1).

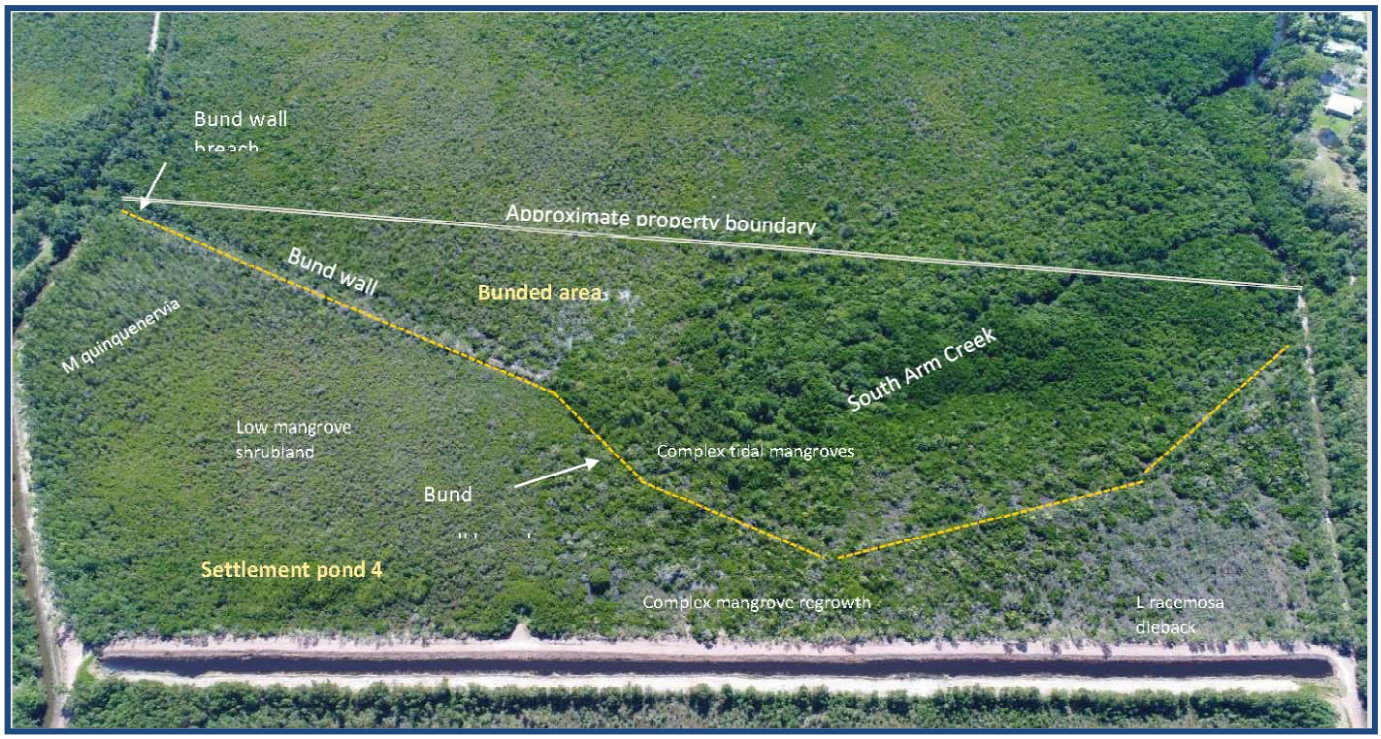
Vegetation will not be disturbed. The hydrological regime will not be adversely affected. The habitat connectivity to the adjoining areas of similar vegetation areas to the north, east and west will not be affected.

The drain between existing settlement ponds 3 and 4, which will become the Final Settlement Pond/Balancing Storage, will act as a disturbance buffer to ensure no disturbance to the essential habitat. During construction the northern bund of the final settlement pond will form the utmost boundary of disturbance. Indeed, no construction is proposed along this bund. The construction of the discharge weir at the eastern end of this final settlement pond will require no clearing of vegetation or disturbance of the mapped wildlife habitat. Particular attention will be paid to ensure the footprint of disturbance avoids the existing settlement pond 4 where it is mapped as essential habitat.

It is concluded that the proposed development avoids the mapped essential habitat and there are no likely significant residual impacts on this regulated vegetation.

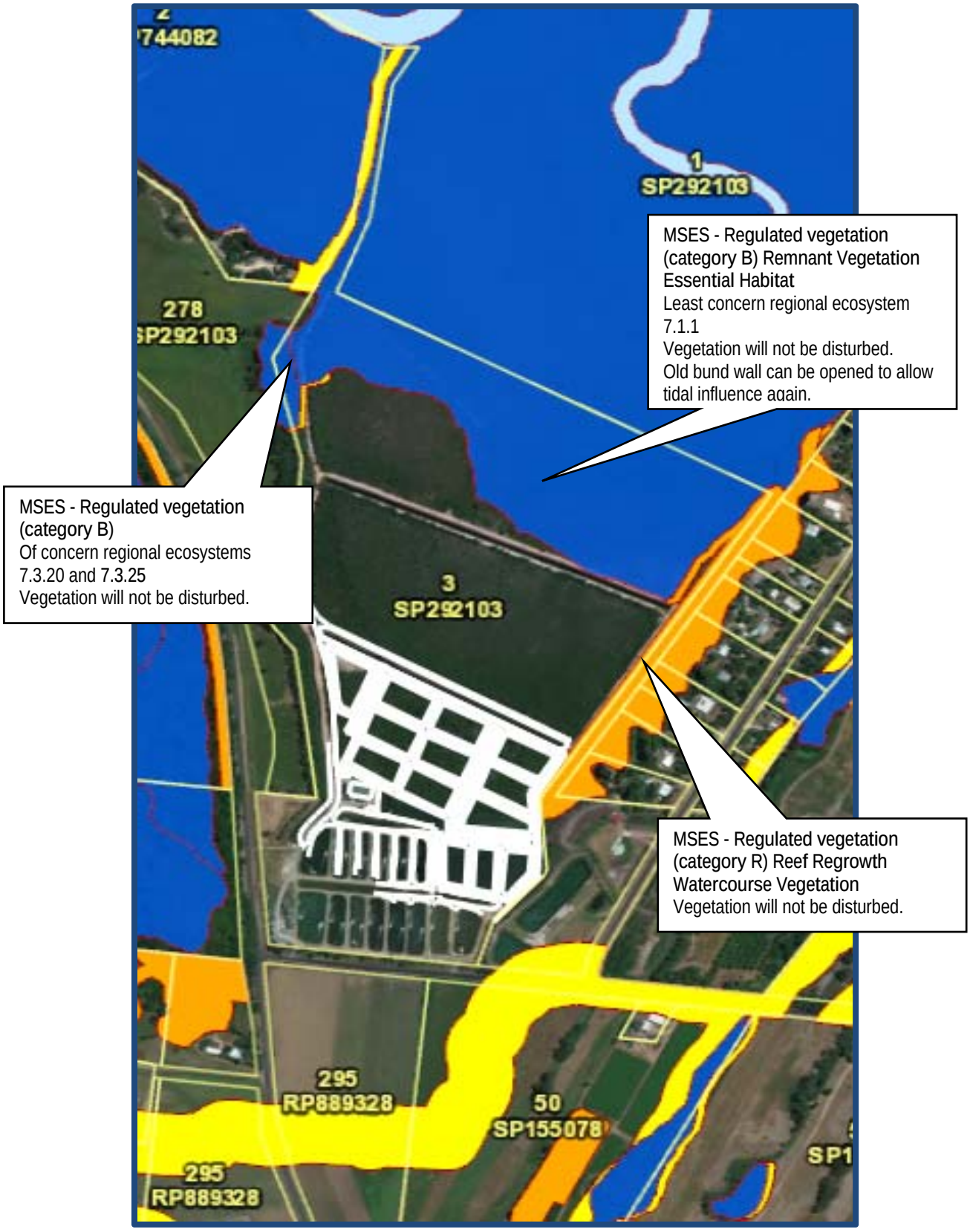
NOTE: Section 9 sets out the Significant Residual Impacts Analysis and concludes that there will not be any significant residual impacts. Given this a formal offset is not proposed. That said, in recognition of the habitat value in settlement pond 4 it is proposed to breach the old bund wall in, say six places to allow greater tidal connectivity.

Figure 38: Marine Plants in Settlement Pond 4



From: Small, A (2017) Marine Plant and Fisheries values Assessment Report (see Appendix 7A).

Figure 39: Regulated Vegetation



8.3.2 MSES - Regulated vegetation (category B)

The area comprising of concern regional ecosystems 7.3.20 and 7.3.25 is shown on Figure 39 and Map 1 lies along the intake drain/watercourse and will not be disturbed as it is well away from the areas proposed for construction of new ponds and re-purposing of existing settlement ponds.

The hydrological regime will not be adversely affected. The habitat connectivity to the adjoining areas of similar vegetation areas to the north, east and west will not be affected.

It is concluded that the proposed development avoids the mapped regulated vegetation habitat and there are no likely significant residual impacts on this regulated vegetation.

8.3.3 MSES - Regulated vegetation (category R) Reef Regrowth Watercourse Vegetation

The watercourse to the east of Lot 3 and in places within Lot 3 is mapped as reef regrowth watercourse vegetation, see Figure 39 and Map 1. The western bank is now the bunds of settlement ponds 2 and 3.

The reef regrowth watercourse vegetation is mainly mangrove habitat along the drainage line of the site, which also serves as the stormwater discharge for South Arm Drive residential properties.

There will be no disturbance of the reef regrowth watercourse vegetation. The hydrological regime will not be affected. The watercourse will still have the same level of tidal connectivity. The discharge for aquaculture will be into this watercourse and therefore entail somewhat more flow than at present but is small in proportion to the volume of standing waters and tidal exchange in the watercourse and will not affect the volume of waters or tidal planes (water levels) in the wetland.

The new ponds will be built by capping the existing bund walls of existing settlement ponds 1 and 2. Erosion and sediment control measures are outlined in section 4 and the acid sulfate soils management approach is set out in section 12, these measures will protect the wetland during construction. See figure 25 for a typical cross section and the protection measures, which in summary are:

- A hard boundary at the top of the existing bund wall for construction disturbance.
- A 2 m wide bench kept on the existing bund.
- A silt fence placed along the bund (bench) just outside the toe of the new bund.
- Erosion and sediment control measures on drainage lines from new earthworks disturbance to the wetland to reduce additional erosion and trap sediment (e/g rock dams, silt fences, riffle zones to slow flow rates and trap sediment).
- Immediate stabilisation of bunds through the use of woodchip/mulch created from the cleared vegetation.

The treatment of acid sulfate soils is set out in section 12 and Appendix 6A. Any release of water which may in any way be contaminated with ASS leachate, will be neutralised prior to discharge. During construction weekly inspection of erosion and sediment control structures, evidence of any disturbance to the wetland, sediment which has entered or any move into the wetland and water quality monitoring (pH and turbidity) at three sites in the wetland will be undertaken.

Based on the above, it is concluded that there will be no direct disturbance of the reef regrowth watercourse vegetation. Further, with stringent erosion and sediment control and a firm delineation of the area of disturbance along the bunds adjacent to new ponds 17, 18, 19 and 20, that the proposal can be achieved without any significant residual or consequential impact on the reef regrowth watercourse vegetation. It is further concluded that ongoing weekly verification of protection measures and turbidity monitoring will ensure any impact can be detected and mitigated prior to any significant residual or consequential impacts on the wetland.

8.4 MSES - Regulated vegetation (wetland)

The regulated vegetation (wetland) to the west of Lot 3 and in places within Lot 3 also serves as a intake drain. The alignment generally follows a pre-existing water course but which has been straightened. The eastern bank of this pre-existing watercourse is now the bunds of settlement ponds 2 and 3 (see Figure 39 and Map 4).

The regulated vegetation (wetland) is the mangrove habitat along the western drainage line of the site, which also serves as the intake for the aquaculture production and is the drainage of the catchment to the immediate west of the Lot 3.

There will be no disturbance of the regulated vegetation (wetland). The hydrological regime will not be affected. The regulated vegetation (wetland) will still have the same level of tidal connectivity. The intake for aquaculture will be somewhat more than at present but is small in proportion to the volume of standing waters and tidal exchange in the creek and will not affect the volume of waters or tidal planes (water levels) i the wetland.

The new ponds will be built by capping the existing bund walls of existing settlement pond 2. Erosion and sediment control measures are outlined in section 4 and the acid sulfate soils management approach is set out in section 12, these measure will protect the wetland during construction. See figure 25 for a typical cross section and the protection measures, which in summary are:

- A hard boundary at the top of the existing bund wall for construction disturbance.
- A 2 m wide bench kept on the existing bund.
- A silt fence placed along the bund (bench) just outside the toe of the new bund.
- Erosion and sediment control measures will be installed on drainage lines from new earthworks to the wetland to reduce additional erosion and trap sediment (e/g rock dams, silt fences, riffle zones to slow flow rates and trap sediment).
- Immediate stabilisation of bunds through the use of woodchip/mulch created from the cleared vegetation.

The treatment of acid sulfate soils is set out in section 12 and Appendix 6A. Any release of water which may in any way be contaminated with ASS leachate, will, after neutralisation, be discharged into the eastern creek and not into the wet regulated vegetation (wetland).

During construction weekly inspection of erosion and sediment control structures, evidence of any disturbance to the wetland, sediment which has entered or any move into the wetland. Water quality monitoring (pH and turbidity) at three sites in the wetland will be undertaken weekly.

Based on the above, it is concluded that there will be no direct disturbance of the regulated vegetation (wetland). Further, with stringent erosion and sediment control and a firm delineation of the area of disturbance along the bunds adjacent to new pond 27, it is concluded that the proposal can be achieved without any significant residual or consequential impact on the wetland of high ecological significance. Ongoing weekly verification of protection measures and turbidity monitoring will ensure any impact can be detected and mitigated prior to any significant or consequential impacts on the wetland.

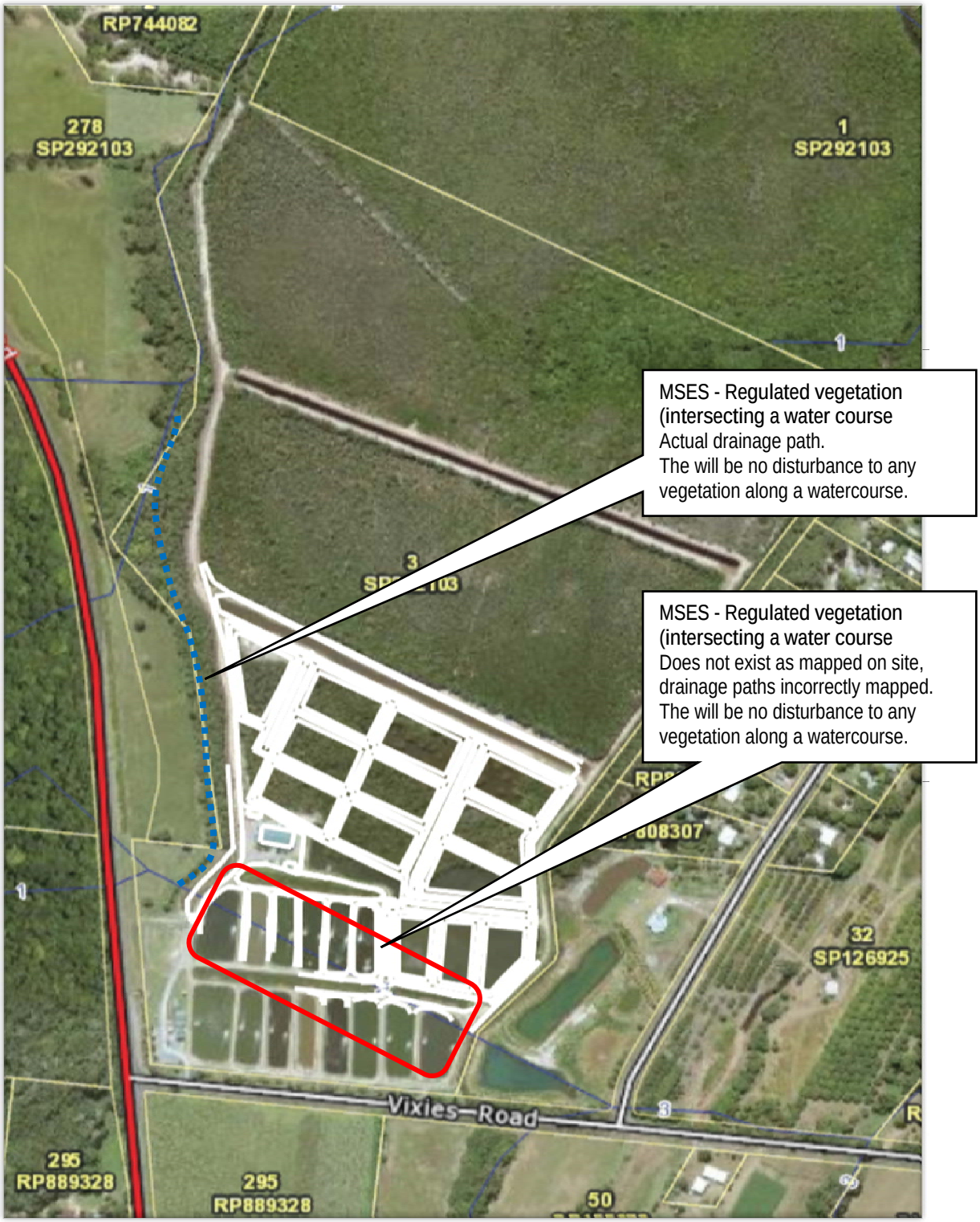
Figure 40: Regulated Vegetation Wetland

8.5 MSES - Regulated vegetation (intersecting a watercourse)

Figure 41 and Map 12 sets out the mapping of the watercourses on site. These are clearly wrong, most likely owing to the LIDAR contour mapping being affected/misinterpreted with the low level of the drain within the existing ponds. To avoid any doubt all stormwater and surface water that enters Lot 3 passes to the north along the western intake drain/ watercourse.

There will not be any disturbance to the watercourses in and adjacent to the site, not any disturbance to the vegetation along the watercourse. It is therefore concluded that there will no be any significant impact nor significant residual impact on the matter of state significance of regulated vegetation intersecting a watercourse.

Figure 41: Regulated Vegetation Intersecting a Watercourse



8.6 MSES - High ecological significance wetlands

The wetland to the west of Lot 3 and in places within Lot 3 also serves as a intake drain. The alignment generally follows a pre-existing water course but which has been straightened and the eastern bank is now the bunds of settlement ponds 2 and 3 (see Figure 42 and Map 5).

The wetland of ecological significance is the mangrove habitat along the western drainage line of the site, which also serves as the intake for the aquaculture production and is the drainage of the catchment to the immediate west of the Lot 3.

There will be no disturbance of the wetland. The hydrological regime will not be affected. The wetland will still have the same level of tidal connectivity. The intake for aquaculture will be somewhat more than at present but is small in proportion to the volume of standing waters and tidal exchange in the creek and will not affect the volume of waters or tidal planes (water levels) i the wetland.

The new ponds will be built by capping the existing bund walls of existing settlement pond 2. Erosion and sediment control measures are outlined in section 4 and the acid sulfate soils management approach is set out in section 12, these measure will protect the wetland during construction. See figure 25 for a typical cross section and the protection measures, which in summary are:

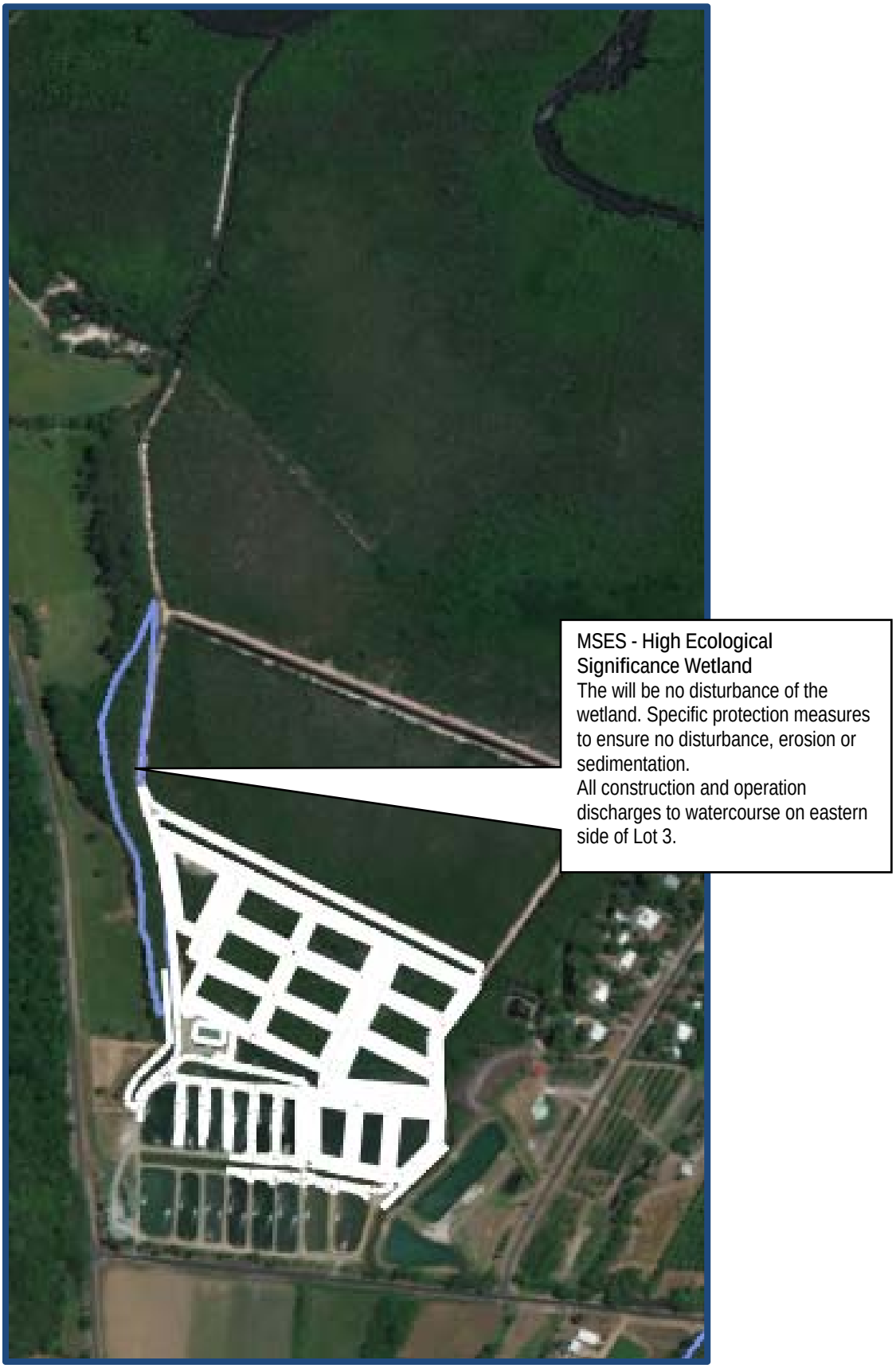
- A hard boundary at the top of the existing bund wall for construction disturbance.
- A 2 m wide bench kept on the existing bund.
- A silt fence placed along the bund (bench) just outside the toe of the new bund.
- Erosion and sediment control measures on drainage lines from new earthworks disturbance to the wetland to reduce additional erosion and trap sediment (e/g rock dams, silt fences, riffle zones to slow flow rates and trap sediment).
- Immediate stabilisation of bunds through the use of woodchip/mulch created from the cleared vegetation.

The treatment of acid sulfate soils is set out in section 12 and Appendix 6A. Any release of water which may in any way be contaminated with ASS leachate, will, after neutralisation, be discharged into the eastern creek and not into the wetland of high ecological significance.

During construction weekly inspection of erosion and sediment control structures, evidence of any disturbance to the wetland, sediment which has entered or any move into the wetland. Water quality monitoring (pH and turbidity) at three sites in the wetland will be undertaken weekly.

Based on the above, it is concluded that there will be no direct disturbance of the regulated vegetation (wetland). Further, with stringent erosion and sediment control and a firm delineation of the area of disturbance along the bunds adjacent to new pond 27, it is concluded that the proposal can be achieved without any significant residual or consequential impact on the wetland of high ecological significance. Ongoing weekly verification of protection measures and turbidity monitoring will ensure any impact can be detected and mitigated prior to any significant or consequential impacts on the wetland.

Figure 42: MSES High Ecological Significance Wetlands



9 Significant Residual Impacts Analysis

9.1.1 Pre-lodgement Advice

Pre-lodgement advice was received, see Appendix 1A (SPL-1216-035627).

> *5. Once avoidance and mitigation measures have been exhausted, an assessment against the DILGP Significant Residual Impact Guideline for each MSES will need to be undertaken to determine whether it is likely the activity will have a significant residual impact on any of the MSES. The following sections of the guideline will need to be used:*
> *• Section 3.1.1 – Essential Habitat (EH) and section 3.5 – Protected wildlife habitat to determine if a significant residual impact will be had on cassowaries or their habitat;*
> *• Section 3.3 – Wetlands and watercourses to determine if a significant residual impact will be had on the HES wetland; and*
> *• Section 3. 9 – Marine plants to determine if a significant residual impact will be had on marine plants.*

This section is based on the Significant Residual Impact Guidelines (For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009) established in accordance with the Queensland Environmental Offsets Policy and dated December 2014.

9.1.2 Avoidance of Disturbance

The approach for the proposal is avoidance of disturbance to matters of state environmental significance in terms of the footprint of disturbance and consequential impacts.

9.1.3 Best Practice Mitigation

The approach is to ensure there is no disturbance or impact upon matters of state environmental significance by adopting best practice mitigation strategies such as erosion and sediment control and acid sulfate soils management.

9.2 Regulated Vegetation

9.2.1 Situation

The site has regulated vegetation (see Figure 39):

- Regulated vegetation (category B) of concern regional ecosystems 7.3.20 and 7.3.25
- Regulated vegetation (category B) Remnant Vegetation Essential Habitat Least concern regional ecosystem 7.1.1
- Regulated vegetation (category R) Reef Regrowth Watercourse Vegetation

Please refer to sections 7 and 8 for a discussion of the consideration of impacts.

9.2.2 Applicable Significant Residual Impact Criteria

Queensland Environmental Offsets Policy—Draft Significant Residual Impacts Guideline section 3.11
'Endangered' or 'of concern' regional ecosystem (RE)
An action is LIKELY to have a SRI on an 'endangered' or 'of concern' RE if the action will result in:
(a) clearing of more than 5ha of 'endangered' or 'of concern' RE vegetation;
(b) clearing that results in an overall area (not confined to property boundaries) of 'endangered' or 'of concern' RE vegetation of less than 5ha; OR
(c) clearing that results in the physical separation1 of 'endangered' and 'of concern' RE communities within and on adjoining sites.

There will be no disturbance of, or clearing of, the regulated vegetation category B, regional ecosystems 7.3.20 and 7.3.25. Therefore there is no likely significant residual impact.

Queensland Environmental Offsets Policy—Draft Significant Residual Impacts Guideline section 3.11
Notwithstanding the above, an action is UNLIKELY to have a SRI on an 'endangered' or 'of concern' RE if the action will result in:
Significant Residual Impact Guideline (for MSES and prescribed activities assessable under SPA) **10**

(a) lineal clearing (that is for a purpose under section 22A of the *Vegetation Management Act 1999* (VMA)) within 'endangered' or 'of concern' REs not exceeding the width and area thresholds specified in Table 1, SDAP Module 8[2] by more than 25%; where an equivalent area which can be mapped as 'endangered' or 'of concern' in the future is being rehabilitated on the subject site;
(b) clearing of less than 10% of the total mapped area of 'endangered' or 'of concern' REs intersecting the property boundaries of the project, if total clearing is under 5ha; and where an equivalent area which can be mapped as endangered or of concern in the future, is rehabilitated through other locations on the subject site;
(c) clearing of 'endangered' or 'of concern' REs not exceeding the width thresholds specified in Table 1, SDAP Module 8 by more than 100% or the area threshold by 50%; where rehabilitated on the subject site;
(d) clearing of 'endangered' or 'of concern' REs within width thresholds specifies in Table 1, SDAP Module 8 and not exceeding the area threshold by more than 50%, to a maximum area of 5ha;
(e) removal of up to 5% of the total mapped area of 'endangered' REs intersecting the property boundaries of the project, where not greater than 25m in width; for the purposes of removing fragments, patches, uneven edges or protruding vegetation;
(f) removal of up to 10% of the total mapped area of 'of concern' RE intersecting the property boundaries of the project, where not greater than 50m in width; for the purposes of removing fragments, patches, uneven edges or protruding vegetation;
(g) clearing of 'endangered' or 'of concern' vegetation that is equivalent in size/area to existing exempt clearing to be protected via the proposal (i.e. realignment of a boundary which results in a shorter length of exempt clearing through an existing endangered or of concern area than allowed via the existing boundary); OR
(h) clearing of REs less than 1.1ha in size where surrounding land uses are zoned for urban purposes or future urban purposes under a local planning instrument.

Given the proposal will not involve clearing or disturbance to any endangered of concern regional ecosystem it is considered that the proposed action is UNLIKELY to have a significant residual impact to any endangered of concern regional ecosystem.

Essential Habitat (EH)
An action is LIKELY to have a SRI on EH if the action will result in:
(a) clearing of EH exceeding the thresholds specified in Table 1, SDAP Module 8, and resulting in a greater than 10% permanent reduction in the extent of EH mapped on site.

There will be no disturbance of, or clearing of essential habitat, therefore there is no likely significant residual impact.

Notwithstanding the above, an action is UNLIKELY to have a SRI on EH if the action will result in:
(a) lineal clearing (that is for a purpose under section 22A of the VMA) within EH not exceeding the width and area thresholds specified in Table 1, SDAP Module 8 by more than 25%, and where an equivalent area which can be mapped as EH in the future is rehabilitated on the subject site;
(b) clearing of less than 10% of the total mapped areas of EH on-site; where the remaining 90% is protected through a legally binding agreement (or similar) in order to maintain ecosystem function (e.g. to continue to support the species for which the EH is derived);
(c) temporary clearing of EH vegetation not exceeding the width thresholds specified in Table 1, SDAP Module 8 by more than 100% or the area threshold by more than 50%; where cleared EH vegetation is rehabilitated, on the subject site;
(d) clearing of EH vegetation complying with the width thresholds specified in Table 1, SDAP Module 8 and exceeding the area threshold by less than 50%;
(e) removal of EH vegetation exceeding the width and area thresholds specified in Table 1, SDAP Module 8 and where through the remapping of other vegetation the site results in an increase in the extent of mapped EH vegetation; OR
(f) removal of fragmented or isolated areas of EH where the equivalent area of EH can be added to a larger retained vegetated area displaying the same EH factors, by revegetation.

Given the proposal will not involve clearing or disturbance to the essential habitat it is considered that the proposed action is UNLIKELY to have a significant residual impact to the essential habitat.

9.3 Wetlands and Watercourses

9.3.1 Situation

The site has a wetland of high ecological significance (see Figures 18, 40, and 42 and Map 5). Please refer to section 7 and 8 for a discussion of the consideration of impacts.

9.3.2 Applicable Significant Residual Impact Criteria

Queensland Environmental Offsets Policy—Draft Significant Residual Impacts Guideline section 3.3.1
An action is LIKELY to have a SRI on a wetland or watercourse if:
(a) works are undertaken within a wetland in a WPA, a wetland of HES or the bed or banks of a HEV watercourse that will result in a permanent degradation of the landform, vegetation or water quality6
(b) in an urban area, works are undertaken within 50m of a wetland in a WPA, a wetland of HES or the bed or banks of a HEV watercourse that will result in a permanent and significant change to surface or groundwater hydrology or water quality; OR
(c) in a non-urban area, works are undertaken within 200m of a wetland in a WPA, a wetland of HES, or the bed or banks of a HEV watercourse that will result in a permanent and significant change to surface or groundwater hydrology or water quality.

The proposal will not involve any works undertaken within the wetland of high ecological significance, therefore there is no likely significant residual impact.

Whilst works will be undertaken within 200m of the wetland of high ecological significance there will be no disturbance of the bed or banks of the wetland of HES, nor will there be any change to the surface or groundwater hydrology or water quality, therefore there is no likely significant residual impact.

Notwithstanding the above, an action is UNLIKELY to have a SRI on a wetland or watercourse if:
(a) the mapped wetland in a WPA, wetland of HES or a wetland or watercourse in a HEV water is determined as not having 'high' or 'very high' conservations values using AquaBAMM or an appropriate assessment technique agreed with the assessing department (i.e. the site should not be mapped as having HEVs);
(b) no works are undertaken within 50m of a wetland in a WPA, a wetland of HES or a HEV watercourse or works undertaken within 50m of a wetland in a WPA or a HEV watercourse will not result in a significant change to the function of the wetland or watercourse including no significant changes to surface and groundwater hydrology and water quality; OR
(c) all works undertaken within 50m of a wetland in a WPA or a HEV watercourse, rehabilitate land (including drainage and flow paths) and vegetation to their pre-disturbance condition within a time period or condition agreed to by the assessing department.

Given the proposal will not involve disturbance within the bed or banks of the wetland of high ecological significance and the proposal will not result in a significant change to the function of the wetland or watercourse nor any significant changes to surface and groundwater hydrology and water quality the essential it is considered that the proposed action is UNLIKELY to have a significant residual impact to the wetland of high ecological significance.

9.4 Marine Plants

9.4.1 Situation

The site has marine plants in the wetlands on its eastern and western boundary and within existing settlement ponds 3 and 4 (see Figures 32–34). Please refer to sections 7 and 9 for a discussion of the consideration of impacts, Appendix 7A provides a report on the marine plants and fisheries values on site.

Excoecaria agallocha is present as isolated individuals growing on the margins of the settlement pond but nowhere does it form a community.

9.4.2 Applicable Significant Residual Impact Criteria

Queensland Environmental Offsets Policy—Draft Significant Residual Impacts Guideline section 3.9.1
An action is LIKELY to have a SRI on marine plants if:
(a) more than 50m^2 of marine plants above tidal limits will be permanently removed as a result of the project; AND
(b) onsite rehabilitation or restoration will not result in an equal or larger area of marine plants, providing equal or better fisheries values, within 5 years of clearing.

The only permanent removal of marine plants will be a few *Excoecaria agallocha* isolated individuals growing on the margins of the settlement pond 2 for the construction of production ponds 18–27, this will be a total of less than 25m^2, therefore is no likely significant residual impact.

Notwithstanding the above, an action is UNLIKELY to have a SRI on marine plants if:
(a) the removal or destruction of marine plants is within an additional 25% of an area or linear width of clearing that would otherwise be exempt from code assessment;
(b) the area impacted is expected to return to its pre disturbance condition within 5 years;
(c) the removal of marine plants is associated with coastal protection work or other approved marine development and will disturb less than 50m^2 of marine plants, and the marine plants being removed are above tidal limits (HAT) or bankfull width;
(d) the removal of marine plants does not exceed 25m^2; OR
(e) onsite rehabilitation or restoration results in at least an equal area of marine plants, providing similar or better fisheries values, within 5 years of clearing.

Given the proposal will only permanent removal of a few *Excoecaria agallocha* isolated individuals growing on the margins of the settlement pond 4 for the construction of production ponds 18–27, this will be a total of less than 25m^2, it is considered that the proposed action is UNLIKELY to have a significant residual impact in marine plants.

9.5 Conclusion

9.5.1 Unlikely to have a Significant Residual Impact

It is concluded that the proposed action is UNLIKELY to have a significant residual impact as:

- The proposal does not involve clearing or disturbance of the of concern regulated vegetation and essential habitat which is on site.
- The proposal does not involve clearing or disturbance of the wetland and watercourse vegetation on site.
- The permanent removal of marine plants will be limited to a few individuals on the inner bund of settlement pond 2 and less than 25m^2.

Further the proposal involves various protection and mitigation strategies to ensure there are no impacts or disturbance to the matters of state environmental significance conservation values during construction and ongoing operation.

9.6 Offset

9.6.1 Offset Not Required

To avoid any doubt, as the proposal has been designed and planned to not have any disturbance of MSES and therefore no significant residual impact, a formal offset is not offered.

9.6.2 Habitat Rehabilitation

Following discussion at the pre-lodgement meeting of leaving current settlement pond 4 without any disturbance and potential for this to have offset/habitat rehabilitation values, the SARA pre-lodgement advice (see Appendix 1A, SPL-1216-035627) stated:

> *Include an option that will serve to improve the area, for example removing the wall that is currently obstructing tidal access within Settlement Pond 4.*

Daintree Saltwater Barramundi offers to open the old bund which forms the northern boundary of the current settlement pond 4. Six openings are proposed to allow tidal connectivity which will allow further rehabilitation of marine plants and fisheries habitat value in the area. Works would be undertaken by using a small, light footprint machine (such as a "Dingo", small rubber tired excavator) with access along the old bund to avoid marine plant disturbance.

10 Environmental Authority Considerations

10.1 Prescribed Application Report

This section is based on the results of the Business Queensland "Forms and Fees finder", accessed 9 March 2018 and the resultant "Prescribed ERA Application Report".

Guidance
Prescribed ERA Application Report

Air:	Emissions to air from pond cleaning residues.
Noise:	Noise impacts on nearby sensitive receptors from general operation of the activity, including noise from feeding equipment and the operation of aeration devices and pumps.
Water:	Impacts to the receiving environment (surface waters) from waste water releases from the growing ponds including depleted oxygen, eutrophication and algal blooms. The contaminants/water quality issues of concern include: nitrogen phosphorus biological oxygen demand total suspended solids pH dissolved oxygen residual chlorine (if used in hatchery cleaning). For large farms, changes to the natural flows in the receiving environment (surface waters) due to waste water releases and intake channels. Monitoring of the above quality indicators as well as discharge volumes (and intake if using a net load approach). Receiving water monitoring of above as well as biological indicators (e.g. chlorophyll 'a', delta 15 N). Salinity intrusion into groundwater from ponds and channels affecting other groundwater users. Monitor groundwater levels, common anions and cations as well as salinity if a likely issue.
Waste:	Impacts of uneaten food wastes on benthic communities in the receiving environment.
Land:	Potential disturbance of acid sulfate soils during pond construction. Erosion in the receiving environmental due to waste water releases. Handling and storage of chemicals and fuels onsite.
Other:	Impacts of predator exclusion. Discharge locations near other aquaculture intakes. Intake locations near other industry discharges.

10.2 ERA Aquaculture

Currently the farm does not have an Environmental Authority for Aquaculture on the basis that there is no discharge, this expansion proposal includes an application for an Environmental Authority for the existing and additional pond aquaculture as there will be a settlement ponds, treatment wetland and whilst about 50% recirculation is planned there will be a define and managed discharge.

Part 1 Aquaculture and intensive animal industry

1 Aquaculture

(1) Aquaculture (the relevant activity) consists of cultivating or holding marine, estuarine or freshwater organisms in an enclosure on land or in waters.
(2) The relevant activity does not include cultivating or holding marine, estuarine or freshwater organisms—
(a) in an aquarium for display purposes only; or
(b) in an enclosure from which no water, other than uncontaminated stormwater, can be released to waters; or
(c) if the marine, estuarine or freshwater organisms receive no augmented food supply.
(3) In the following table, the aggregate environmental score for the relevant activity is the score stated opposite the threshold within which the relevant activity is carried out.
<<< Extract from table below>>>
1 cultivating or holding crustaceans in enclosures that are on land and have a total area of—
(a) more than 100m2
(b) more than 10ha but not more than 100ha
(c) more than 100ha

2 cultivating or holding marine, estuarine or freshwater organisms, other than crustaceans, in enclosures that are on land and have a total area of—

(a) more than 100m2 but not more than10ha

(b) more than 10ha but not more than 100ha

(c) more than 100ha

3 carrying out the relevant activity in enclosures that are in waters and have a total area of—

(a) no more than 1ha

(b) more than 1ha

<<< Regulation continues>>>

(4) In this section— augmented food supply, for cultivating or holding marine, estuarine or freshwater organisms, means the addition of foods for cultivating or holding the organisms. enclosure includes a cage, pond or tank.

10.3 Prior Clean Waters Act Permit

The farm once held a Clean Waters Act permit (the precursor to an environmental authority).

Appendix 4 – 1991 Clean Waters Act Permit shows that the site (Lot 1 RP746359) did once have a licence to discharge. This included water quality limits for BOD, NFR, pH, DO and requiring N, P and Chlorophyll$_a$ to be the "minimum practical". The Permit included a daily discharge limit of 1500m^3 per day. At some point the Clean Waters Act permit expired or was not renewed.

10.4 Environmental Relevant Activity Proposal

10.4.1 Environmentally Relevant Activity

The extension of the farm on Lot 3/SP SP292103 is a material change of use requiring a development approval (including for ERA 1 (2) (b)). The Department of Environment and Science is a concurrence agency for this.

NOTE The actual area of production ponds will be less than 10 ha and the Department of Environment and Science may consider ERA 1 (2) (a) applicable.

10.4.2 Key Aspects of Proposal

The proposal is to undertake aquaculture in 27 production ponds with a total area of 8.29 ha and with a managed treatment system with a primary settlement, wetland treatment and final settlement/balancing storage with a total area of 12.77 ha. The key aspects of the proposal are:

- A single discharge point as set out in Figures 19 and 20, which will comprise a controllable weir box, ensuring discharge can be controlled.
- The discharge will have erosion protection on the banks downstream of the outlet.
- Discharge will only occur on outgoing tides.
- Discharge volume will generally be managed to match the intake volume plus stormwater. The average daily intake/discharge volume is planned to be 2055 kL, to allow for the vagaries of production (pond draining etc.), the maximum daily discharge sought for the licence (excluding stormwater) is 8,000 kL.
- Noting that the total catchment of ponds, drains and treatment wetland is almost 25ha a peak rainfall event of 250mm would result in almost 65,000 kL of stormwater. Therefore, the total discharge sought for the licence in one day, including stormwater, is 70,000 kL.
- The discharge water quality characteristics sought are:
    - DO 90% of background or 4mg/L whichever is greater
    - pH 6.5>9.0
    - TSS maximum 75mg/L, mean 10 mg/L and total load 7500 kg/yr

  - TN maximum 4mg/L, mean 0.5 mg/L and total load 375 kg/yr
  - TP maximum 0.5mg/L, mean 0.02 mg/L and total load 15 kg/yr

- The above is to be calculated based on 6 monitored discharges annually occurring when rainfall <5mm in past 5 days.
- The proposal is to undertake the aquaculture in accordance with the commitments made in this application, including the proposed environmental management as set out in section 11.
- Monitoring is proposed:
  - Daily recording of intake and discharge volumes.
  - Daily rainfall recording.
  - Two monthly (six per year) monitoring of intake and discharge water quality (pH, DO, TSS, TN, TP).
  - Twice annual receiving water monitoring program (SADR 1, 3 and 5, see Figure 43) (pH, DO, TSS, TN, TP), to be undertaken pre and post wet season (with tidal/discharge conditions as per section 10).

10.4.3 Application Information

Please see this section for analysis against key environmental aspects, Attachment 3 (DA Form 1 Environmental Authority Application), Attachment 4 (Suitable Operator Daintree Saltwater Barramundi) and Attachment 10 which is SDAP 22 and this application report overall for supporting information.

10.5 Air

10.5.1 Dust

Guidance

Prescribed ERA Application Report

Emissions to air from pond cleaning residues.

The operation of the aquaculture farm does not involve any significant air emissions. When ponds are emptied they are dried out, however there have not been dust issues in the existing ponds operation and none are expected with the new ponds. There are backup diesel generators and farm vehicles with exhaust emissions.

The proposal meets the Environmental objective as the activity will be operated in a way that protects the environmental values of air.

The proposal meets the Performance outcomes There is no discharge to air of contaminants that may cause an adverse effect on the environment from the operation of the activity.

10.5.2 Odour

The operation of the aquaculture farm does not involve any significant odour emissions. When ponds are emptied they are dried out, however there have not been odour issues in the existing ponds operation and none are expected with the new ponds. The nearest sensitive receptors are residential properties to the east along South Arm Drive. In more than two decades of operation of the current aquaculture farm there has never been an odour complaint from South Arm Drive residents.

10.6 Noise

Guidance

Prescribed ERA Application Report

Noise impacts on nearby sensitive receptors from general operation of the activity, including noise from feeding equipment and the operation of aeration devices and pumps.

The development will not cause noise nuisance or environmental harm. The aquaculture operation involves very quiet pumps and aerators and vehicles. There are no large tonal or impulsive noises.

The nearest sensitive receptors are residential properties to the east along South Arm Drive. In more than two decade of operation of the current aquaculture farm there has never been a noise complaint from South Arm Drive residents.

The Environmental objective will be met as the aquaculture operation will be operated in a way that protects the environmental values of the acoustic environment.

The performance outcome is met as sound from the activity is not audible at sensitive receptors.

10.7 Water Quality

Guidance

Prescribed ERA Application Report

Impacts to the receiving environment (surface waters) from waste water releases from the growing ponds including depleted oxygen, eutrophication and algal blooms. The contaminants/water quality issues of concern include:

- nitrogen
- phosphorus
- biological oxygen demand
- total suspended solids
- pH
- dissolved oxygen
- residual chlorine (if used in hatchery cleaning).

For large farms, changes to the natural flows in the receiving environment (surface waters) due to waste water releases and intake channels.

Monitoring of the above quality indicators as well as discharge volumes (and intake if using a net load approach). Receiving water monitoring of above as well as biological indicators (e.g. chlorophyll 'a', delta 15 N).

Salinity intrusion into groundwater from ponds and channels affecting other groundwater users. Monitor groundwater levels, common anions and cations as well as salinity if a likely issue

10.7.1 Environmental Values and Water Quality Objectives

Two statutory documents are relevant: The Queensland Water Quality Guidelines; and the Daintree and Mossman Rivers Basins – Environmental Values and Water Quality Objectives (Basin No's. 108 and 109 and adjacent coastal waters) which was published in 2014 and is given statutory effect under the Environmental Protection (Water) Policy 2009 (See Appendix 8).

Adjacent to the Daintree Saltwater Barramundi farm, the Daintree River tributary is classified as an enclosed coastal/lower estuary with High Ecological Value Waters (HEV3001) under the Daintree and Mossman Rivers Basins – Environmental Values and Water Quality Objectives. The water quality objectives for physico-chemical, nutrient, algal and water clarity indicators to protect the aquatic ecosystems EV's (environmental values) under baseflow conditions are:

- DO 95-100-105 % (20th, 50th and 80th percentiles)
- pH 8.1-8.3 - 8.4 (20th, 50th and 80th percentiles)
- Ammonia N (NH_3) 1-3-7µg /L (20th, 50th and 80th percentiles)
- Oxidised N 0-0-1µg /L (20th, 50th and 80th percentiles)
- Particulate N =<20µg/L median
- Total N 76-105-140µg/L (20th, 50th and 80th percentiles)
- FRP 0-2-3µg/L (20th, 50th and 80th percentiles)
- Particulate P =< 2.8µg/L median
- Total P 8-14-22µg/L (20th, 50th and 80th percentiles)
- Algal Growth Chl-a <0.45µg/L median
- Turbidity 0.6-0.9-1.8 NTU (20th, 50th and 80th percentiles)
- TSS <0.2 mg/L median

Section 10.7.6 below sets out the results of 2017 background water quality monitoring which shows some variance of the intake/receiving waters of South Arm from the above environmental values:

- Ammonia Nitrogen is above the environmental values, nitrate/nitrite are below the detectable limit of 0.005 mg/L but this is above the 0.001 mg/L environmental value, total N with a measured range of 0.18 – 0.35mg/L is above the environmental values (e.g. 50th percentile of 0.105 mg/L).
- Filterable Reactive Phosphorous with a measured range of 0.006-0.022 mg/L is within the environmental value of 0.002 mg/L (50th percentile), whereas total phosphorous is well below the environmental value.
- Total suspended solids have a recorded range of 2-26mg/L whereas the environmental value is <0.2 mg/L.

From the above it is concluded that from the (limited) background monitoring undertaken the water quality of the South Arm has some water quality parameters which do not meet the environmental objectives in their current state. It is noted that the South Arm is a usually turbid lowland estuary with significant ongoing tidal flow remobilising sediments, this would affect these parameters.

10.7.2 Environmental Protection (Water) Policy 2009

The Policy is a statutory instrument under the Environmental Protection Act. It sets out Environmental values and Water Quality Objectives, all tidal and non-tidal waters have environmental values

The waters near Daintree Saltwater Barramundi are listed in Schedule 1 of the Policy and as such the WQOs are the set out Daintree and Mossman Rivers Basins Environmental Values and Water Quality Objectives (see Appendix 8).

The Daintree and Mossman EV&WQO's does not identify Aquaculture as an environmental value for estuarine waters in the Daintree River Basin nor Daintree Coastal waters (Table 1.1). There are water quality objectives for a range of aquatic environmental and a range of ecological conditions. It would appear (but has not been finally determined) that the "high ecological values waters/slightly disturbed waters and the sub category "Enclosed coastal/lower estuary" may apply. The key physico-chemical and nutrient values are:

- DO 85-100 %
- pH 6.5-7.3-8.4 (20th, 50th and 80th percentiles)
- Total N 160 µg/L (note other N values also prescribed)
- Total P 20 µg/L (note other P values also prescribed)
- Chl-a 2 µg/L
- Turbidity 10 NTU

There are also a variety of objectives for specific pesticides and biocides.

"Table 3.5" (below) sets out water quality objectives to protect human use environmental values, there are values ascribed for "Suitability for aquaculture" which are the Water Quality Objectives (tables 3.3 to 3.5) and ANZECC guidelines and Australia New Zealand Food Standards Code, Food Standards Australia New Zealand, 2007 and updates.

Section 10.7.6 below sets out the results of 2017 background water quality monitoring which shows some variance of the intake/receiving waters of South Arm from the above environmental values:

- Total N with a measured range of 0.180 – 0.350 mg/L is above the environmental value of 0.160mg/L.
- Total P being below the limit of reporting is well below the environmental value of 0.020mg/L (however other phosphorous analytes are detectable).

From the above it is concluded that from the (limited) background monitoring undertaken the water quality of the South Arm has some water quality parameters which do not meet the nutrient values for "Enclosed coastal/lower estuary" in their current state. It is noted that the South Arm is a usually turbid lowland estuary with significant ongoing tidal flow remobilising sediments, this would affect these parameters.

10.7.3 Suitability for Aquaculture

In terms of the South Arm water quality being suitable for use for aquaculture, it has been used for more than twenty years for the existing farm and as such is considered suitable for the proposed farm expansion.

Table 3.5 Aquaculture EV – Water quality objectives for optimal growth of particular marine species

Water parameter	Barramundi		Tiger prawn		Kuruma prawn
	Hatchery	Grow out	Hatchery	Grow out	Grow out
Dissolved oxygen	Saturation	>4 mg/L	>4 mg/L	>3.5 mg/L	>4 mg/L
Temperature °C	28–30 optimum 25–31 range	28–30 optimum		26–32	24
pH	~8	~8	~8	7.5–8.5	7.5–8.5
Ammonia (TAN, total ammonia-nitrogen)		0.1–0.5 mg/L			
Ammonia (NH_3, un-ionised form)	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L
Nitrate (NO_3)	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L
Nitrite (NO_2)	<0.2 mg/L	<1.0 mg/L	<0.2 mg/L	<0.2 mg/L	<0.2 mg/L
Salinity	28–31 ppt	0–35 ppt		10–25 ppt optimum	30–35 ppt optimum
Alkalinity		105–125 mg/L $CaCO_3$			
Clarity				30–40 cm Secchi disk	30–40 cm Secchi disk
Hydrogen sulphide		<0.3 mg/L			
Iron		<0.02 mg/L		<1.0 mg/L	
Spawning temperature °C		28–32		27–32	

Source: Department of Primary Industries and Fisheries—Water Quality in Aquaculture—DPI Notes April 2004 (as amended).

10.7.4 DEHP Prawn Aquaculture Policy

There is a prawn aquaculture policy for the expansion of prawn farms. The results of the Business Queensland "Forms and Fees finder", accessed 9 March 2018 includes the Water-EHP Operational Policy - Licensing wastewater releases from existing marine prawn farms i Queensland.

Despite the policy being for prawn farms, given it is listed as a policy resource for reference in the "Prescribed ERA Application Report" we have reviewed it in the context of it providing a framework for consideration of a barramundi farm expansion.

The policy has a discussion of “Category B” farms which are existing and want to expand their operation. Fundamentally it assumes in the Policy that any expansion will include treatment systems.

The Policy states: “All applications to expand to Category B will require full assessment under the EP Act. Under these circumstances any approval that is issued will have discharge levels no less stringent than those described in this policy for Category B. The proposed limits for category B licences are:

- DO 90% of background or 4mg/L whichever is greater
- pH 6.5>9.0
- TSS 40mg/L mean, 75mg/L max, 12kg/ka/day average over growing season.
- Nitrogen (TN) 3.0 mg/L max, 0.80kg/ha/day average
- Phosphorous (TP) 0.40 mg/L maximum, 0.15 kg/ha/day average over growing season

In the above mean is 6 consecutive samples.

In the context of Lot 3, assuming 8ha of ponds in production on average every day. This would calculate to total TN discharge of 35,040 kg per year of TSS, 2336 kg of TN per year and 438 kg of TP per year.

10.7.5 Intake and Current Settlement Pond Water Quality

August 2016 sampling of the intake and settlement pond waters shows (see Appendix 9A and Table 6):

- pH of 7.4 for both.
- Total suspended solids of 8mg/L for the intake and 7 mg/L for the settlement pond.
- Total Nitrogen of 0.36 mg/L for the intake and 2.3 mg/L for the settlement pond.
- Total Phosphorus of <0.02 mg/L for the intake and 0.42 mg/L for the settlement pond.

Table 6: Intake and Sediment Pond Water Quality Monitoring

16/8/2016	Units	Inlet Drain	Sediment Pond
pH**	pH Units	7.4	7.4
Total Suspended Solids Dried at 103-105°C	mg/L	9	7
Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.048	0.018
Total Kjeldahl Nitrogen	mg/L	0.31	2.3
Total Nitrogen (calc)	mg/L	0.36	2.3
Total Phosphorus (Kjeldahl Digestion)	mg/L	<0.02	0.42

10.7.6 Background Water Quality

For this MCU application, background water quality sampling of the South Arm of the Daintree River was reviewed against the Environmental Values and Water Quality Objectives established under the Queensland Water Quality Guidelines/EPP Water. This helps to determine if the waters of the South Arm currently meet the Queensland Water Quality Guidelines/EPP (water) in the vicinity of the proposed discharge.

In order to undertake this, five water samples were undertaken in June 2017 downstream locations on two days where there had been no farm discharge.

- Sites are SADR-1, SADR -2, SADR -3, SADR -4, SADR -5 (see Figure 43),
- Samples were taken during normal "dry season" conditions with no flood or major (>25mm) rainfall events in the catchment in the previous week.
- Samples taken in the week between Neap and Spring tides.
- Samples taken one hour after peak of high tide (as observed at proposed discharge point).
- Analytes, pH, Ammonia N, Oxidised N, Particulate N, Total N, FRP, Particulate P, Total P, Algal Growth (Chlorophyll-a), and Turbidity NTU.

Table 7 shows a summary of results with the full results and SGS quality assurance reporting at Appendix 9B.

Table 7: Background Water Quality

	Unit	LOR	SADR 1	SADR 2	SADR 3	SADR 4	SADR 5	SADR 1	SADR 2	SADR 3	SADR 4	SADR 5
Turbidity	NTU	0.5	2.1	1.9	5.1	2.3	2.8	2.7	2.4	2.9	2.1	2.5
Total Suspended Solids Dried at 103-105°C	mg/L	1	4	2	26	6	5	6	3	10	6	4
Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.016	0.015	0.015	0.015	0.009	0.023	0.013	0.011	0.012	0.011
Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.036	0.012	<0.005	<0.005	<0.005	0.014	0.009	<0.005	<0.005	<0.005
Total Kjeldahl Nitrogen	mg/L	0.05	0.31	0.34	0.26	0.28	0.35	0.35	0.24	0.25	0.31	0.18
Total Nitrogen (calc)	mg/L	0.05	0.35	0.35	0.26	0.29	0.35	0.37	0.25	0.25	0.31	0.18
Particulate (insoluble) Kjeldahl Nitrogen (calc)	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05
Soluble Kjeldahl Nitrogen	mg/L	0.05	0.31	0.34	0.26	0.28	0.30	0.30	0.24	0.25	0.31	0.17
Total Soluble Nitrogen (calc)	mg/L	0.05	0.35	0.35	0.26	0.29	0.30	0.31	0.25	0.25	0.31	0.18
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Particulate (Insoluble) Total Phosphorus	mg/L	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Filterable Reactive Phosphorus	mg/L	0.005	0.007	0.008	0.022	0.007	0.007	0.010	0.007	0.007	0.007	0.006
Total Soluble Phosphorus (Kjeldahl Digestion)	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chlorophyll a	mg/L	0.002	0.002	<0.002	0.005	0.003	0.003	<0.002	<0.002	0.004	0.003	0.004

10.7.7 Treatment Wetland and Recirculation Approach

Table 5 sets out the key hydraulic aspects. This table ignores rainfall (and evaporation). Mean annual rainfall for Port Douglas is 1964 mm and Mossman 2321mm, monthly pan evaporation rates for Port Douglas range from about 170mm to over 250mm[2]. Overall for the Wonga Beach location of Daintree Saltwater Barramundi the appears to be a balance of rainfall and evaporation overt the year. Obviously periods of high rainfall mean there are periods where stormwater in the ponds and treatment wetland will add to the daily discharge.

To account for increased evaporation in drier months and the need to occasionally refill ponds the proposal is to modestly increase the total intake to 750ML annually. Based on a 3% turnover the daily volume discharged by ponds to the settlement/treatment system will be 3724 kL. This is 54% of the primary settlement ponds useable volume and as such results in a mean retention time of 1.86 days. The daily turnover will be 6% of the treatment wetland volume and hence a retention time of over two weeks. The final settlement pond has a similar volume to the primary settlement pond with daily turnover being 53% of volume and 1.88 days retention.

The daily recirculation is proposed to be 1669kL with a consequent daily discharge of 2055kL. This represents, on average 45% recirculation of daily pond turnover.

[2] Wilson, P.R. (1991) Agricultural Land Suitability of the Wet Tropical Coast Mossman-Julatten area, Queensland Department of Primary Industries report QO91010.

Figure 43: Receiving Waters Monitoring Locations

Table 8: Key Hydraulic Aspects

Current annual intake	560,000kL
Current daily intake	1534kL
Current daily turnover	3%
Proposed Annual Intake	750,000kL
Proposed daily intake	2055kL
Proposed daily pond turnover	3%
kL Proposed daily pond turnover	3724kL
Daily pond turnover % of volume of Primary settlement pond	54%
Daily pond turnover % of volume of treatment wetland	6%
Daily pond turnover % of volume of Final Settlement Pond/Balancing Storage	53%
Days detention of daily pond turnover in Primary settlement pond	1.86
Days detention of daily pod turnover in treatment wetland	15.55
Days detention of daily pond turnover in Final Settlement Pond/Balancing Storage	1.88
kL Daily intake	2055kL
kL Daily pond turnover @3%	3724kL
kL Recirculation	1669kL
kL Daily discharge	2055kL
Recirculation proportion of daily pond turnover	45%

10.7.8 Modelling of Treatment Wetland

Dr Trevor Anderson undertook specific modelling of the treatment wetland for Daintree Saltwater Barramundi (see Appendix 10). The following is the executive summary of the report.

Scope

Daintree Saltwater Barramundi currently operate a barramundi farming enterprise at Vixies Road, Wonga and are intending to apply for an Environmental Authority, which permits discharge from the farm to allow expansion of the farm.

The lead consultant Ecosustainability has sought advice regarding the design and effectiveness of a wetland to treat the pond discharge in order to return the water to the environment with acceptable environmental impacts. This report addresses that request.

Key Findings

The results of the modelling undertaken indicate that:

- *The area of the proposed wetland is much greater than those generally used for treating low nutrient level aquaculture discharge waters. On the basis of dividing the total area of wetland into 10 sequential smaller areas to bring Hydraulic Loading Rate into the range covered by published studies,*
- *Utilising pond discharge water quality parameters based on industry standard good practice, namely Total Kjeldahl Nitrogen of 2.3 mg.L-1, Total Kjeldahl Phosphorus of 0.45 mg.L-1, Total Suspended Solids of 20 mg.L-1 and exchange rates of 3%.day-1,*

- ***The wetland as proposed by Daintree Saltwater Barramundi as part of their expanded farming activity will satisfactorily achieve the level of processing required to allow discharge water quality to match receiving water quality.***
- *Noting that water quality parameters of the proposed receiving waters at Daintree Saltwater Barramundi have 80th percentile measured values of 9.0 mg.L-1 for Total Suspended Solids, 0.35 mg.L-1 Total Kjeldahl Nitrogen and 0.01 mg.L-1 for Total Kjeldahl Phosphorus and normal exchange rates in barramundi farms operated with good practice are around 3%.day-1,*
- *The proposed wetland will be able to process exchange rates of up to 3.85%.day-1 and 1.33x the reasonable expected concentration of TP in the pond discharge. Further, the wetland will be able to process concentrations of TSS and TN up to 10x reasonable concentration in the pond discharge and discharge rates up to 36%.day-1 for TN or 60%.day-1 for TSS before reaching the levels measured in the receiving waters.*
- *Under expected usual operating conditions, the wetland will process discharge water such that each of the nutrients will be below the level of sensitivity of the analyses for Total Kjeldahl Nitrogen (0.05 mg.L-1), Total Kjeldahl Phosphorus (0.02 mg.L-1), and Total Suspended Solids (5 mg.L-1).*

10.7.9 Balanced Intake/Discharge Nutrients

Given the results of the treatment wetland modelling (section 10.7.8) the proposal is to have a balance contaminants/ nutrients of the intake/discharge waters.

The proposal is to use the treatment wetland and recirculation to ensure that there is no net change in the water quality characteristics and environmental values of the South Arm of the Daintree River. Table 9 sets out the current levels of TSS. TN and TP in the intake waters based on the 80th percentile results of the 2017 background water quality monitoring undertaken in the South Arm of the Daintree River.

To take account of the vagaries of rainfall, evaporation and production variability maximum concentrations for the discharge are proposed to be TSS 75mg/L, TN 4mg/L and TP 0.5mg/L. The proposed means (and hence total annual load) are set out in Table 10. TSS mean 10 mg/L (7500 kg/yr), TN mean 0.5 mg/L (375 kg/yr) TP, mean 0.02 mg/L (15 kg/yr).

Table 9: Receiving Waters 80th Percentile Results

		2016 Intake	2017 SADR 80th PERCENTILE
TSS	mg/L	9	9.00
TN	mg/L	0.36	0.35
TP	mg/L	0.02	0.01

Table 10: Intake and Proposed Discharge Characteristics

		Volume kL	TSS	TN	TP
Annual Intake		750,000			
Background	mg/L		9	0.35	0.02
Annual Intake	kg/yr		6750	262.5	15
Prawn Policy Max	mg/L		75	3	0.4
Prawn Policy Mean	mg/L		40	-	-
Prawn Policy annual	Kg/yr		35,040	2336	438
Suggested Max	**mg/L**		**75**	**4**	**0.4**
Suggested Mean	**mg/L**		**10**	**0.5**	**0.02**
Annual discharge (excluding stormwater)	kg/yr	750,000	**7500**	**375**	**15**

10.7.10 Phosphorous Contingency

It is recognised that phosphorous may be the nutrient which is the most challenging to ensure compliance with the proposed maximums/means at all times. As reported by Anderson (see Appendix 10) low phosphorous feeds may be able to be sourced. In addition there is a potential option to use a CSIRO developed approach.

In order to control the composition of the algal bloom Flicking Fresh (a Barramundi farm in the Northern Territory trialled a propriety product, developed by CSIRO, Phoslock. For background the following are extracts from the Phoslock website:

> *In intensive aquaculture ponds, natural carrying capacities are greatly exceeded, and heavily laden artificial ecology is established among the various organisms and the environment they live. Due to the high densities of fish or prawn stock for profitable commercial aquaculture, ponds receive large nutrient inputs from uneaten fish feeds, fish excretion, and sediment mineralization/resuspension.*
>
> *Any nutrients, for example, nitrogen, phosphorus or certain metals can become limiting nutrients for phytoplankton growth. Limitation of nitrogen is an expensive process, which required high energy and chemical costs and specialized equipment.*
>
> *Any nutrients, for example, nitrogen, phosphorus or certain metals can become limiting nutrients for phytoplankton growth. Limitation of nitrogen is an expensive process, which required high energy and chemical costs and specialized equipment. Therefore, phosphorus limitation is the cheapest and most practical means of preventing the growth of phytoplankton, particularly toxic blue-green algae.*
>
> *Phoslock is a natural product which controls and manages blue-green algae in aquaculture ponds in environmentally friendly and sustainable way. Phoslock is produced from modified bentonite clay that was invented and developed by the CSIRO (Commonwealth Scientific and Industrial Research Organisation) Land and Water Division, Australia to significantly reduce the amount of bioavailable phosphorus (Filterable Reactive Phosphorus (FRP) or Soluble Reactive Phosphorus (SRP)) present in the water column and in the sediment pore water of a water body.*
>
> *Phoslock locks up the soluble inorganic phosphate (PO_4) in the matrix of Phoslock clay. The phosphate is rendered bio-unavailable and cannot be used to fuel algal growth.*

When applied as a slurry, Phoslock moves down through the water column and up to 95% of the Filterable Reactive Phosphorus (FRP) is rapidly removed and adsorbed onto the surface, forming an insoluble complex within the clay structure. As the Phoslock settles on the sediment-water interface it forms a 1-3 mm layer that is capable of adsorbing the FRP (on available binding sites) that is released from the sediment layer. Once the FRP is bound to Phoslock, it is no longer bioavailable for use by algae for assimilation and growth.[3]

The farm found this changed the algal floc in the ponds and reduced BOD. Whilst this trial did not focus on removal of phosphorous in discharge waters the product may have an application if Daintree Saltwater Barramundi finds total phosphorous to be a challenge to ensure a nutrient balance between intake and discharge waters. Initially Phoslock could be trialled in the final settlement pond

Given the above, the contingency plans to ensure net nutrient balance between intake and discharge waters will be:

1. Maximise recirculation, noting that this may not reduce the concentration of TSS, TN or TP in discharge waters, but by reducing the volume discharged the total kg of these contaminants can be reduced
2. Use of reduced phosphorus feeds and other feed reduction/management strategies.
3. Trialling "Phoslock", initially in the final settlement/balancing storage.

To avoid any doubt, this section should not imply any lack of confidence in the background water quality data, treatment wetland modelling or the farms ability to recirculate about 50%, rather the contingency strategies are offered to show confidence in the ability to meet the proposed total kg of phosphorous in the discharge and hence minimal likelihood of impact on the receiving waters.

10.7.11 pH and DO

The above discussion does not specifically address pH and DO however the proposal is based on achieving discharge which meets the limits suggested for prawn aquaculture:

- DO 90% of background or 4mg/L whichever is greater
- pH 6.5>9.0

This is considered appropriate to ensure there will be no impacts on the environmental values or water quality objectives for the receiving waters.

10.7.12 Groundwater Salinity

The site of the new ponds was historically a freshwater wetland just inland of tidal influence. Ground water is not saline. The construction of the ponds (with the floor above HAT) to meet the Queensland pond aquaculture guidelines and the clay lining of the pond floor and bunds walls to meet the impermeability as per the risk assessment will ensure that there is minimal risk of salinisation of groundwater.

10.8 Waste

10.8.1 Food Wastes

Guidance

Prescribed ERA Application Report

Impacts of uneaten food wastes on benthic communities in the receiving environment.

Given the proposal does not involve uneaten food waste directly entering into receiving waters there will not be any impact on benthic communities.

The net nutrient discharge will match the water quality of the intake waters.

[3] http://www.phoslock.com.au/Blue-Green%20Algae%20Management%20in%20Aquaculture.pdf

10.8.2 Acid Sulfate Soils

Guidance

Prescribed ERA Application Report

Potential disturbance of acid sulfate soils during pond construction.

The development of the site will be in accordance with the Acid Sulfate Soils Management Plan as set out in section 12 and Appendix 6A.

10.9 Land

10.9.1 Erosion in Receiving Environment

Guidance

Prescribed ERA Application Report

Erosion in the receiving environmental due to waste water releases.

10.9.2 Handling and Storage of Chemicals

Guidance

Prescribed ERA Application Report

Handling and storage of chemicals and fuels onsite.

The farm does have 800 L of diesel stored on site. This is an overhead tank which is bunded and stored in accordance with AS 1940. The fuel store is on the workshop which is at 3.27 m AHD, well above local flood level and above the storm tide level of 2.8m AHD.

Other small volumes of chemicals , oils and greases will be stored local containment structures (e.g. bunded pallets).

10.10 Other

10.10.1 Predator Exclusion

Guidance

Prescribed ERA Application Report

Impacts of predator exclusion.

To date, Daintree Saltwater Barramundi has not had the need for predator exclusion devices for juvenile/adult grow out ponds. The farm does manage predator exclusion for fingerlings with in-pond floating cages grow out. With the expanded farm there could be an issue with saltwater crocodiles and if this proves to be more than an occasional visitor or individuals take up residence in the ponds/wetlands then a perimeter fence may be considered. This would not have an effect on wild populations as the current farm is not wild habitat and feeding on aquaculture fish could artificially inflate the available resources affecting natural productivity of the population.

Hence, if required, predator exclusion devices are not likely to have any affect on target or non-target wildlife species.

10.10.2 Discharge Near Other Aquaculture

Guidance

Prescribed ERA Application Report

Discharge locations near other aquaculture intakes.

There are no other nearby aquaculture intakes.

10.10.3 Intake Locations Near Other Industry Discharges.

Guidance

Prescribed ERA Application Report

Intake locations near other industry discharges.

There are no other nearby industry discharges.

10.11 Standard Criteria

This section sets out a response to the standard criteria.

Guidance

Schedule 4 Dictionary of the Environmental Protection Act 1994 ◄*standard*► ◄*criteria* means—
(a)the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment—
(i)the precautionary principle;
(ii)intergenerational equity;
(iii)conservation of biological diversity and ecological integrity; and
(b)any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development; and
(d)any relevant environmental impact study, assessment or report; and
(e)the character, resilience and values of the receiving environment; and
(f)all submissions made by the applicant and submitters; and
(g)the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
(i)an environmental authority;
(ii)a transitional environmental program;
(iii)an environmental protection order;
(iv)a disposal permit;
(v)a development approval; and
(h)the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and
(i)the public interest; and
(j)any relevant site management plan; and
(k)any relevant integrated environmental management system or proposed integrated environmental management system; and
(l)any other matter prescribed under a regulation.

10.11.1 Precautionary Principle

Guidance

Schedule 4 Dictionary of the Environmental Protection Act 1994 ◄*standard*► ◄*criteria* means—
(a)the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment—
(i)the precautionary principle;

Given the proposal is for a net nutrient balance (see section 10.7) and there are no significance residual impacts on matters of state environmental significance (see section 9) the proposal meets the precautionary principle as there is not likely to be any net change in the environmental values thus no change to the assimilative capacity of the receiving environment.

10.11.2 Intergenerational Equity

Guidance

(a)the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment—
(ii)intergenerational equity;

The proposal has no implications for intergenerational equity as the proposal is for a net nutrient balance (see section 10.7) and there are no significance residual impacts on matters of state environmental significance (see section 9).

10.11.3 Biodiversity and Ecological Integrity

Guidance

(a)the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment—
(iii)conservation of biological diversity and ecological integrity;

Given the proposal has no significant residual impacts on matters of state environmental significance (see section 9) the proposal is unlikely to have any conservation of biological diversity and ecological integrity.

10.11.4 MSES Matters

(b)any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development;

The proposal has no significant residual impacts on matters of state environmental significance (see section 9).

10.11.5 Environmental Impact Assessment

Guidance

(d)any relevant environmental impact study, assessment or report;

This application report provides an assessment of potential environmental impacts.

10.11.6 Receiving Environment

Guidance

(e)the character, resilience and values of the receiving environment;

The proposal is for a net nutrient balance (see section 10.7) and there are no significance residual impacts on matters of state environmental significance (see section 9), therefore the proposal is unlikely to affect the character, resilience and values of the receiving environment.

10.11.7 Submitters

Guidance

(f)all submissions made by the applicant and submitters;

The has been no community consultation to date.

10.11.8 Best Practice Environmental Management

Guidance

(g)the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
(i)an environmental authority;
(ii)a transitional environmental program;
(iii)an environmental protection order;
(iv)a disposal permit;
(v)a development approval; and
(h)the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and
(i)the public interest; and
(j)any relevant site management plan; and
(k)any relevant integrated environmental management system or proposed integrated environmental management system; and
(l)any other matter prescribed under a regulation.

The proposal is considered to exhibit best practice environmental management as it:

1. Has settlement/treatment system over 150% of the area of production ponds.
2. Has a planned recirculation of treated pond wastewater comprising almost 50% of daily pond turnover.
3. Has a net nutrient balance between intake and discharge waters.
4. Will be managed in accordance with the proposed environmental management pan (which can form the basis of and be adapted to an integrated environmental management system once the environmental authority is issued and conditions can be embodied).
5. Will be managed in accordance with the Australian Sustainably Farmed Barramundi certification system including annual ecoefficiency assessments and auditing (see current Certification certificate at Appendix 11).
6. The footprint of disturbance avoids any significant residual impacts on nearby matters of state environmental significance.

11 Environmental Management

11.1 Sustainability, Operations and Site Plan

This chapter sets out the operations and site management measures in order for the efficient, profitable and sustainable operation of the proposed farm.

This EMP will be revised and held as a separate document (subject to internal document control), once the development approval and environmental authorities are issued. The EMP will be revised to accommodate any approval conditions.

To avoid any doubt, Daintree Saltwater Barramundi implements this for its existing operation and will do so for the expanded farm.

11.1.1 Daintree Saltwater Barramundi Aquaculture Farm Management Plan

Once approvals are obtained and prior to full production, an integrated site, operations and environmental sustainability management plan will be developed. This will include all the relevant compliance aspects for the various permit conditions (once they are known). The following sections of this chapter as set out as firm commitments of practices for the purposes of assessment of this application), will form the basis of the Daintree Saltwater Barramundi Aquaculture Farm Management Plan augmented by any further compliance measures required.

11.2 Principles

11.2.1 Australian Sustainably Farmed Barramundi

Daintree Saltwater Barramundi's aquaculture operation is based on the principles of the Australian Sustainably Farmed Certification Program. Daintree Saltwater Barramundi has been audited and certified for its farm operations and will extend this certification once the farm expansion is underway.

Australian Sustainably Farmed Certification Program principles are:

11.2.2 Sustainability Management

Each farm makes a **commitment to sustainability** which is communicated to staff, visitors, suppliers and customers.

Each farm is developed and managed to achieve **sustainability within the local ecology**.

Each farm **monitors** their **potential impacts** upon the natural environment.

Farms are located on **approved and sustainable sites** and new farms do not involve large scale disturbance of marine plants.

New farms and expansions are designed to **maximise ecoefficiency** and the **water quality of any discharges**.

Each farm has a specifically developed **environmental management approach** or documented environmental management plan which has strategies to **minimise environmental risks and maximise sustainability**.

Farms ensure **staff understand the obligations, priorities and strategies** to achieve environmental compliance, sustainability and maximise eco-efficiency.

Farms have identified **key aspects of the local natural environment** and potential impacts are understood.

Farms have undertaken a specific **risk assessment** and have developed **mitigation strategies** and **contingency plans** which address all **foreseeable events**.

Farms strive for **continual improvement** in **sustainability** and **eco-efficiency**.

11.2.3 Sustainability Performance

Construction and upgrading works on farms **minimise disturbance** or re-establish soils, **erosion protection and drainage**.

Farms regularly review their **eco-efficiency**.

Water quality of **receiving waters** and any **discharge** waters is understood and potential effects minimised.

Water use from **groundwater** and **surface** waters is **minimised** within the constraints of farm design and efficient operations.

Energy use is minimised to achieve the best possible eco-efficiency within the constraints of farm design and efficient operations.

Erosion, sedimentation and any acid sulfate soils are **managed** on site and there is **minimal sediment loss** or dust from the farm.

Waste is minimised to achieve the best possible eco-efficiency within the constraints of farm design and efficient operations, waste disposal is sustainable.

Chemicals are used on farm only where their (adverse and beneficial) **affects are understood**, **storage is safe** and disposal of surplus product and containers is environmentally safe.

Off farm noise and odour impacts on neighbours and any surrounding natural environment is **minimised**.

Protected natural vegetation on farm and **natural vegetation** off farm is **not disturbed**, **weeds** on farm are **controlled** and **impacts on wildlife minimised**.

Ponds are managed to **maximise production**, achieve the best possible **eco-efficiency** and **minimise contaminants** discharged.

Farms manage fish stocks to **maintain fish health**, **reduce disease** risk and **minimise escapes**.

Farms consider the **sustainability aspects of feed** used.

11.2.4 Product Quality

Farms process fish and deliver to market in a manner which meets all **food safety requirements**.

Fish is of **high quality**, presents undamaged and is **without "muddy" taint**.

11.3 Sustainability Commitment

11.3.1 Sustainability Policy

Daintree Saltwater Barramundi has a written Sustainability Policy in place, signed by Owner(s), the Policy is reviewed annually.

The Policy includes a commitment to ecological sustainability, to understand potential impacts and minimise risks of impacts.

The Policy includes a commitment to ecoefficiency, to reduce energy and water consumption and minimise waste in accordance with best practice.

The Policy includes a commitment to purchasing eco-friendly and sustainable products where possible.

The Policy includes a commitment to purchasing locally as far as practicable.

The Policy includes a commitment to compliance with environmental, planning, safety and hygiene permits, licences and regulations.

The Policy includes a "good neighbour" approach, recognising aspirations and concerns of neighbours through consultation and avoids practices with impacts.

The Policy includes a commitment to continual improvement, including adopting or trialling emerging best practices.

The Policy is posted in a prominent place(s) on the farm at locations(s) where visitors, staff, customers and suppliers a may read it.

The Policy is reviewed at least once a year, resigned and dated.

11.4 Location

The site is approved by local planning and environmental zoning and regulations (subject to this application for expansion and issueance of an environmental authority!)

The expansion will NOT involve clearing of remnant or regulated vegetation, mangroves or marine wetlands. The farm has not and the expansion will not involve reclamation of tidal areas or wetlands.

11.5 Design

11.5.1 Design

Overland flow does not enter ponds or tanks.

Discharge points are located to maximise dispersion, minimise impacts on hydraulics of receiving waters and disturbance to marine/aquatic ecosystems.

Ponds are above the storm tide flood level.

Ponds have adequate overflows and spillways to cope with major rainfall events (whilst still allowing some freeboard and with mechanisms to prevent escape of fish)- For extreme rainfall events a direct discharge from the primary settlement pond will avoid flooding the saltmarsh wetland treatment area.

Ponds have an arrangement that allows complete drainage if required.

Ponds are orientated/designed in relation to the prevailing wind direction(s) to avoid wave fetch and downwind bank erosion. Banks will be vegetated to avoid erosion.

An Acid Sulfate Soil management plan will be in place for construction.

Ponds are impervious (minimal outflow/inflow seepage) and there is a low likelihood of ground water contamination.

The ponds and primary settlement/treatment ponds are designed to ensure recirculation is maximised (with allowance for seasonal variation of saline intake and rainfall salinity consideration etc.).

11.6 Monitoring

11.6.1 Monitoring

If required by the Environmental Authority (Permit), monitoring of the local environment will be undertaken (e.g. water quality monitoring of receiving waters). NOTE some background monitoring has been undertaken to date.

Photographic reference points have been established and photographs taken annually or seasonally of the immediate environment (i.e. adjoining wetland, discharge creek).

11.6.2 EMP

An environmental management approach is developed and implemented to minimise risks and maximise sustainability (including eco-efficiency).

Daintree Saltwater Barramundi has this set of environmental measures, an environmental compliance and monitoring register and a risk assessment to form the basis for an environmental management approach.

NOTE: Once approvals are obtained and prior to full production an integrated site, operations and environmental sustainability management plan will be developed.

11.6.3 Suggestions and Complaints

Staff, suppliers and any contractors are encouraged to make suggestions to increase eco-efficiency and sustainability or reduce the risk of environmental harm.

Daintree Saltwater Barramundi has a system is in place to receive, record and respond to complaints from staff, contractors, suppliers, neighbours and community stakeholders.

A compliant register, as a part of the ongoing running file/diary is kept.

11.6.4 Incidents and Corrective Action

Daintree Saltwater Barramundi has an incident register and a corrective action process in place:

11.6.5 Incident Reporting

There is a process to evaluate the potential for environmental harm or non-compliance with environmental licences and permits in the event of an incident. Reporting is made when statutorily required or environmental harm may occur.

11.6.6 Records

Records on monitoring and compliance are kept for at least five years.

An Environmental file/register is kept and contains:

- Copies of all permits, licences and government agency correspondence
- The Farms sustainability policy
- Copies of government environmental agency guides to best practice.
- Monitoring information
- Training records
- Environmental complaints
- The Risk Assessment
- Material safety data sheets for all chemicals

11.6.7 Training and Awareness

All Daintree Saltwater Barramundi staff know the overall environmental commitment and understand the responsibilities for environmental compliance and environmental protection relevant to their duties.

Daintree Saltwater Barramundi operates with few staff and has general program between supervisors and staff to ensure the training and awareness is undertaken.

Staff are specifically advised and are aware of the farms Sustainability Policy.

Staff are encouraged to report environmental incidents and make suggestions for environmental, sustainability and ecoefficiency improvements.

11.7 Understanding Potential Impacts

11.7.1 Water Quality

As there is a discharge of wastewater or effluent from the farm, there is some ongoing receiving water quality assessment.

The potential assimilative capacity of receiving waters has been judged as being able to accept the quality and quantity of wastewater/effluent discharge.

11.7.2 Hydrology

The farms hydrology is understood and potential impacts on drainage patterns and surface water volumes and quality have been considered in pond design.

There is no groundwater use for aquaculture production.

11.7.3 Aquatic/Marine Plants

Locally occurring aquatic and marine plants are known and the potential effects on local native aquatic and marine vegetation is minimal.

Disturbance to marine and aquatic plants is minimised and Daintree Saltwater Barramundi tries to ensure exotic/weed marine/aquatic plants are not introduced to nearby natural systems.

11.7.4 Fauna

Local populations of wildlife (e.g. migratory waders) are understood, particularly any endangered or migratory species.

Local populations of predator species (e.g. pelicans, crocodiles etc.) are understood.

11.7.5 Odour

Local sources of odour (other than the farm) are known and the local situation with regard to odour is understood (in order to place any odour issues from the farm in a local context). The main odour around the farms is from the estuary in particular tidal/seasonal weather conditions. There are no local human induced odour sources.

11.7.6 Noise

Local sources of noise (other than the farm) are known and the local noise environment is understood (in order to place any noise issues from the farm in a local context). Apart from adjoining properties' farm machinery, are no local human created noise sources.

11.8 Risk Management

11.8.1 Risk Assessment

A risk assessment has been undertaken which considers the likelihood, magnitude and reversibility of impacts after practical mitigation strategies has been developed.

11.8.2 Contingency Planning

There are contingency plans in place for foreseeable (even if unlikely) events and practical strategies have been devised to minimise farm production losses and environmental impacts.

Contingency planning considers:

- Power failure (onsite and from grid)
- Pump and/or aerator failures
- Intake Filter blockages

- Contamination of pond water and disease outbreaks.
- Flood and storm rainfall
- Cyclonic winds and storm surge
- Fire

Any plant, machinery or products required for immediate use or during periods of inaccessibility (such as flood) to implement contingency plans are held on farm.

11.9 Continual Improvement

11.9.1 Best Practices

The Farm operations are regularly reviewed with a view to adopting current best practice for ecoefficiency, sustainability and farm productivity.

Within the capacity of the Farm's resources, new techniques are trialled and support is given to research programs.

11.10 Sustainability Performance

11.10.1 Minimising Disturbance

The construction of the expanded farm aims to minimise soil and drainage pattern disturbance.

The aim is to prevent overland flow from entering the disturbance area (e.g. use cut off drains and bunds).

11.10.2 Ecoefficiency

There is an ongoing internal ecoefficiency assessment of key indicators for energy, water, waste and feed inputs.

As part of Daintree Saltwater Barramundi's Australian Sustainable Farmed Barramundi certification, there is an annual assessment of ecoefficiency which involves benchmarking against industry averages.

Daintree Saltwater Barramundi's ecoefficiency assessment includes

- all energy use, including electricity, diesel, petrol, LPG and liquid oxygen.
- quality and quantity of feed.
- assessment of water consumption.
- waste production.
- discharge and net nutrient discharge.

Ecoefficiency assessment is calculated on inputs per kilogram of fish produced at farm gate.

Ecoefficiency assessment includes the calculation of greenhouse gas emissions from the farm (up to the fish leaving the farm gate).

11.11 Water

11.11.1 Water Harvesting and Use

Where surface water is used, extraction only occurs in places and at rates approved (the approved intake).

Daintree Saltwater Barramundi propose to monitor and record the volume and the water quality parameters of intake waters in accordance with the Environmental Authority (Permit),

11.11.2 Water Conservation

Ponds and tanks are managed to minimise water use within the constraints of the design.

Potable water from a utility provider is not used for site irrigation.

Daintree Saltwater Barramundi intends that (within the constraints of the design), recirculation, rather than discharge is to be maximised.

11.11.3 Discharge

All discharges are approved and planned.

Discharges do not result in any irreversible or long term increase in nutrients, phytoplankton, suspended solids or salinity levels of receiving waters.

As required, discharge water quality is monitored and only complying effluent is released off-farm.

Daintree Saltwater Barramundi plans to maximise re-circulation in order to minimise discharges.

11.12 Energy

11.12.1 Aeration

Energy efficient paddlewheels are used.

Aeration aims to ensure dissolved oxygen remains at or above 4 mg/L, additional aeration above this level is avoided.

Daintree Saltwater Barramundi would like to have real time monitoring, if not cost effective, twice daily monitoring of DO will be undertaken.

11.12.2 Pumping and Filtration

Pumps have been specifically sized and the type is fit for purpose and efficient for its use.

During the farm expansion, Daintree Saltwater Barramundi propose to install energy efficient pumps (e.g. axial flow) and/or variable speed where appropriate. For the older pumps that are in operation, they will be replaced with more energy efficient pumps as they come out of service.

11.12.3 Lighting

Energy efficient lighting is used.

There is no light pollution off site.

11.13 Soil

11.13.1 Erosion and Sedimentation

Undertake any new works and construction in accordance with an erosion and sediment control plan as required by permits and licences.

Daintree Saltwater Barramundi plan to minimise erosion and sedimentation by:

- Limiting the area of disturbance.
- Reducing overland flow though disturbed areas.
- Stockpiling topsoil (and store in a bunded or silt fence enclosed area).
- Implementing erosion control through use of mulching, hydromulching, seeding, and revegetation.
- Minimise erosion of drainage lines through use of channel protection e.g. rock rip rap etc. Protect natural drainage lines at the outflow of concentrated stormwater.

- Use silt fences, bunds, hay bales, rock check dams and cross drains to ensure silt is not transported to natural watercourses and/or offsite.

At present there is no evidence of ongoing gulley, rill or sheet erosion on site.

Any pond walls subject to wave action from prevailing winds will be stabilised, if possible vegetated or have adequate erosion protection (HDPE liner, rip rap).

Aerators will be placed to avoid scour and erosion of pond walls.

The discharge channel will be managed to ensure there is no ongoing erosion (if needed line below water line and vegetate or protect batters above water line).

Water velocity in the discharge channel will be minimised to reduce erosion potential (a 0.5m fall over its length is a slow flow regime).

Pond wall batters and caps will be vegetated or otherwise protected against erosion.

The existing farm discharge points adequately protect against scouring of beds and banks of waterways/drainage lines.

11.13.2 Acid Sulfate Soils

The likely presence of acid sulfate soils is known. The development will be in accordance with the proposed Acid Sulfate Soils Management Plan (see summary at Section 12).

11.13.3 Dust

Farm management practices avoid the creation and release off-farm of dust.

In dry conditions, major works such as dry pond management is undertaken using methods to avoid dust creation (wetting down).

11.14 Waste

11.14.1 Minimise

Whenever possible materials are purchased in bulk containers, or if possible in re-useable/refillable containers.

Feed is purchased in the largest bulk containers possible, or recycleable/reusable feed containers are used.

11.14.2 Re-Use and Recycle

Daintree Saltwater Barramundi ensures general waste streams are separated and where possible disposes of recyclables (glass, plastic containers, paper etc.) to the recycling system.

Daintree Saltwater Barramundi has identified opportunities for beneficial re-use of wastes and works to ensure these wastes are so used (e.g. sediments for fertiliser, re-use of feed bags etc.).

All green waste is composted on site.

Corpses from any fish mortality are composted on site.

Waste oil (from farm machinery and generators etc.) and is collected and disposed of to oil recycling facility.

11.14.3 Sustainable Disposal

Daintree Saltwater Barramundi avoids use of on-site landfill for all wastes except dead fish, green waste and sediment/sludge.

Chemical containers (e.g. pesticide containers) are treated as regulated/toxic wastes and disposed of to appropriate local government managed landfill/disposal points.

Dry and wet cell batteries are treated as regulated/toxic wastes and disposed of to appropriate local government managed landfill/disposal points.

11.14.4 Sediment

Sediment build up is minimised with adequate aeration, stocking densities and feed management.

Sediment is stored and disposed of appropriately, away from overland flows and in an area where any leaching of nutrients will not enter surface waters off-farm.

Wherever possible, on-site reuse of sediment occurs (e.g. placement on pond batters for top dressing etc.).

11.15 Chemicals

11.15.1 Water Quality

The use of copper sulfate to control algal blooms and reduce risks of consequential disease is avoided and only undertaken where necessary.

Antifouling paints (containing tributyltin, copper or algaecides) are not used on any structures, floating plant or vessels in ponds.

11.15.2 Animal Husbandry

Chemical use for animal husbandry is minimised and storage and use are in accordance with manufacturers guidelines.

Parasite control is undertaken using potassium permanganate, copper sulfate, formalin or peroxide only. Correct doses are used (i.e. the lowest with efficacy).

Growth hormones are not used in growout.

Antibiotics (e.g. OTC, oxytetracycline) are only used where necessary for disease control. Use is minimised and dosage rates as per regulator, manufacturer or veterinarian advice.

Only hormones and antimicrobials approved for use for fish production (by the relevant QLD or Australian governments) are used.

11.15.3 Herbicides/Insecticides

Where herbicides and insecticides are necessary, only non-residual (biodegradeable) products are used (e.g glyphosate based herbicides).

Herbicides and insecticides are used strictly in accordance with manufacturers recommendations, application rates are kept to a minimum required and procedures are in place to avoid overspray into farm ponds/tanks and natural waterways.

DDT and other toxic and/or persistent insecticides are not used.

11.15.4 Cleaning and Disinfection

Surfactants, corrosive and oxidising cleaners are used sparingly if required for essential farm operations to avoid potential impacts on pond/tank water quality and release to natural waterways.

11.15.5 Refrigerants

Where there are refrigeration systems (e.g. for icemakers, cold rooms, heat pumps) they are maintained to ensure no release of gas.

Maintenance of refrigerant systems is undertaken by qualified technicians and involves complete gas recovery.

11.15.6 Knowledge

A material safety data sheet (MSD) is be kept on site for all chemicals.

Staff know the environmental and occupational safety aspects.

11.15.7 Storage

Chemicals are stored in accordance with the Material Safety Data Sheet.

Fuels and oils in small (20L or smaller) containers are kept in a roofed, bunded area and larger drums near the generator shed are located on bunded pallets.

11.16 Noise and Odour

11.16.1 Noise

Noise sources are located away from neighbouring noise sensitive places (e.g. the generator is not near any neighbouring residences).

When unusual activities which may create excessive noise are to be undertaken they are planned to be undertaken during normal day time/ weekday business hours and affected neighbours are advised and consulted.

11.16.2 Odour

Minimise odours from sediments and drying vegetation by the use of cover or burial.

Pond sediments are dried out prior to removal/disturbance.

Sediments likely to be malodorous are not disturbed when winds could spread odour and affect neighbours.

Odour from disposal of dead fish after minor or major fish kills is minimised though appropriate location of disposal pits (away from odour sensitive places) and covering of fish corpses.

11.17 Vegetation and Wildlife

11.17.1 Native Vegetation

There is no ongoing disturbance of adjoining mangrove and marine vegetation.

Daintree Saltwater Barramundi recognises that there is protected vegetation on Lot 2, (the mangrove area, wetland, remnant vegetation), all disturbance is avoided.

11.17.2 Weeds

Any declared or noxious weeds are controlled as a matter of priority. No current issues are known.

The introduction of topsoil, mulch, straw and hay avoids the introduction of weeds and undesirable plants.

Where there is a choice, low impact techniques are used for weed control (e.g. non-residual herbicides etc.).

11.17.3 Predator Management

Physical barriers are used as far as practical to avoid predation and wildlife becoming accustomed to farm fish in their diet.

Culling of predator species only occurs with approval of wildlife management agencies.

For bird predation Daintree Saltwater Barramundi propose to use the following measures as appropriate:

- Overhead netting of fingerling growout cages
- Overhead wires
- Waterline level nets

- Repellent light emissions
- Predatory images or models

If crocodiles affect the Barramundi farm:

- If occasional, undertake once off removal in collaboration with the State wildlife management agency or their approved handler.
- If regular develop exclusion approaches, including if an ongoing constant issue, fences.

11.18 Pond/Tank Management

11.18.1 Pond Structure

Ponds are essentially watertight with impermeable banks and bottoms with adequate lining and/or compaction being maintained when maintenance occurs.

Drains are managed to avoid any ongoing erosion and discharge of sediment.

Overland flow does not enter ponds.

Protect ponds walls from erosion caused by wave setup and aerator/circulation induced scour and erosion.

11.18.2 Pond /Tank Water Quality

Ponds are managed to maximise fish health and production AND to ensure discharges are minimised and of acceptable water quality.

Food conversion rates are maximised.

Aeration/oxygenation of ponds is adequate.

Stocking densities are determined in consideration of available aeration, water exchange requirements and feed quality.

Algal and bacterial floc is managed to avoid disease and maximise water quality of discharge waters.

Daintree Saltwater Barramundi works to understand intake water quality as in some cases intake waters can have elevated nutrients, particulates and/or salinity.

11.18.3 Treatment Ponds

The primary settlement pond and wetland treatment ponds will be managed and monitored for their ongoing capacity to cope in relation to biomass and sludge build up. Planning is in place for the potential need for sludge removal and harvesting of plants.

11.19 Fish Management

11.19.1 Harvesting

Harvesting methods ensure no escapes.

If pond sediments are disturbed during net harvesting, turbid waters settle in the pond or settlement pond prior to discharge.

11.19.2 Escape Prevention

There are mechanisms in place to ensure there is no escape of cultured barramundi at any life stage from the farm.

Pond discharge structures have appropriate sized screens to avoid escapes.

Pond discharge screens/mesh are regularly maintained.

Pond walls and tanks should be above 1 in 100 year flood levels.

11.19.3 Disease and Parasites

Procedures are in place to treat any disease and parasites to avoid release to the natural environment.

Maintain adequate pond/tank water quality to avoid disease.

Ensure stocking densities are not excessive.

Undertake regular monitoring of fish to gauge levels of disease.

Quarantine affected ponds/tanks, dry and treat (e.g. liming of ponds) prior to restocking after major disease outbreaks.

Any disease affected stock (including fingerlings and hatchlings) are not sold or released into the wild.

Where statutorily required, disease specimens are collected and appropriate authorities advised.

Malachite green is not used for protozoan control.

11.20 Feed Sustainability

11.20.1 Aspect

Feed is used which minimises impacts:

- Content from wild caught fish meal is minimised (and only used where the fish meal is sustainable).
- Vegetable protein content is maximised.
- Vegetable oils are maximised over animal sourced oils (including fish oil).

Where possible, Daintree Saltwater Barramundi buys feeds with a low level of phosphorous, low dust/fines and have a high percentage of digestible ingredients.

Feed is stored in a cool dry location (and not stored for too long). (This maximises food conversion rates and minimises losses of solids/nutrients which adversely affect water quality).

12 Acid Sulfate Soils Management

12.1.1 Preliminary Acid Sulphate Soils Management Plan

Please see Appendix 6A, a preliminary acid sulfate soils management plan (ASSMP) for the development of 13 additional aquaculture ponds at Daintree Saltwater Barramundi's Wonga Beach farm (Lot 3 SP292103).

Give the requirement for a plan to manage potential acid sulfate soils is required prior to further soil testing (which can only be undertaken during construction as ponds must be drained), this document is preliminary only. Once soil testing has been undertaken and the full extent of ASS/PASS known detailed and specific treatment strategies will be developed and this plan revised.

This preliminary ASSMP has been developed in accordance with the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines (2014).*

The Preliminary ASSMP includes two appendices, Appendix A –Geotechnical Investigation Report (Ground Engineering Services); and Appendix B – Acid Sulfate Soils Management Plan for Bund Remediation (BTEQ)

Daintree Saltwater Barramundi intends to engage professional services to undertake the ASS testing, development of the final ASSMP and for supervision/performance monitoring during construction.

Preliminary field testing was undertaken. Whilst treatment options are outlined in the Plan, further testing and development of a specific treatment system will be required.

This section provides a concise summary:

12.1.2 2017 Field Tests

Field tests were taken when geotech sampling was undertaken. These samples were taken at sites most likely to be ASS/PASS, being the floor of the settlement ponds and drains. Sampling and subsequent laboratory testing were undertaken to assess site won materials for the presence of acid forming materials. Results of the testing are summarised in Table 1 and presented in full in Appendices 6A and 6B.

Table 11: 2017 Soil Tests

	SPOCAS Net Acidity Calculations	
Location	**s-Net Acidity (%w/w S)**	**a-Net Acidity (moles H+/T)**
ASS#1 - Drain (at Discharge Point)	0.10	62
ASS#2 – Pond 2,Floor -0.1m	1.60	1000
ASS#3 – Pond 2, Floor -0.5m	0.94	580
ASS#4 – Pond 2, Floor -0.5m	0.42	260
ASS#5 – Pond 1, Floor -0.1m	0.97	610
ASS#6 – Pond 1, Floor -0.5m	0.61	380

Based on the above results the following is concluded:

- The drain where the discharge weir will be excavated and installed has a Net Acidity (%w/w S) of 0.10 and a-Net Acidity (moles H+/T). This will require the disturbance of less than ten tonnes of material is a low treatment regime (based on Table 4-2 QLD ASS Technical Guidelines).

- The main drains linking to the primary settlement pond (between ponds 16/16/17 and 18, 18/19/20 and 21/22/23 and 24/25/26 and 27) will require excavation of about 1000 tonnes of material below the current floor of settlement ponds 1 and 2. NOTE The net cut in the design is 420m^3 but there will be additional material removed to account for the drain lining. Sites ASS#3, ASS #4 and ASS#6 are representative of the material, at a depth of 0.5m below the pond floor. The range of Net Acidity (%w/w S) is 0.42 to 0.94 and a-Net Acidity (moles H+/T), 260 to 580, this is therefore just into the extra high treatment and will require 47 Tonnes of CaCO3 (based on Table 4-2 of QLD ASS Technical Guidelines).

  The settlement pond floors do have ASS properties, with the surface layer (e.g. sites ASS#2 and ASS#5 having higher existing and potential sulfidic acidity than the lower soil profile (represented by ASS#3, ASS #4 and ASS#5). The conclusion is that these soils should not be disturbed and the plan is to drain the current water, remove vegetation, rip, lime, place a buffer lime layer and cover as quickly as possible during construction. The material will have a minimum of 500mm of material capping (select fill, then 250mm of clay liner) and then the ponds will be filled above. The area of the settlement ponds 1 and 2, where the new ponds will be built is 6.6ha, with ripping to a depth of 250mm this is a total of 16,500m^3, therefore with an average specific gravity of 2.7, 44,500 tonnes of material will be disturbed. this will need approximately 1478 tonnes of $CaCO_3$.

Given that it is not practicable to sample the materials in the interior of ponds 1 and 2 until they are drained, and recognising that if they all have ASS properties oxidisation could start immediately and generate an acidic leachate, a conservative approach has been developed of urgently ripping and liming the soils, then covering as soon as practicable. The above ripping and liming rate is considered "worst case" and it may prove to be practical to just add a lime cover and then cover with fill. On-site engineering advice (and amendment of this ASSMP) will be required once the ponds are drained and field testing can be carried out.

12.1.3 Risk Management

The design of the proposal has been based upon reducing risk of environmental harm from ASS/PASS on site. The approach is based on:

- The new aquaculture ponds will be constructed entirely within the bunded settlement ponds 1 and 2. The integrity of these outer bunds will at all time remain. Disturbance of ASS/PASS material on the bed/floor of these existing settlement ponds will be minimised and the approach will be dry out/lime/cover.
- Actual excavation of ASS/PASS material has been minimised to just the discharge weir point and the drains. This material will be moved to a bunded treatment area
- Ponds will be used to collect and neutralise any leachate from within disturbed areas during construction.

12.1.4 Overall Construction Approach

The approach to construction will be to minimise disturbance outside the construction footprint and to embody best practice acid sulfate soils and erosion and sediment control. Figure 44 sets out the locations of key aspects of the strategy, Key acid sulfate soils aspects are:

- The existing bunds around currently settlement ponds 1 and 2 will be kept intact and built onto.
- Fill brought on site will be checked for physical properties and contaminant (metals and ASS/PASS) status. PASS material will not be brought on site.

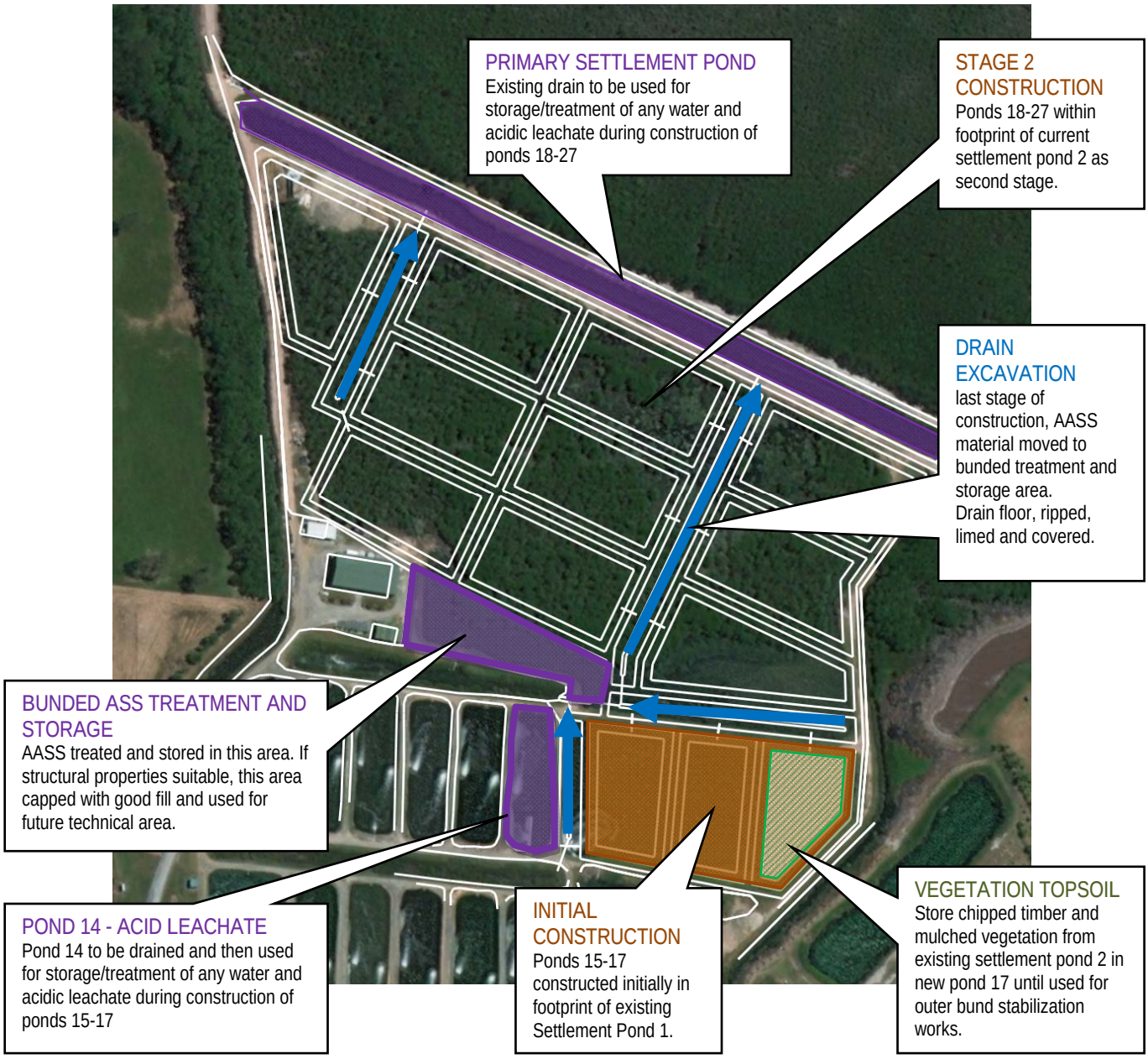
- Induction of all construction workers will be undertaken, particularly to ensure the need to remain entirely within the footprint of disturbance and not have any impacts on the adjoining wetland and remnant vegetation, the importance of the acid sulfate management procedures and the importance of erosion and sediment control on the outside bunds (to protect adjoining wetlands).

Basic construction staging will involve (preliminary, may be amended by detailed Construction Plan and EMP, ASSMP and erosion and sediment control plan):

- Empty current production pond 14 (best) or 1 and 2 as holding/treatment pond for any collected acid leachate.
- Pumping free standing water from pond 1 into settlement pond 2.
- After this initial pumping out of settlement pond 1, any water from groundwater seepage or stormwater to be pumped into the holding pond, tested weekly for pH and limed as required before discharge.
- Lime and rip the floor of pond 1 and then placing select fill the level of 1.8-1.95 m AHD..
- *NOTE: Presuming the floor soils are AASS the time of exposure of the bottom sediment of Pond 1 (by pumping out) until it is limed, ripped and capped with fill is critical to minimising acid leachate. This operation will be carefully planned and coordinated with lime and fill ready and available for transport to site.*
- Place fill in layers and compact to create external and internal bund walls established (for ponds 15, 16 and 17).
- Note: Other than to place each pond's drain structures, do not excavate drain between existing pond 14 and new pond 15 at this stage.
- Stockpile lime on site and stockpile select fill (ponds 15 and 16 can be used for fill stockpile) such that there will be little delay in capping ASS material in settlement pond 2. Pump out settlement pond 2, clear and remove vegetation. This needs to be a quick process to minimise oxidation of ASS, vegetation and timber can be mulched/chipped and/or stored temporarily in new pond 17.
- Vegetation mulched and chipped on site and stored in Pond 17 for later re-use for revegetation and bank stabilisation works.
- Lime and ripping the floor of pond 2 and then placing select fill the level and then clay lining to the design pond floor levels.
- *NOTE: Presuming the floor soils are AASS the time of exposure of the bottom sediment of Pond 2 (by pumping out) until it is limed, ripped and capped with fill is critical to minimising acid leachate. This operation will be carefully planned and coordinated with lime and fill ready and available for transport to site.*
- Create a bunded area east of workshop (for ASS stockpile).
- If there is any obvious ASS (yellow deposits on soil etc.), remove and stockpile in bunded ASS stockpile area with any necessary liming.
- After this initial pumping out of settlement pond 2, any water from groundwater seepage or stormwater to be pumped into the Primary Settlement Pond (the drain between current settlement pond 2 and 3), tested weekly for pH and limed as required before discharge.

- Excavate all drains, placing ASS material (and any PASS) in the ASS stockpile area with lime treatment and ongoing monitoring for any leachate. Sample and record structural properties of material placed. After liming the base of the drain, place at least 200mm of coarse sand/gravel at the base of each drain (for erosion and to cap any remaining ASS.
- Install discharge weir and outlet erosion protection works.

Figure 44: Construction ASSMP Approach



13 Summary of supporting information

Guidance

DA Forms Guide Planning Template

Specialist reports cover information not provided by the DA forms, relevant plans or planning report. They provide expertise in particular fields that relate to certain development aspects.

For example, your development may require the following:

Traffic impact assessment

Heritage impact report

Stormwater management report

Acoustic report.

Small-scale development, such as minor building works, often does not require any specialist reports. On the other hand, a development involving a new shopping centre would require a number of specialist reports. To ensure you are providing the correct information, you should contact your local council or organise a pre-lodgement meeting.

Plan 1

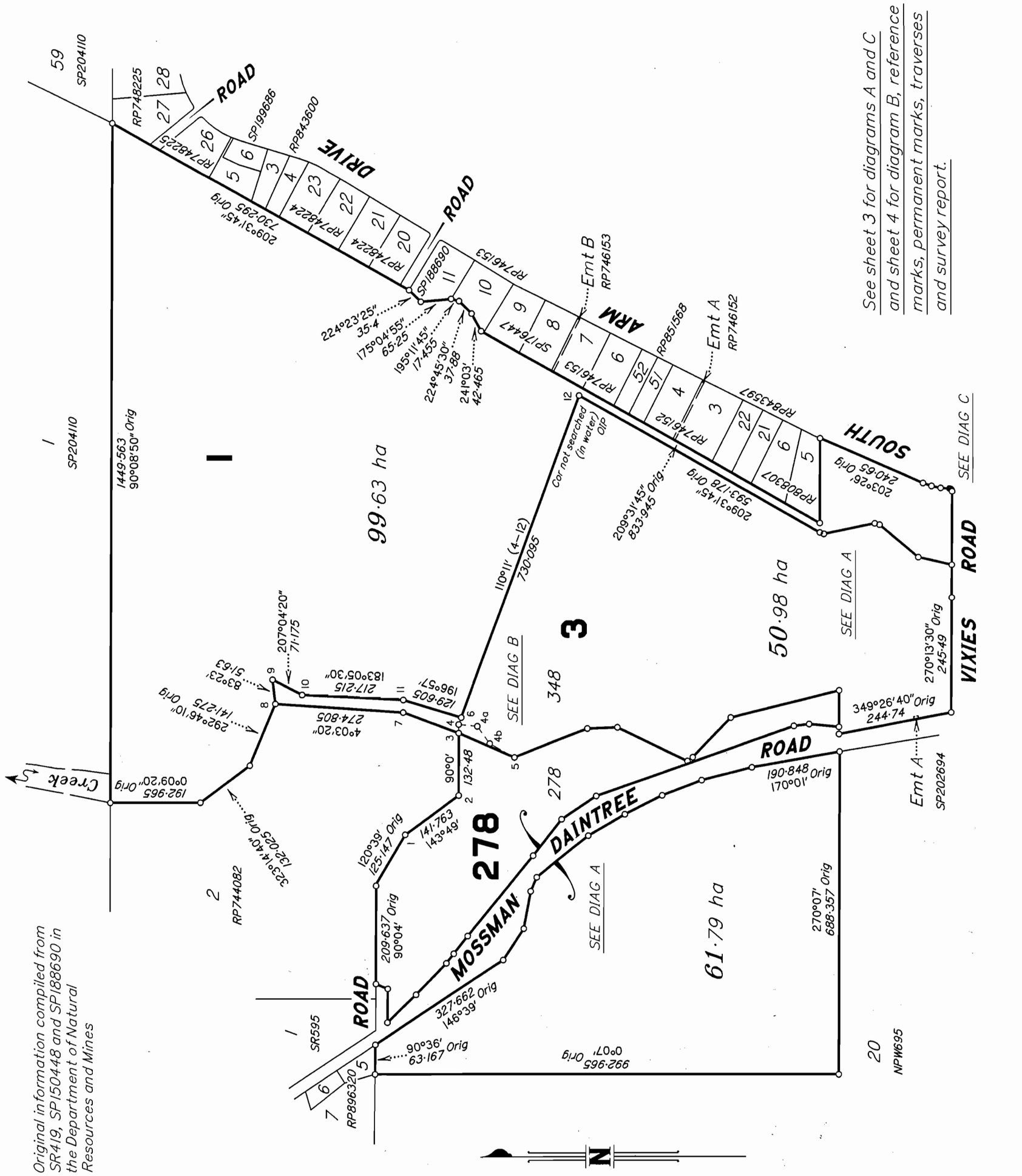
Lot SP292103

KR

Land Title Act 1994 ; Land Act 1994
Form 21 Version 4

SURVEY PLAN

Sheet 1 of 4



I, Garry Ernest Hopkins hereby certify that the land comprised in this plan was surveyed by Grainger Scott Morris, Surveying Associate, for whose work I accept responsibility and that the plan is accurate, that the said survey was performed in accordance with the Survey and Mapping Infrastructure Act 2003 and Surveyors Act 2003 and associated Regulations and Standards and that the said survey was completed on 18·08·2016.

Cadastral Surveyor

23:09:2016
Date

0 400 m 800 m 1·2 km

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Plan of Lots 1, 3 & 278

Cancelling Lot 278 on SR419, Lot 3 on SP150448 and Lot 1 on SP188690

LOCAL GOVERNMENT: Douglas Shire Council

LOCALITY: Wonga Beach

Meridian: Of SP150448

Survey Records No

Scale: 1:8000

Format: STANDARD

SP292103

Land Title Act 1994 ; Land Act 1994
Form 21B Version 1

(Dealing No.)

WARNING : Folded or Mutilated Plans will not be accepted.
Plans may be rolled.
Information may not be placed in the outer margins.

Sheet 2 of 4

5. Lodged by

(Include address, phone number, reference, and Lodger Code)

1. Certificate of Registered Owners or Lessees.

I/We *Trevor Mark Hober, Christine Ann Brlyack, Pavel Prokopec & Vittorio Guiseppe Scomazzon*

(Names in full)

* as Registered Owners of this land agree to this plan and dedicate the Public Use Land as shown hereon in accordance with Section 50 of the Land Title Act 1994.

~~* as Lessees of this land agree to this plan.~~

Signature of *Registered Owners ~~*Lessees~~

* Rule out whichever is inapplicable

2. Planning Body Approval.

*

hereby approves this plan in accordance with the :

%

Dated this ..... day of .....

..... #

..... #

* Insert the name of the Planning Body.
# Insert designation of signatory or delegation
% Insert applicable approving legislation.

3. Plans with Community Management Statement :

CMS Number :

Name :

4. References :

Dept File :

Local Govt :

Surveyor : 16/132

6.

Existing		Created		
Title Reference	Description	New Lots	Road	Secondary Interests
21009237	Lot 278 on SR419	3 & 278	–	–
50411985	Lot 3 on SP150448	3	–	–
50631221	Lot 1 on SP188690	1 & 3	–	–

Easement Allocations

Easement		Lots to be burdened
711242415	Emt A on SP202694	3

Administrative Advices

Dealing	Lots fully encumbered	Lots partially encumbered
710117732	278	3
710098247	3	
713775181	3	
714056921	1	3

1	Portion 348
3	Portions 278 & 348
278	Portion 278
Lots	Orig

7. Orig Grant Allocation :

8. Passed & Endorsed :

By : G E Hopkins
Date : 23 SEPTEMBER 2016
Signed :
Designation : Cadastral Surveyor

9. Building Format Plans only.

I certify that :

* As far as it is practical to determine, no part of the building shown on this plan encroaches onto adjoining lots or road,
* Part of the building shown on this plan encroaches onto adjoining * lots and road

..... * .....
Cadastral Surveyor/Director * Date
*delete words not required

10. Lodgement Fees :

Survey Deposit	$.....
Lodgement	$.....
.....New Titles	$.....
Photocopy	$.....
Postage	$.....
TOTAL	$.....

11. Insert Plan Number SP292103

Land Title Act 1994 ; Land Act 1994
Form 21A Version 1

ADDITIONAL SHEET

Sheet 3 of 4

Peg pld at stations 3, 5–7 and 9–11.

DIAGRAM A

Scale – 1: 5000

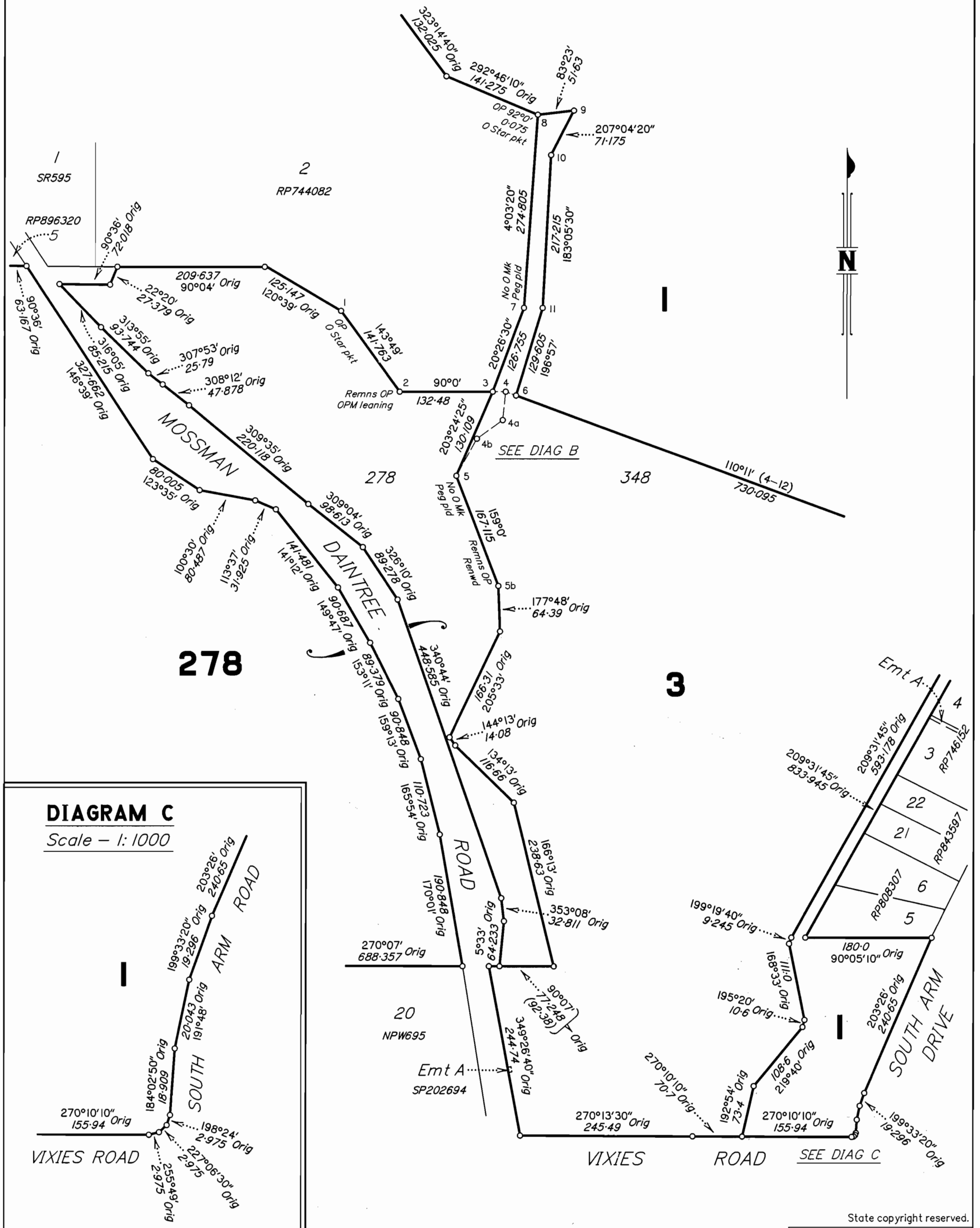

DIAGRAM C

Scale – 1: 1000

Scale – 1:5000

0 250 m 500 m 750 m

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Insert Plan Number SP292103

Land Title Act 1994 ; Land Act 1994
Form 21A Version 1

ADDITIONAL SHEET

Sheet 4 of 4

Reference Marks

Stn	To	Origin	Bearing	Dist	
1	O Star pkt 0·4 deep	1/RP744082	92°32′	0·82	
1	GI Nail in FP		150°51′40″	29·22	
2	GI Nail in FP		82°42′	2·545	
3	OIP gone	IS77459	270°0′	0·995	
3	OIP	8/DP223943	100°32′30″	2·216	
3	GI Nail in FP		251°06′	2·35	
4	Remns OIP distbd	13/SP150448	91°45′	1·615	Ntd & chckd
5	Pin		96°23′	1·14	
6	Pin		130°14′	5·4	
6	Pin		294°32′	12·125	
7	Pin		86°11′	1·535	
8	O Star pkt	6/RP744082	179°04′	1·08	
9	Pin		359°0′	1·915	
10	Pin		97°09′	1·935	
11	Pin		86°12′	1·335	
12	OIP	12/SP150448	300°50′	4·71	

Permanent Marks

PM	Origin	Bearing	Dist	No	Type	
2–OPM leaning	10/DP223943	91°34′	42·125	181204	C	New Conn Ntd & chckd

Traverses etc

Line	Bearing	Dist
3–4	90°0′	18·396
4–4a	186°0′	40·234
4–6	110°11′	15·705
4a–4b	234°0′	45·263
4b–5	209°0′	60·35

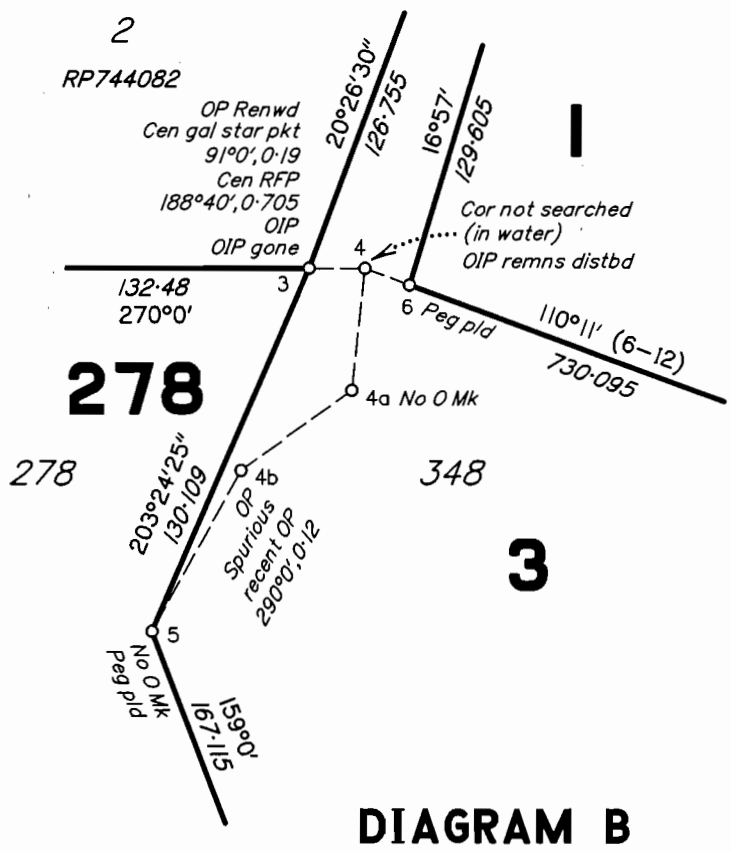

DIAGRAM B

Scale – 1:2500

N

SURVEY REPORT

Plans used - RP744082, DP223943, SR419, SP150448, SP188690 and IS77459.

Datum - Stns 1-3, as located by respective reference marks.

OIP at stn 4 was found in poor condition 0·12 west of its deed location. This can be explained by the migration of the earth towards a deep tidal drain to the west.

At stn 4b an old peg was found at deed dimensions from marks to the north. A second spurious recent peg was found 0·12 away. The original old peg was adopted.

At stn 5b, the remains of an OP was located which fitted for bearing from stn 5 but was 0·145 long for distance. The peg was adopted.

All other marks were found at deed bearing and distance.

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Scale - 1:2500

0 125|m 250|m 375|m

Insert Plan Number SP292103

Plan 2

Site Plan

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Detail survey data shown has been compiled from various surveys from 2000 to 2005.

AERIAL IMAGERY.

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Date of Capture: 2-5-2014

SETTLEMENT POND	AREA
1	1.206 ha
2	6.45 ha
3	11.59 ha
4	9.38 ha
TOTAL	**28.[illegible]2[illegible]**

Pond areas are approximate only. Calculated at approx top of batter interpolated from detail surveys, LiDAR data & aerial imagery.

WATER INTAKE

SETTLEMENT POND 4
9.38 ha

SETTLEMENT POND 3
11.59 ha

SETTLEMENT POND 2
6.45 ha

SETTLEMENT POND 1
1.206ha

PRODUCTION PONDS

SEE SHEET 2

HOOK-A-BARRA TOURIST FACILITY

MOSSMAN DAINTREE ROAD

VIXIES ROAD

SOUTH ARM DRIVE

2 RP744082
278 SR419
3 SP150448
1 SP188690
20 NPW695
3 SP128858
295 RP889328
50 SP155078
32 SP126925
2 RP734708
5 SP126931
11 SP188690
10 RP746153
9 SP176447
8 SP176447
Emt B
7 RP746153
6 RP746153
52 RP851568
51 RP851568
4 RP746152
Emt A
3 RP746152
22 RP843597
21 RP843597
6 RP808307
5 RP808307
19 RP865080
20 RP865080
16 SP235265
2 SP264298
16 SP264298
1 SP108617
2 SP108617
2 SP235266
1 SP235266

0 50 100 150 200 250
metres

SCALE 1:5000 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

AMENDMENTS	
PROJECT MANAGER	O. Caddick-King
SURVEYED	2000-2005
COMPILED	AMK
CAD REF	9338-8.DWG
SHEET	1 OF SHEETS 2
SHEET SIZE	A3

DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

SITE PLAN
SHEET 1 OF 2
LOT 3 SP150448
WONGA BEACH

RPS Australia East Pty Ltd
ACN 140 292 762

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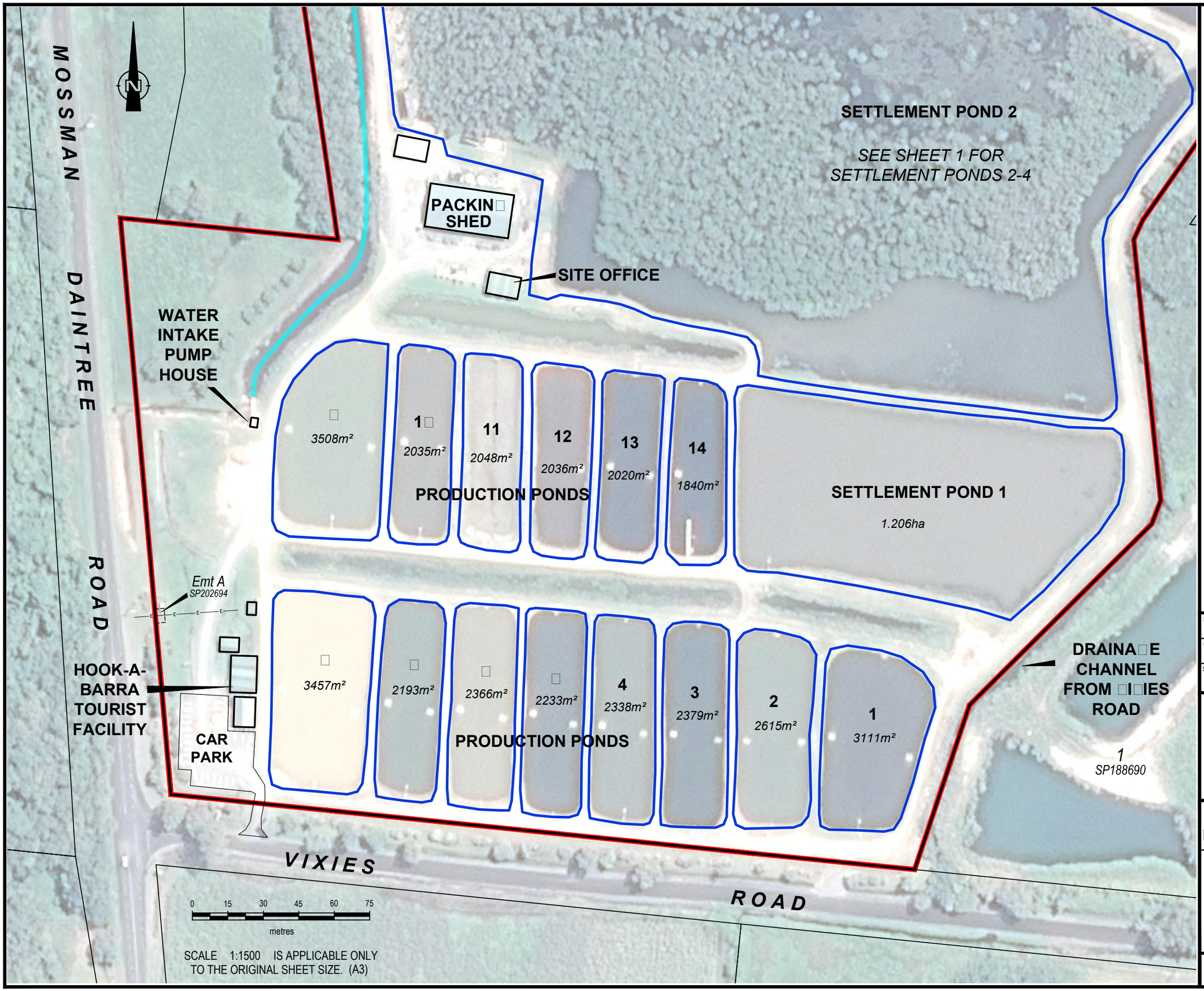
SCALE	DATE	DRAWING NO.	ISSUE
1:5000	27/1/2015	9338-8	

Plan 3

Site Plan - Pond Details



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AERIAL IMAGERY.

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Date of Capture: 2-5-2014

PRODUCTION POND	AREA
1	3111m²
2	2615m²
3	2379m²
4	2338m²
5	2233m²
6	2366m²
7	2193m²
8	3457m²
9	3508m²
10	2035m²
11	2048m²
12	2036m²
13	2020m²
14	1840m²
TOTAL	**34179m²**

Pond areas calculated at top of batter.

PROJECT MANAGER: O. Caddick-King	SURVEYED: 2000-2005
COMPILED: AMK	CAD REF: 9338-8.DWG
SHEET SIZE: A3	SHEET 1 OF SHEETS 1

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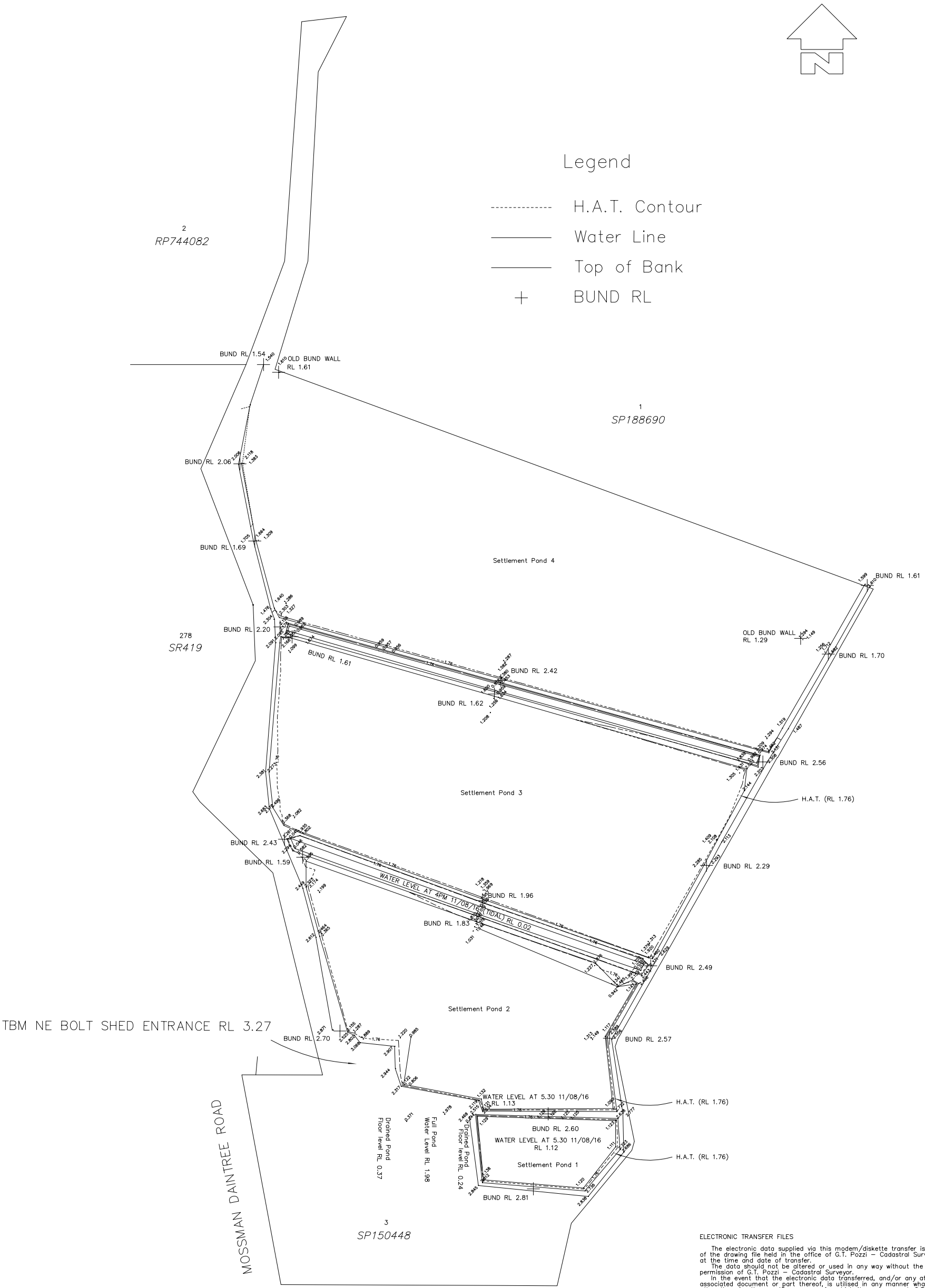
SITE PLAN

SHEET 2 OF 2
LOT 3 SP150448
WONGA BEACH

SCALE	DATE	DRAWING NO.	ISSUE
1:1500	27/1/2015	9338-9	

Plan 4

Current Levels by Survey



Selected Bund Levels Shown on this Plan

For all levels see .dwg file.

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PO Box 152 11 Kavieng Street
Trinity Beach, Queensland 4879

Ph: 0740 577 177 Mob: 0408 772 213
Fax: 0740 577 089 Email: gpozzi@bigpond.net.au

REVISIONS		
NO.	DETAIL	DATE

NOTE : BEARINGS, DISTANCES AND AREAS ARE SUBJECT TO SURVEY

CALCULATED	DATE	FILE REF	
SURVEYED GSM	DATE AUG 16	PLAN REF	
DRAWN GSM	DATE AUG 15		
SURVEY EXAMINED	DATE	FIELD BOOK REF 553	
PLAN EXAMINED G T POZZI	DATE AUG 15	APPROVED	

title : H.A.T. LEVEL SURVEY
Barramundi Farm
Lot 3 SP 150448

project :

LOCALITY WONGA BEACH

client : Mark Hober

LOCAL AUTHORITY DOUGLAS SHIRE

Gary T. Pozzi
Cadastral Surveyor

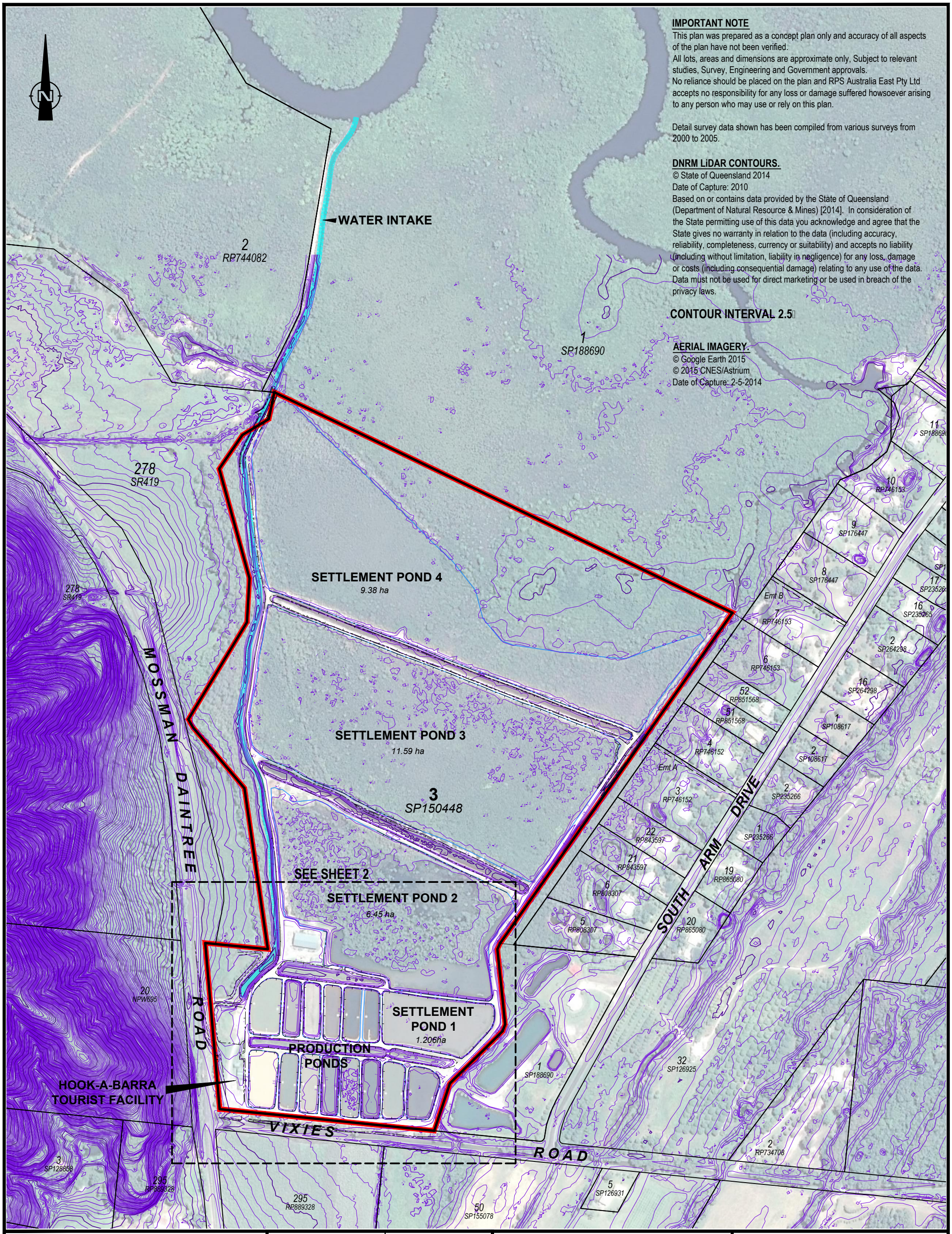
P O Box 152
Trinity Beach 4879
11 Kavieng Street
Trinity Beach.

Phone: 0740 577 177
Mobile 0408 772 213
Fax. 0740 577 089
Email: gpozzi@bigpond.net.au

SCALE	1:5000 (A3)		
LEVEL DATUM / ORIGIN	AHD / PSM 92800 RL 3.489m		
FILE 16/132	SHEET 1/2	VERSION 1	

Plan 5

Site Plan with Contours



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CONTOUR INTERVAL 2.5

AERIAL IMAGERY.

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Date of Capture: 2-5-2014

0 50 100 150 200 250
metres

SCALE 1:5000 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

AMENDMENTS	PROJECT MANAGER	SURVEYED	COMPILED	CAD REF	SHEET	SHEET SIZE
	O. Caddick-King	2000-2005	AMK	9338-6.DWG	1 OF SHEETS 2	A3

DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

SITE PLAN

SHEET 1 OF 2

LOT 3 SP150448
WONGA BEACH

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SCALE	DATE	DRAWING NO.	ISSUE
1:5000	27/1/2015	9338-	

Plan 6

Site Plan with Contours - Pond Details

MOSSMAN DAINTREE ROAD

SETTLEMENT POND 2

SEE SHEET 1 FOR SETTLEMENT PONDS 2-4

PACKIN□ SHED

SITE OFFICE

WATER INTAKE PUMP HOUSE

3508m²

1 2035m²

11 2048m²

12 2036m²

13 2020m²

14 1840m²

PRODUCTION PONDS

SETTLEMENT POND 1

1.206ha

Emt A SP202694

1 3457m²

2 2193m²

3 2366m²

4 2233m²

2338m²

2379m²

2615m²

3111m²

PRODUCTION PONDS

HOOK-A-BARRA TOURIST FACILITY

CAR PARK

DRAINA□E CHANNEL FROM □I□IES ROAD

1 SP188690

VIXIES ROAD

IMPORTANT NOTE

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CONTOUR INTERVAL 0.5□

AERIAL IMAGERY.

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Date of Capture: 2-5-2014

0 15 30 45 60 75
metres

SCALE 1:1500 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

PROJECT MANAGER		SURVEYED
O. Caddick-King		2000-2005
COMPILED		CAD REF
AMK		9338-6.DWG
SHEET SIZE	SHEET 1 OF SHEETS 1	
A3		

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SITE PLAN

SHEET 2 OF 2
LOT 3 SP150448
WONGA BEACH

SCALE	DATE	DRAWING NO.	ISSUE
1:1500	27/1/2015	9338-□	

Plan 8

Site Plan with Elevation LIDAR

ELEVATION (m)
Date of LiDAR Capture: 2010

-1.0 - -0.5
- 0.5 - 0.0
0.0 - 0.5
0.5 - 1.0
1.0 - 1.5
1.5 - 2.0
2.0 - 2.5
2.5 - 3.0
3.0 - 3.5
3.5 - 4.0
4.0 - 4.5
4.5 - 5.0
> 5.0

Note: LiDAR data does not penetrate water surface.

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WATER INTAKE

EXTENT OF LIDAR DATA

SETTLEMENT POND 4
9.38 ha

SETTLEMENT POND 3
11.59 ha

SETTLEMENT POND 2
6.45 ha

SETTLEMENT POND 1
1.206ha

PRODUCTION PONDS

SEE SHEET 2

HOOK-A-BARRA TOURIST FACILITY

MOSSMAN DAINTREE ROAD

SOUTH ARM DRIVE

VIXIES ROAD

2 RP744082
278 SR419
1 SP188690
3 SP150448
20 NPW695
3 SP128858
295 RP889328
50 SP155078
11 SP188690
10 RP746153
9 SP176447
8 SP176447
Emt B
7 RP746153
6 RP746153
52 RP851568
51 RP851568
4 RP746152
Emt A
3 RP746152
22 RP843597
21 RP843597
6 RP808307
5 RP808307
19 RP865080
20 RP865080
1 SP108617
2 SP108617
2 SP235266
1 SP235266
16 SP264298
2 SP264298
16 SP235265
17 SP235265
32 SP126925
2 RP734708
5 SP126931

0 50 100 150 200 250
metres

SCALE 1:5000 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

AMENDMENTS	
PROJECT MANAGER	O. Caddick-King
SURVEYED	2000-2005
COMPILED	AMK
CAD REF	9338-6.DWG
SHEET	1 OF SHEETS 2
SHEET SIZE	A3

DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

ELEVATION PLAN
SHEET 1 OF 2
LOT 3 SP150448
WONGA BEACH

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SCALE	DATE	DRAWING NO.	ISSUE
1:5000	12/2/2015	9338-10	

Plan 9

Design

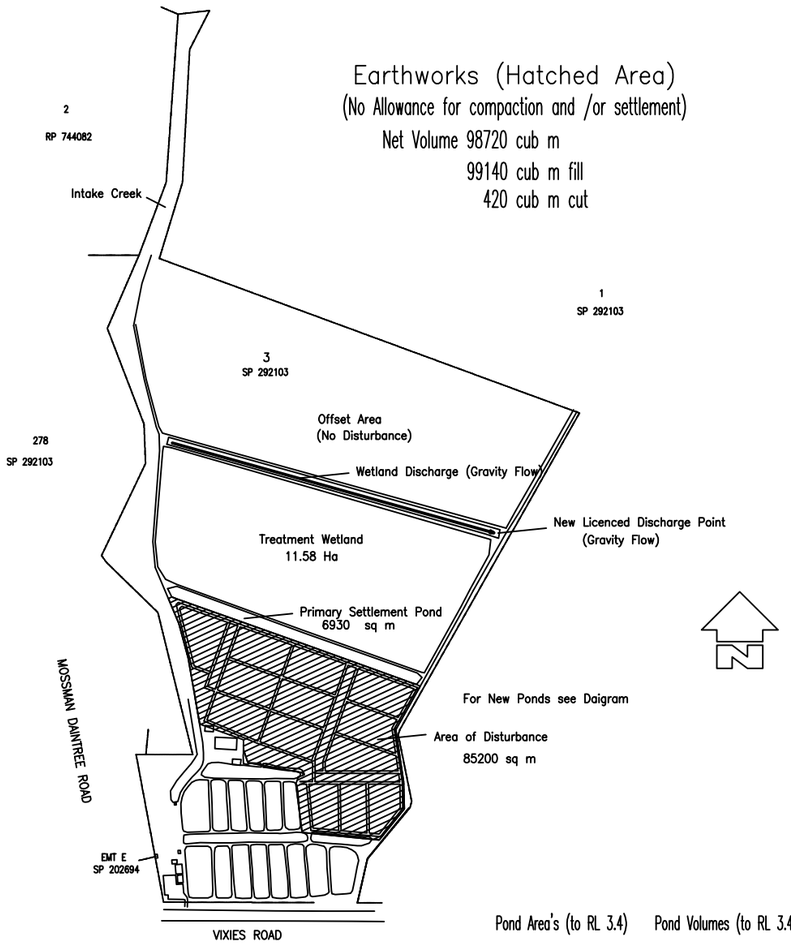
Earthworks (Hatched Area)

(No Allowance for compaction and /or settlement)

Net Volume 98720 cub m

99140 cub m fill

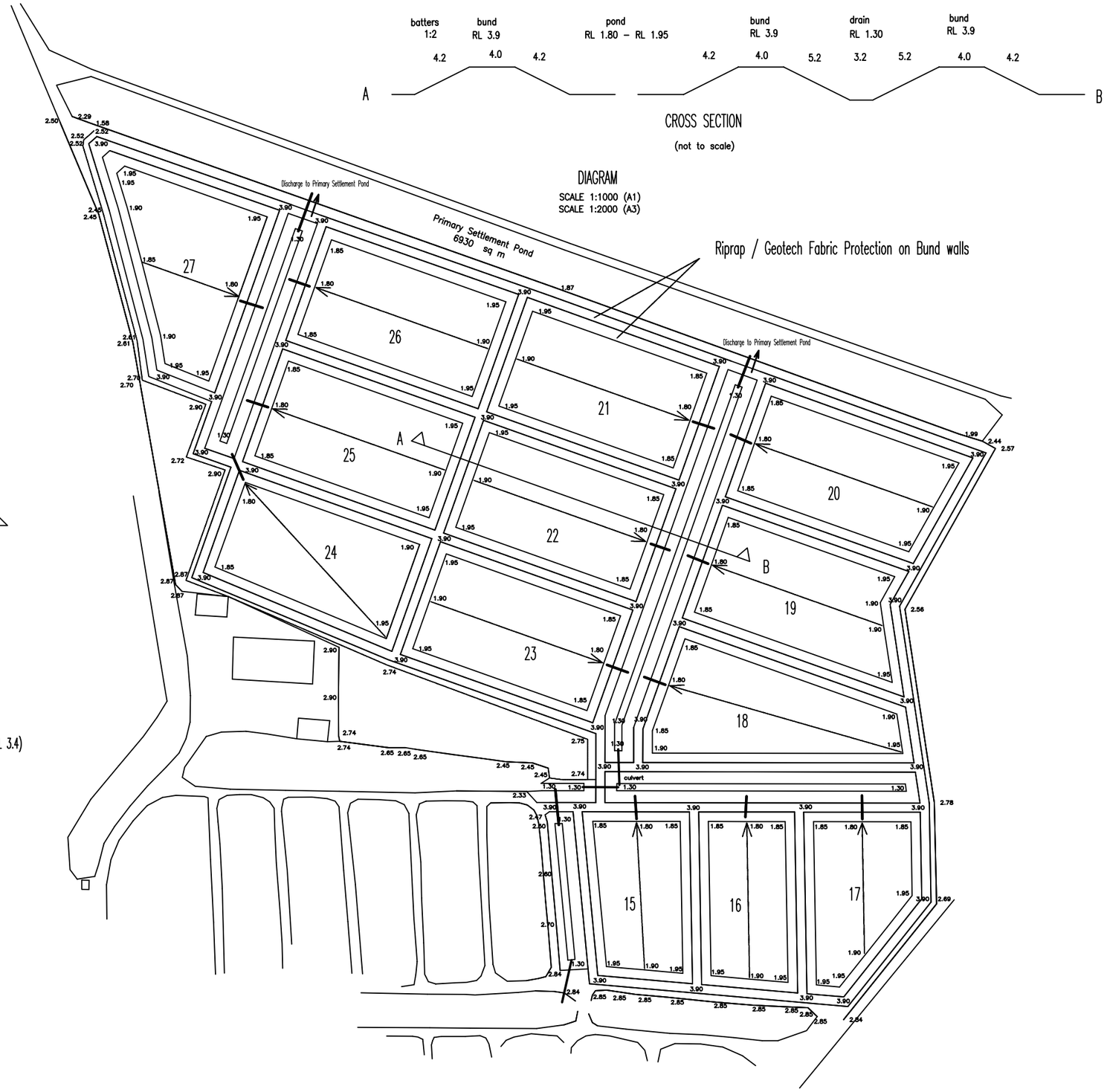
420 cub m cut



LOCATION PLAN

SCALE 1:5000 (A1)
SCALE 1:10000 (A3)

	Pond Area's (to RL 3.4)	Pond Volumes (to RL 3.4)
15	3010 sq m	4065 cub m
16	3015 sq m	4060 cub m
17	3135 sq m	4225 cub m
18	4500 sq m	6150 cub m
19	4470 sq m	6135 cub m
20	4540 sq m	6255 cub m
21	4445 sq m	6110 cub m
22	4405 sq m	6075 cub m
23	4405 sq m	6075 cub m
24	4195 sq m	5765 cub m
25	4405 sq m	6075 cub m
26	4445 sq m	6110 cub m
27	4255 sq m	5780 cub m



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REVISIONS

NO.	DETAIL	DATE	INIT.
A	Initial version	19/1	AF
B	Pond and Drain Levels raised	26/3	AF

NOTE : BEARINGS, DISTANCES AND AREAS ARE / ARE NOT SUBJECT TO SURVEY

CALCULATED	DATE	FILE REFERENCE 180340 sheet 1 ver B .dwg volume files 32 84
SURVEYOR	DATE	PLAN REFERENCE
DRAWN ADLF	DATE JAN 18	
SURVEY EXAMINED	DATE	FIELD BOOK REFERENCE
PLAN EXAMINED G E Hopkins	DATE JAN 18	APPROVED

title : Proposed Pond Layout
Lot 3 on SP 292103
MOSSMAN DAINTREE ROAD, WONGA BEACH

PARISH WHYANBEEL
COUNTY SOLANDER
LOCAL AUTHORITY DOUGLAS S C

project :

client : DAINTREE SALTWATER BARRAMUNDI FISH FARMS P/L

associated consultants

Gary T. Pozzi
Cadastral Surveyor

P O Box 152
Trinity Beach 4879
11 Kavieng Street
Trinity Beach.

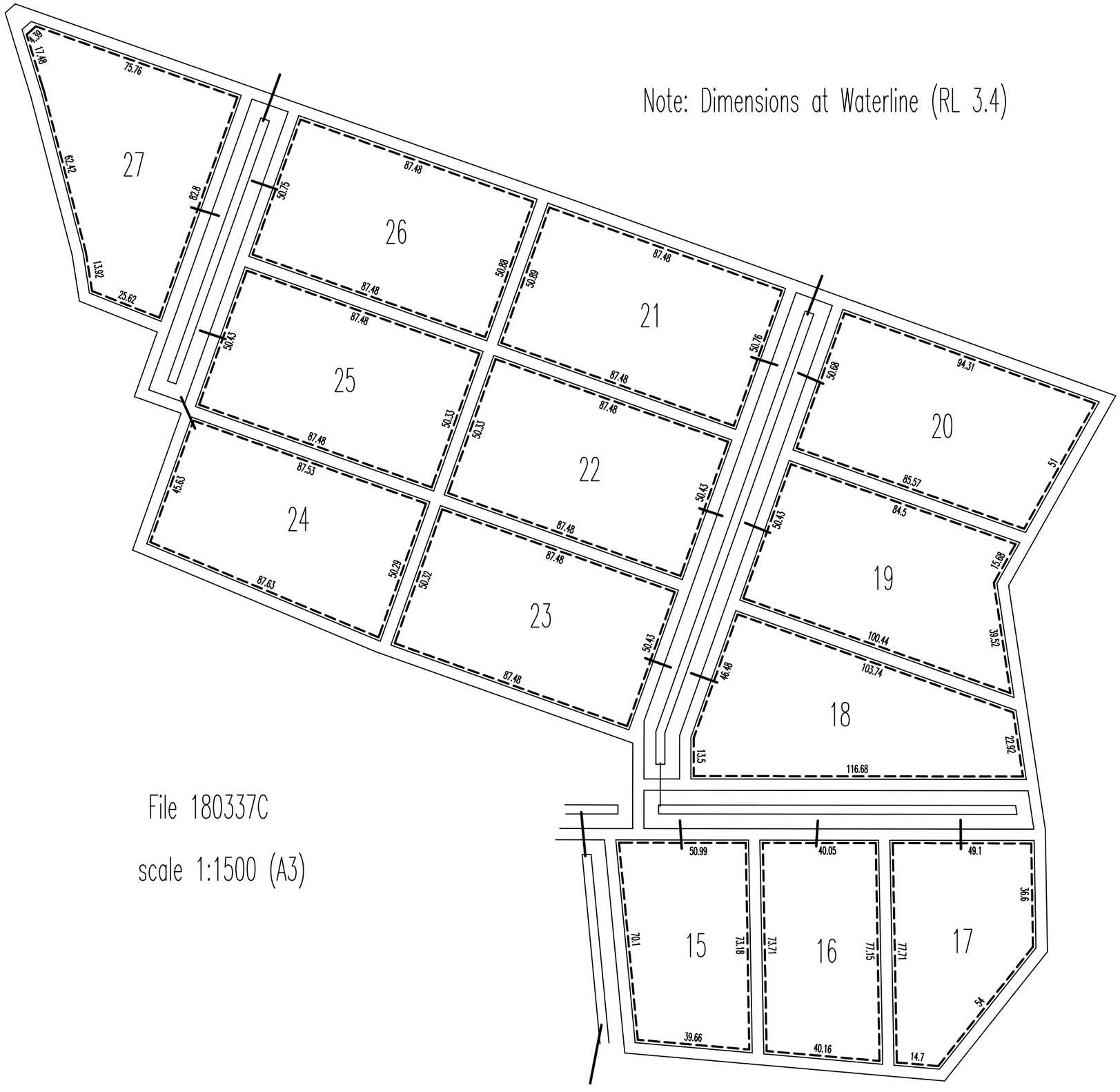
Phone: 0740 577 177
Mobile 0408 772 213
Fax. 0740 577 089
Email: gpozzi@bigpond.net.au

SCALE	see plan
LEVEL DATUM	AHD
LEVEL ORIGIN	PSM 92800 RL 3.489
AZIMUTH CO-ORD ORIGIN	
DWG 18/03	SHEET 1 VER B

Plan 10

Design - {Pond Dimensions)

Note: Dimensions at Waterline (RL 3.4)



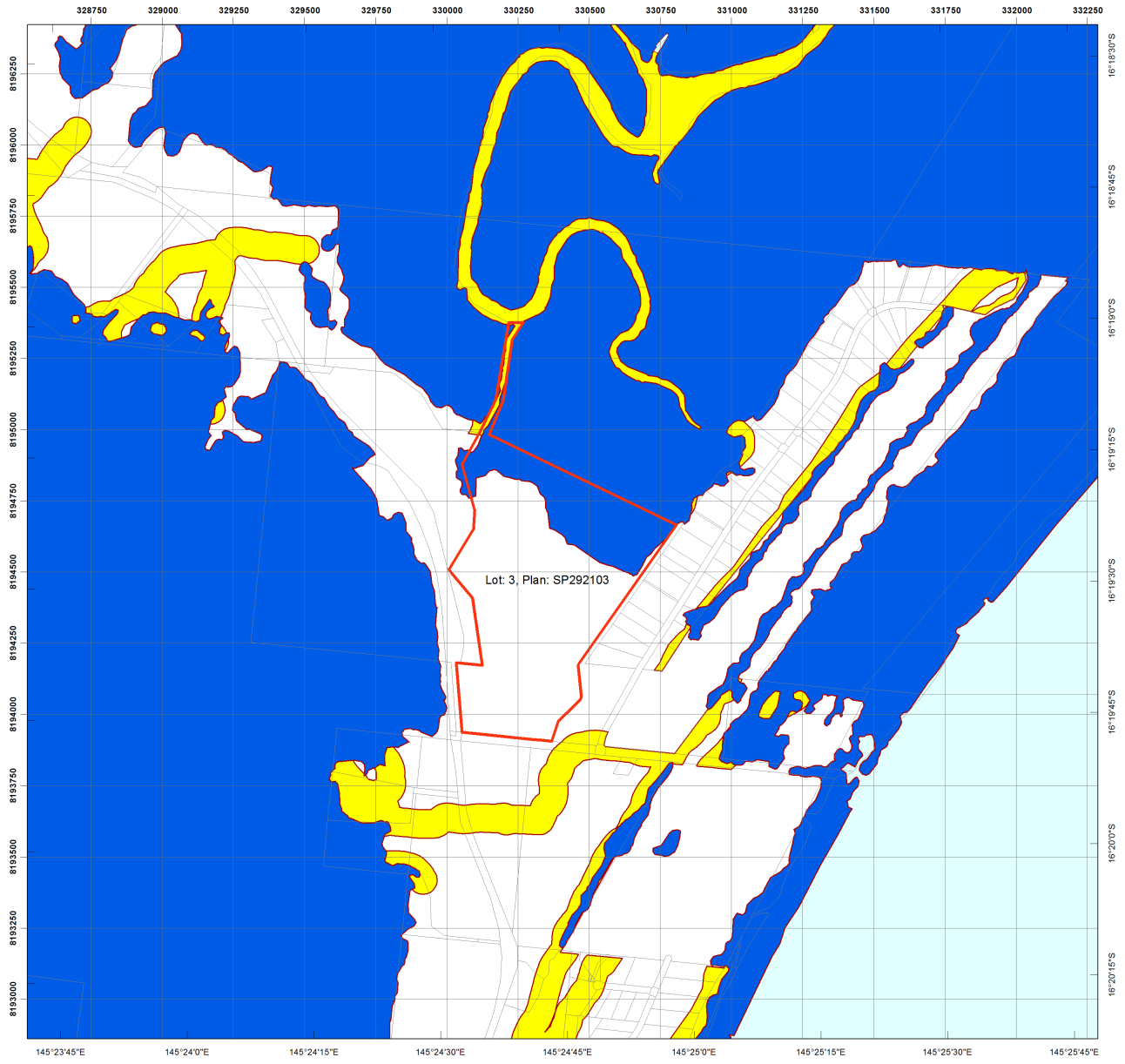
File 180337C

scale 1:1500 (A3)

	Pond Area's (to RL 3.4)	Pond Volumes (to RL 3.4)
15	3010 sq m	4065 cub m
16	3015 sq m	4060 cub m
17	3135 sq m	4225 cub m
18	4500 sq m	6150 cub m
19	4470 sq m	6135 cub m
20	4540 sq m	6255 cub m
21	4445 sq m	6110 cub m
22	4405 sq m	6075 cub m
23	4405 sq m	6075 cub m
24	4195 sq m	5765 cub m
25	4405 sq m	6075 cub m
26	4445 sq m	6110 cub m
27	4255 sq m	5780 cub m

Map 1

Regulated Vegetation Management

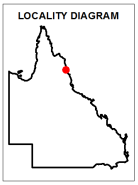


Regulated Vegetation Management Map

Legend

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Exempt clearing work on Freehold, Indigenous and Leasehold land)
- Water
- Area not categorised
- Cadastral line
  Property boundaries shown are provided as a locational aid only

LOCALITY DIAGRAM



N

0 200 400 600 800 1,000 m

This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.

Queensland Government

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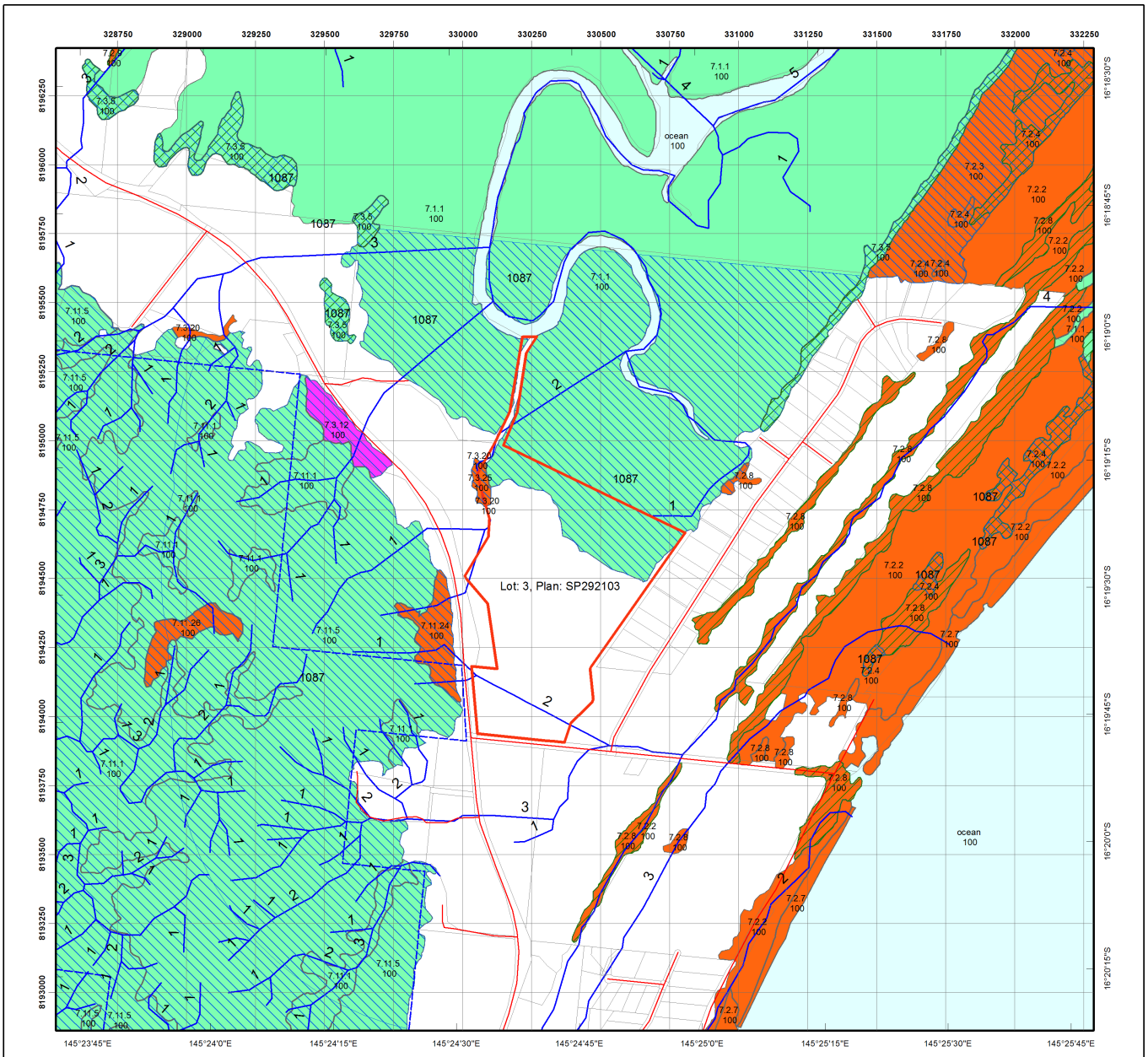


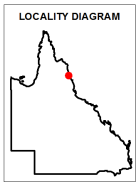
Vegetation Management Supporting Map

Legend

- Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
  These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourses and drainage features on the vegetation management watercourse and drainage features map
  (Stream order shown as black number against stream where available)
- Roads
- National Parks, State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only

Queensland Government

LOCALITY DIAGRAM



N

0 140 280 420 560 700 m

This product is projected into:
GDA 1994 MGA Zone 55

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the vegetation management watercourse and drainage feature map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

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Vegetation Management Act 1999 - Extract from the essential habitat database

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - State Code 16: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Planning Act 2016*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources and Mines website (http://www.dnrm.qld.gov.au) has more information on how the layer is applied under the State Development Assessment Provisions - State Code 16: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

1) (a) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or

2) (b) in which the protected wildlife, at any stage of its life cycle, is located.

Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1992*.

Essential habitat in Category A and/or Category B

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
1087	Casuarius casuarius johnsonii (southern population)	Southern Cassowary (southern population)	E	Dense lowland and highland tropical rainforest, closed gallery forest, eucalypt forest with vine forest elements, swamp forest and adjacent melaleuca swamps, littoral scrub, eucalypt woodland and mangroves; often using a habitat mosaic; will cross open eucalypt, canefields and dry ridges between rainforest patches.	Sea level to 1500m.	no soil information	None

Label	Regional Ecosystem (mandatory unless otherwise specified)
1087	7.1.3, 7.2.1, 7.2.3, 7.2.4, 7.2.5, 7.2.6, 7.2.11, 7.3.1, 7.3.3, 7.3.4, 7.3.5, 7.3.6, 7.3.7, 7.3.8, 7.3.10, 7.3.12, 7.3.17, 7.3.23, 7.3.25, 7.3.36, 7.3.37, 7.3.38, 7.8.1, 7.8.2, 7.8.3, 7.8.4, 7.8.7, 7.8.8, 7.8.14, 7.11.1, 7.11.2, 7.11.5, 7.11.6, 7.11.7, 7.11.10, 7.11.12, 7.11.13, 7.11.14, 7.11.18, 7.11.23, 7.11.24, 7.11.25, 7.11.28, 7.11.29, 7.11.30, 7.11.34, 7.12.1, 7.12.2, 7.12.4, 7.12.5, 7.12.7, 7.12.9, 7.12.13, 7.12.16, 7.12.17, 7.12.19, 7.12.20, 7.12.39, 7.12.40, 7.12.44, 7.12.47, 7.12.50, 7.12.68. Also includes secondary habitat within identified priority corridors, and secondary habitat surrounded by primary habitat. Secondary regional ecosystems are 7.1.1, 7.1.2, 7.1.4, 7.1.5, 7.2.2, 7.2.7, 7.2.8, 7.2.9, 7.2.10, 7.3.2, 7.3.9, 7.3.13, 7.3.14, 7.3.16, 7.3.19, 7.3.20, 7.3.21, 7.3.26, 7.3.28, 7.3.29, 7.3.30, 7.3.31, 7.3.34, 7.3.35, 7.3.39, 7.3.40, 7.3.43, 7.3.45, 7.3.46, 7.3.47, 7.3.49, 7.8.11, 7.8.12, 7.8.13, 7.8.15, 7.8.16, 7.11.16, 7.11.19, 7.11.21, 7.11.26, 7.11.27, 7.11.31, 7.11.32, 7.11.36, 7.11.39, 7.11.40, 7.11.42, 7.11.43, 7.11.44, 7.11.46, 7.11.49, 7.12.10, 7.12.11, 7.12.12, 7.12.21, 7.12.22, 7.12.32, 7.12.24, 7.12.25, 7.12.26, 7.12.27, 7.12.28, 7.12.29, 7.12.30, 7.12.34, 7.12.35, 7.12.37, 7.12.41, 7.12.45, 7.12.48, 7.12.49, 7.12.53, 7.12.59, 7.12.60, 7.12.61, 7.12.62, 7.12.67

Essential habitat in Category C

No records

Map 2

Matters of Interest Lot plan report

State Assessment and Referral Agency

Date: 12/03/2018

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Manufacturing, Infrastructure
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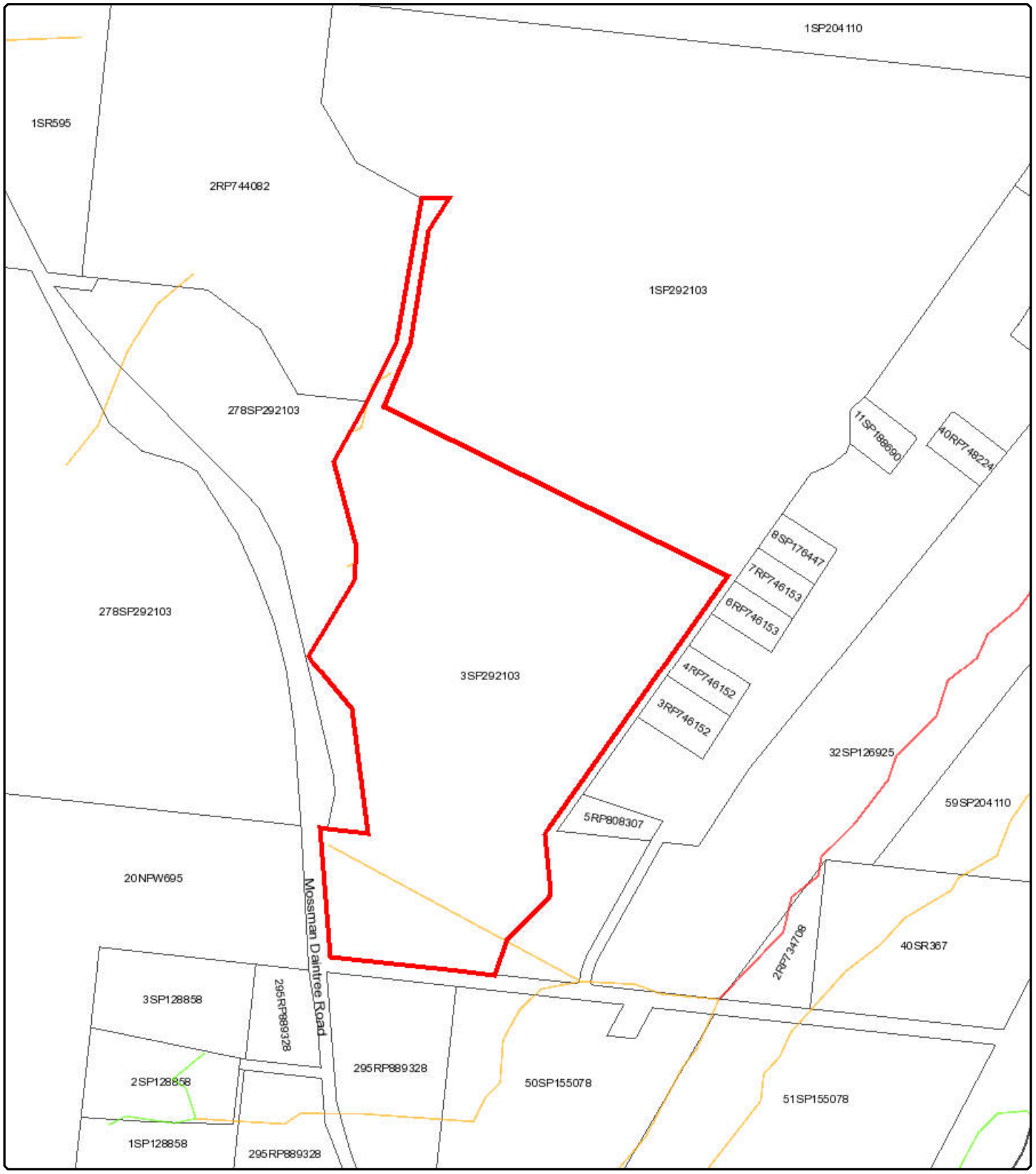
Matters of Interest for all selected Lot Plans

Queensland waterways for waterway barrier works
Regulated vegetation management map (Category A and B extract)
Coastal management district
Coastal area - erosion prone area
Coastal area - medium storm tide inundation area
Coastal area - high storm tide inundation area
Wetland protection area trigger area
Wetland protection area wetland
Area within 25m of a State-controlled road
State-controlled road

Matters of Interest by Lot Plan

Lot Plan: 3SP292103 (Area: 509,800 m^2)

Queensland waterways for waterway barrier works
Regulated vegetation management map (Category A and B extract)
Coastal management district
Coastal area - erosion prone area
Coastal area - medium storm tide inundation area
Coastal area - high storm tide inundation area
Wetland protection area trigger area
Wetland protection area wetland
Area within 25m of a State-controlled road
State-controlled road



State Assessment and Referral Agency

Date: 12/03/2018

Department of State Development
Manufacturing, Infrastructure
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N

0 190 380 570 760

Metres

Legend

Queensland waterways for waterway barrier works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major

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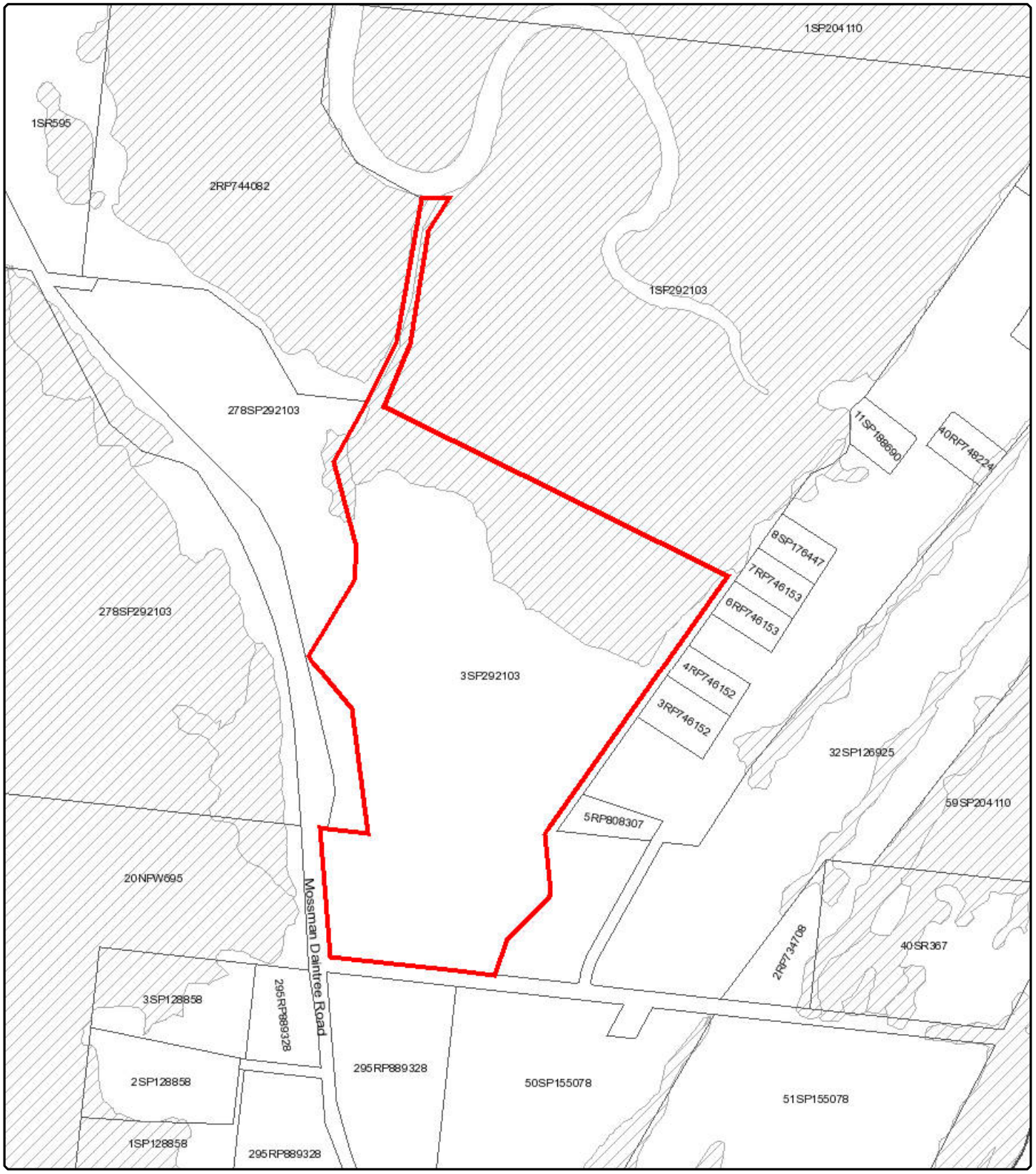

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N

0 190 380 570 760

Metres

Legend

Regulated vegetation management map (Category A and B extract)

- Category A on the regulated vegetation management map
- Category B on the regulated vegetation management map

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Legend

Coastal management district

Coastal management district

0 190 380 570 760

Metres

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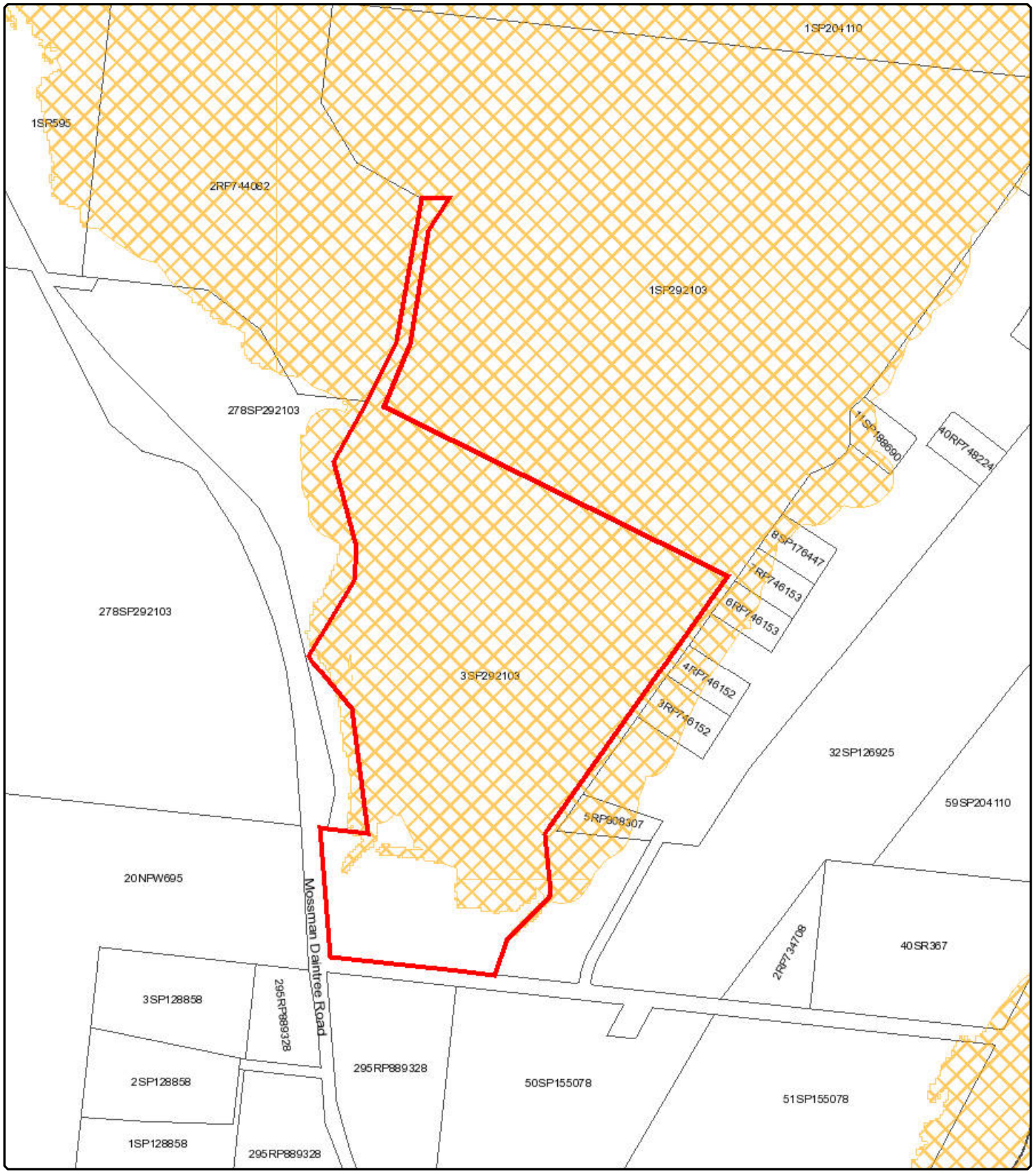

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Legend

Coastal area - erosion prone area

Coastal area - erosion prone area

0 190 380 570 760

Metres

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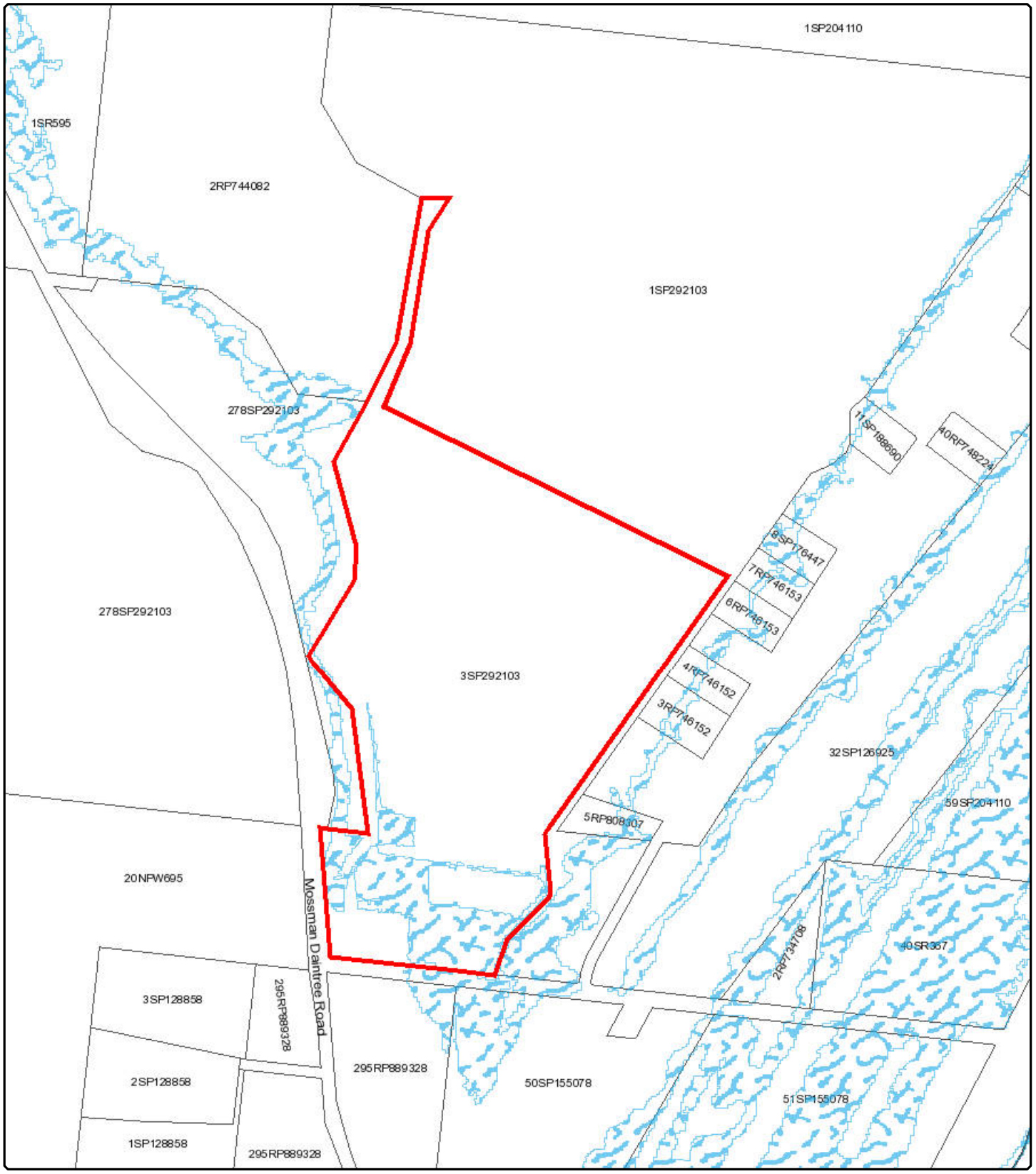

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Legend

Coastal area - medium storm tide inundation area

Coastal area - medium storm tide inundation area

0 190 380 570 760

Metres

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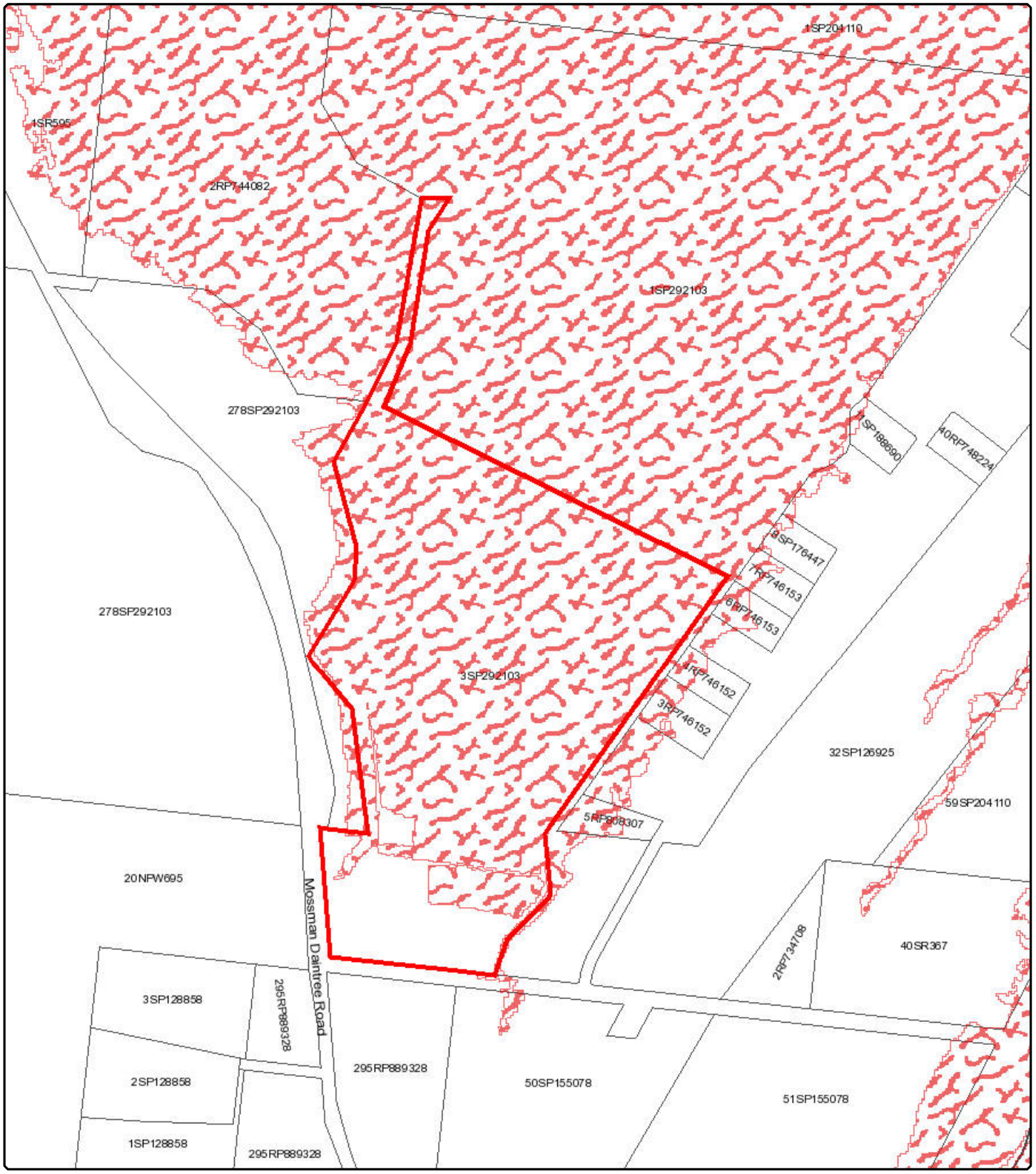

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Legend

Coastal area - high storm tide inundation area

Coastal area - high storm tide inundation area

0 190 380 570 760

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Legend

Wetland protection area trigger area

Wetland protection area trigger area

0 190 380 570 760

Metres

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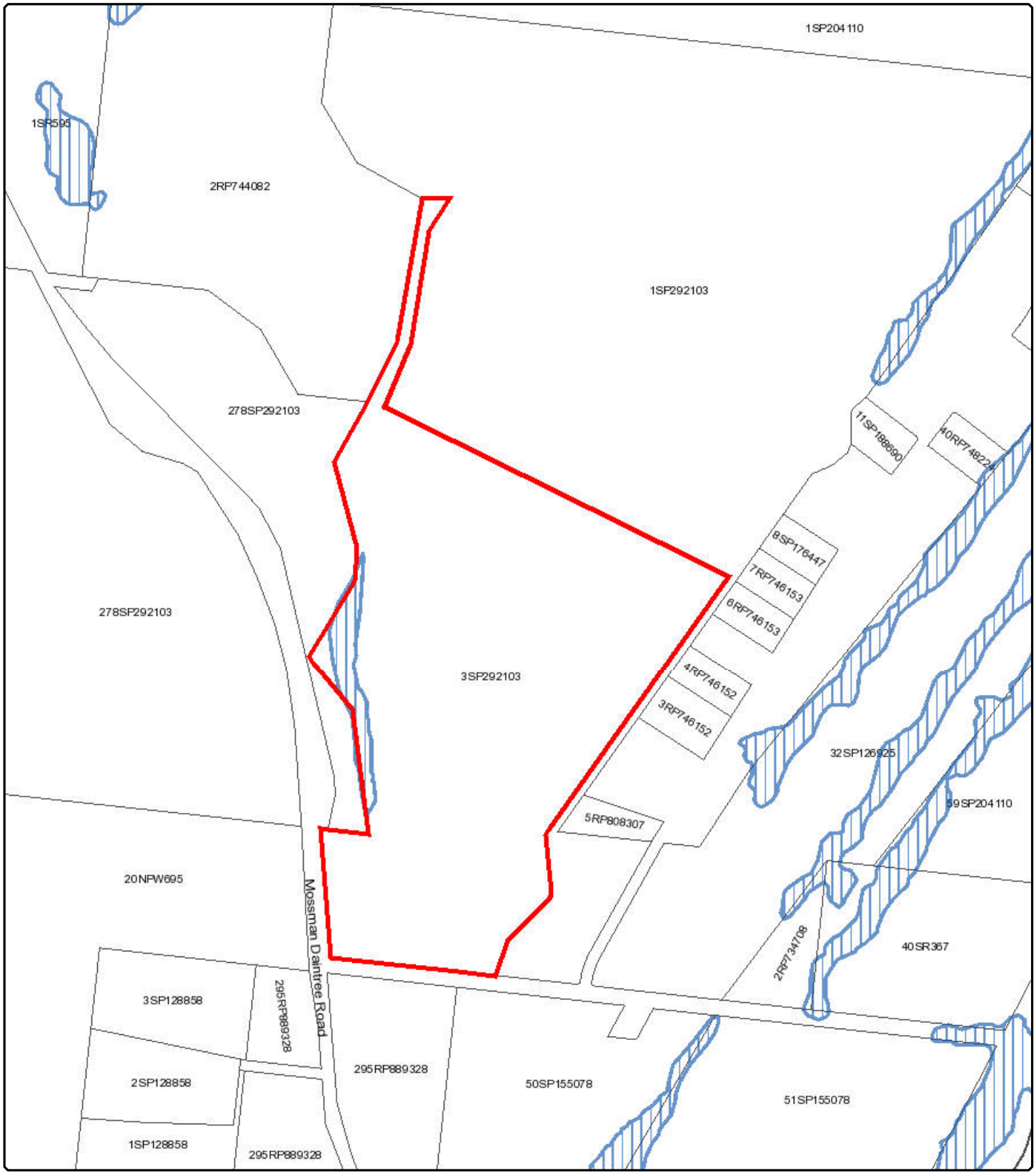

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Legend

Wetland protection area wetland

Wetland protection area wetland

0 190 380 570 760

Metres

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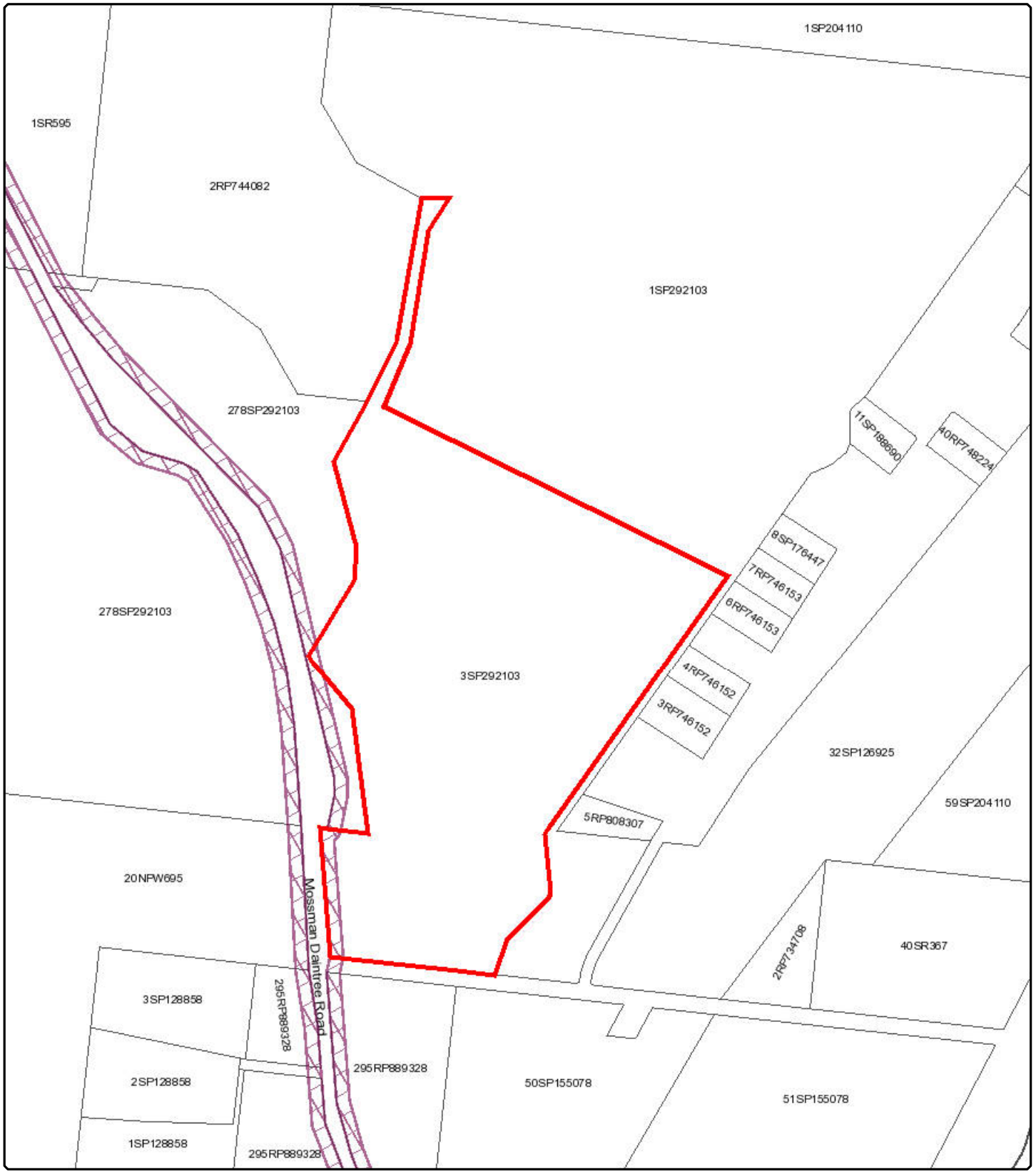

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N

Legend

Area within 25m of a State-controlled road

Area within 25m of a State-controlled road

0 190 380 570 760

Metres

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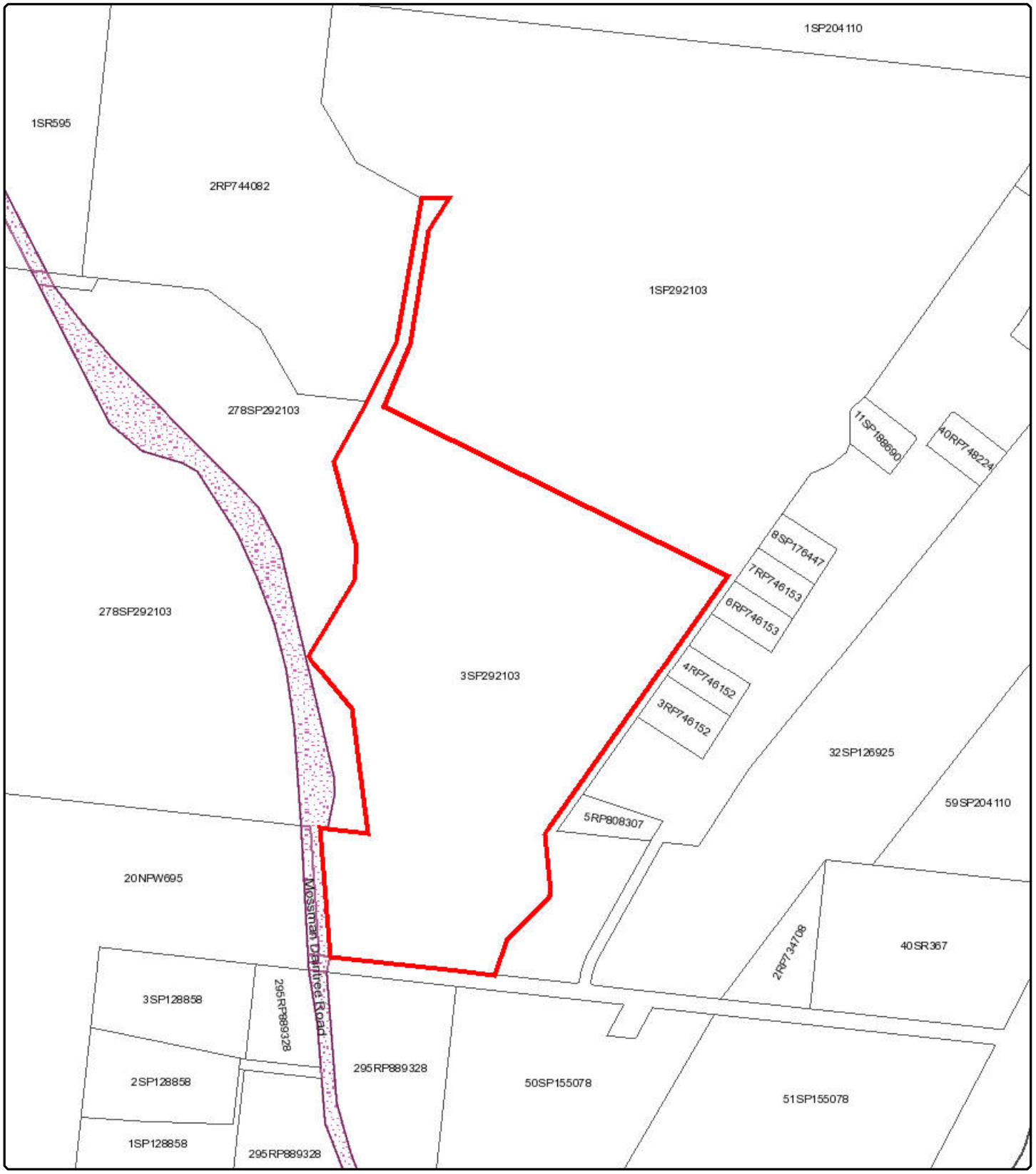

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Legend

State-controlled road

State-controlled road

0 190 380 570 760

Metres

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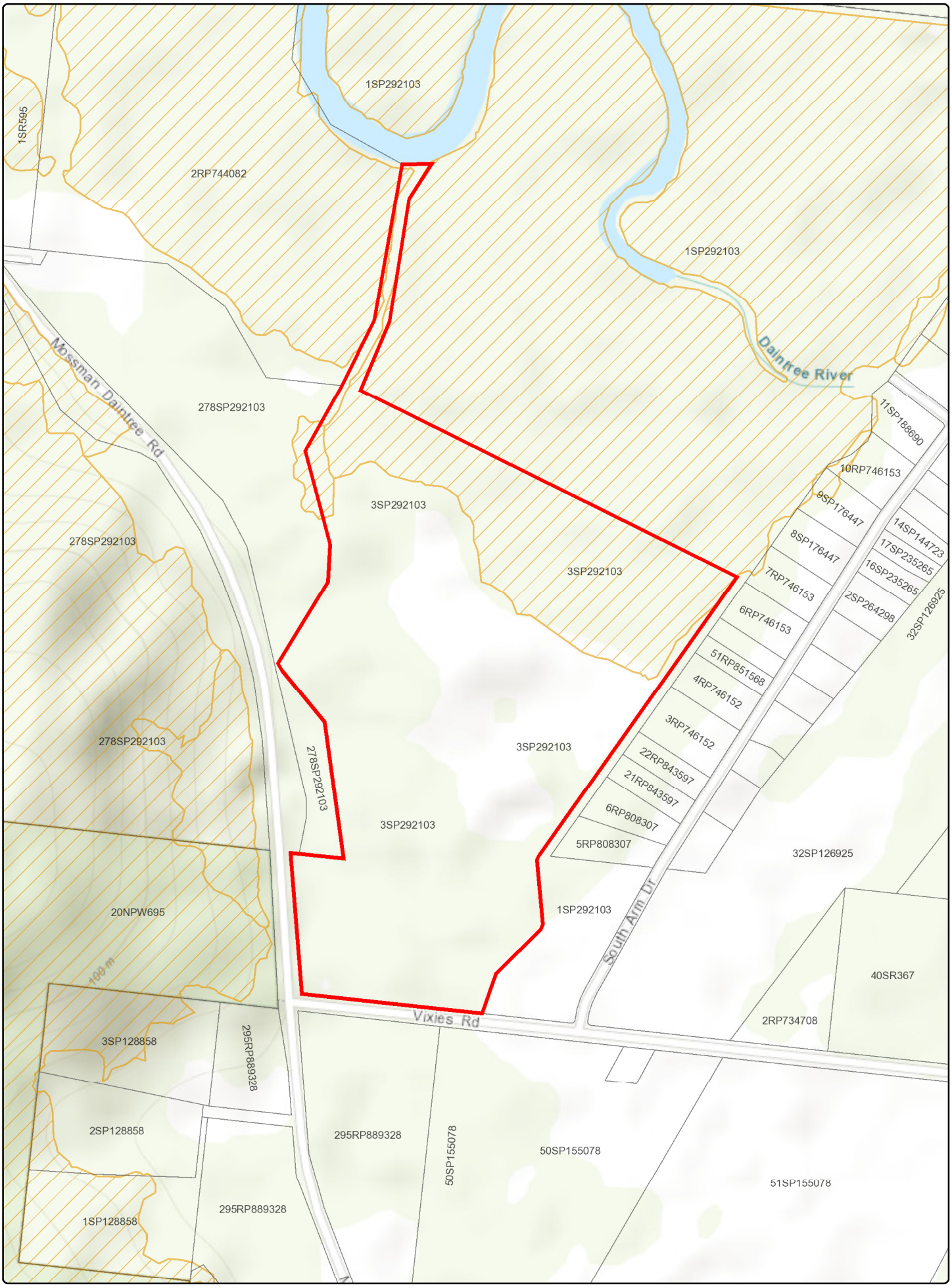
Map 3

SPP MSES Wildlife Habitat



State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

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0 140 280 420 560

Metres

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

MSES - Wildlife habitat

MSES - Wildlife habitat

Date: 12/03/2018

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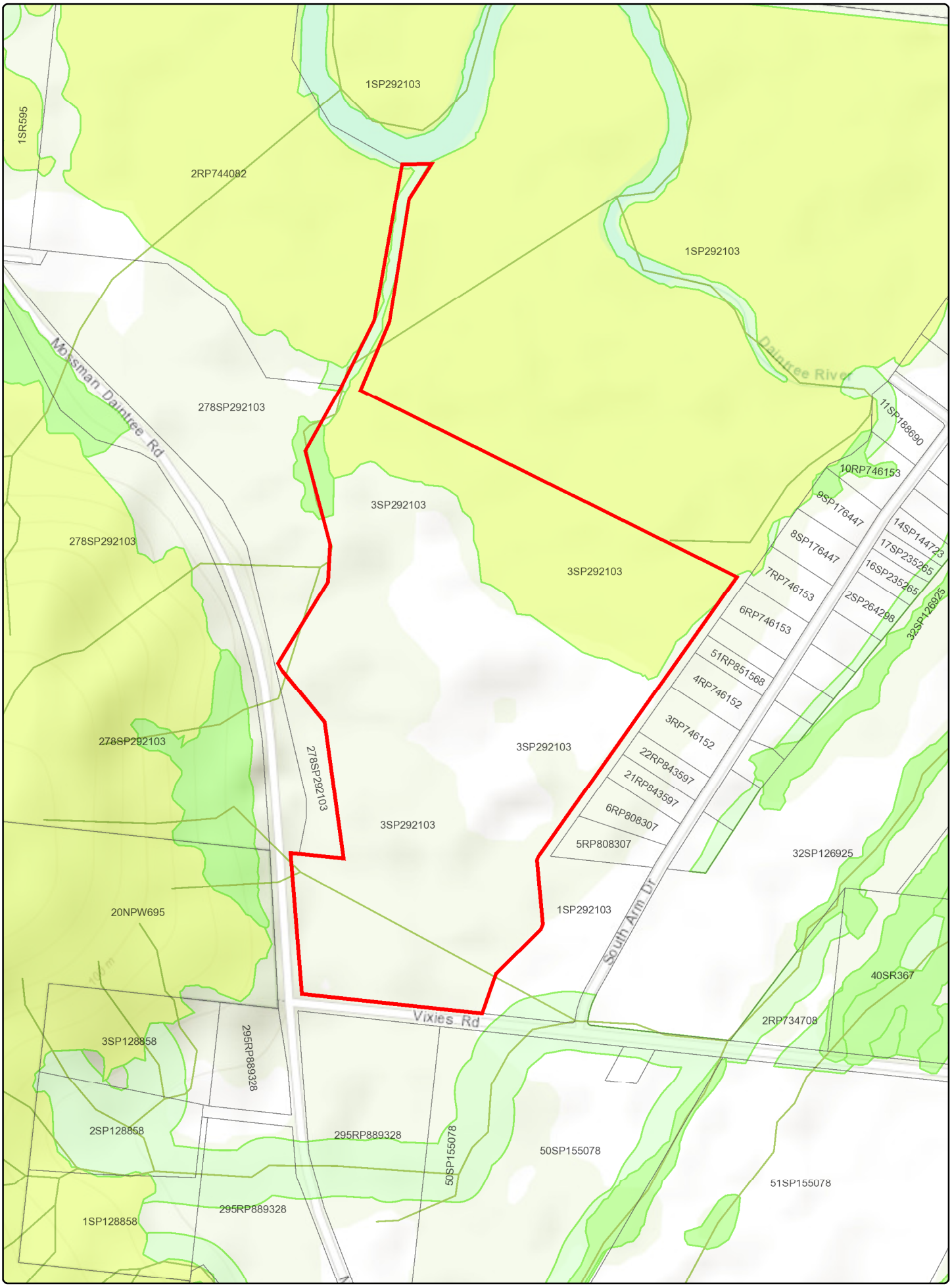
Map 4

SPP MSES Regulated Vegetation



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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

MSES - Regulated vegetation (intersecting a watercourse)

MSES - Regulated vegetation (intersecting a watercourse)

MSES - Regulated vegetation (category B)

MSES - Regulated vegetation (category B)

MSES - Regulated vegetation (category C)

MSES - Regulated vegetation (category C)

MSES - Regulated vegetation (category R)

MSES - Regulated vegetation (category R)

MSES - Regulated vegetation (essential habitat)

MSES - Regulated vegetation (essential habitat)

Date: 12/03/2018

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Map 5

MSES High Ecological Significance Wetlands

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Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

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0 140 280 420 560

Metres

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

MSES - High ecological significance wetlands

MSES - High ecological significance wetlands

Date: 12/03/2018

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Map 6

SPP Coastal Management District

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Making or amending a local planning instrument and designating land for community infrastructure

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N

0 140 280 420 560

Metres

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

Coastal management district

Coastal management district

Date: 12/03/2018

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

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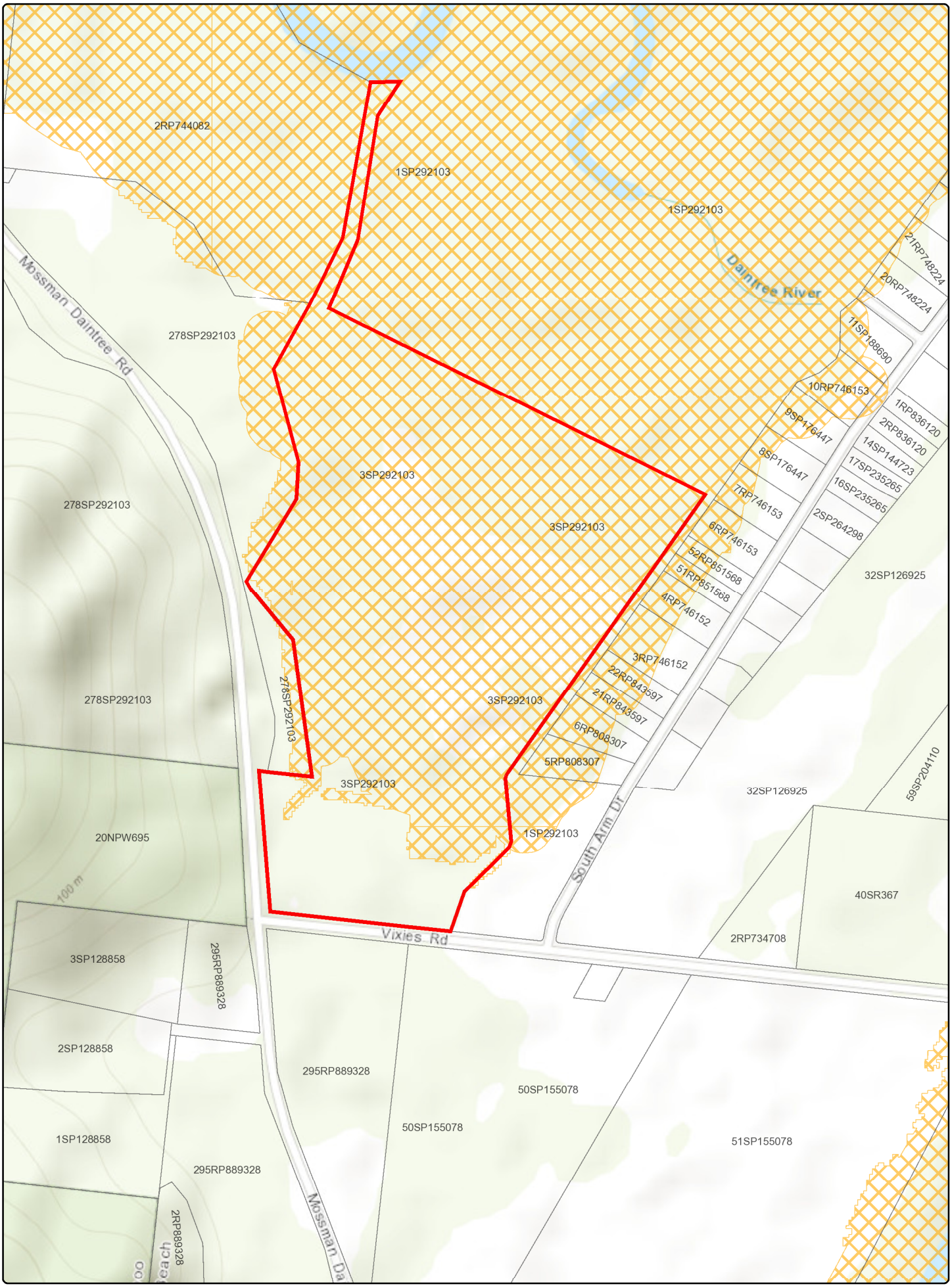
Map 7

SPP Erosion Prone Area



State Planning Policy

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0 140 280 420 560

Metres

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

Erosion prone area

Erosion prone area

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

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Map 8

MSES

A product of Queensland Globe

N

100 metres

Paper Size: A4
Print Date: 25/3/2018

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Queensland Government

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Legend

Road crossing

- Bridge
- Tunnel

Road

- Highway
- Main
- Local
- Private

Natural parcel boundary

Land parcel

- Parcel

Land parcel label

MSES protected area [estates]

MSES protected area [nature refuges]

MSES marine park [highly protected]

Railway

MSES declared fish habitat area [A and B areas]

MSES legally secured offset area [offset register]

MSES legally secured offset area [vegetation offsets]

MSES declared high ecological value waters [watercourse]

MSES declared high ecological value waters [wetland]

MSES high ecological significance wetlands

MSES strategic environmental area [designated precinct]

MSES wildlife habitat [threatened and special least concern animal]

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Legend

Wetlands of high ecological significance

State development area boundaries

Abbot Point state development area precincts

- Environmental Management/Materials Transportation Precinct
- Industry Precinct
- Infrastucture and Corridors Precinct
- Port Expansion Precinct
- Port Facilities Precinct
- Restricted Development Precinct

Bromelton state development area precincts

- Bromelton Local Service Centre Precinct
- Medium – High Impact Industry Precinct
- Rail Dependant Industry Precinct
- Rural Precinct
- Special Industry Precinct
- Transition Precinct

Bundaberg state development area precincts

- Environmental Management Precinct
- Industry Investigation Precinct
- Infrastructure Corridors and Support Industry Precinct
- Port Related Industry Precinct
- Rural Uses

Callide Infrastructure Corridor state development area [boundary]

Gallilee Basin state development area precincts

- Mining Services Precinct
- Rail Corridor Precinct

Queensland Childrens Hospital state development area precincts

- Education Precinct
- Health Precinct

Stanwell to Gladstone Infrastructure Corridor state development area [boundary]

Surat Basin Infrastructure Corridor state development area [boundary]

Legend

Gladstone state development area precincts

- Curtis Island Environmental Management Precinct
- Curtis Island Industry Precinct
- High Impact Industry Precinct
- Industry Investigation Precinct
- Low - Medium Impact Industry Precinct
- Materials Transportation and Services Corridor Precinct
- Medium - High Impact Industry Precinct
- Medium - High Impact and Port Related Industry Precinct
- Medium Impact Industry Precinct
- Separation Precinct
- Transition Precinct
- Transport and Support Services Precinct
- Waste Management Precinct

Townsville state development area precincts

- Buffer Precinct
- Ecological Corridors and Priority Offsets Precinct
- Environmental Conservation Precinct
- High Impact Industry Precinct
- Low - Medium Impact Port Related Industry Precinct
- Low Impact Industry Precinct
- Materials Transportation / Services Corridor Precinct
- Medium - High Impact Industry Precinct
- Medium - High Impact Industry Sub-Precinct
- Medium - High Impact Port Related Industry Precinct
- Medium Impact Port Related Industry Precinct
- Transition Precinct
- Transport and Support Services Precinct
- Transport and Support Services Sub-Precinct

Map 9

SPP Mapping Layers

State Planning Policy - Lot Plan Search

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

Queensland Government

Department of State Development
Manufacturing, Infrastructure
and Planning

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0 210 420 630 840

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State Planning Policy mapping layers - consolidated list for all selected Lot Plans

(Note: Please refer to following pages for State Interests listed for each selected Lot Plan)

AGRICULTURE
- Agricultural land classification - class A and B

BIODIVERSITY
- MSES - Wildlife habitat
- MSES - Regulated vegetation (category B)
- MSES - Regulated vegetation (category R)
- MSES - Regulated vegetation (essential habitat)
- MSES - Regulated vegetation (wetland)
- MSES - Regulated vegetation (intersecting a watercourse)
- MSES - High ecological significance wetlands

COASTAL ENVIRONMENT
- Coastal management district

NATURAL HAZARDS RISK AND RESILIENCE
- Flood hazard area - Level 1 - Queensland floodplain assessment overlay*
- Bushfire prone area
- Erosion prone area
- Medium storm tide inundation area
- High storm tide inundation area

TRANSPORT INFRASTRUCTURE
- State-controlled road

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Department of State Development, Manufacturing, Infrastructure and Planning

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State Planning Policy mapping layers for each selected Lot Plan

Lot Plan: 3SP292103 (Area: 509800 m^2)
AGRICULTURE
- Agricultural land classification - class A and B
BIODIVERSITY
- MSES - Wildlife habitat
- MSES - Regulated vegetation (category B)
- MSES - Regulated vegetation (category R)
- MSES - Regulated vegetation (essential habitat)
- MSES - Regulated vegetation (wetland)
- MSES - Regulated vegetation (intersecting a watercourse)
- MSES - High ecological significance wetlands
COASTAL ENVIRONMENT
- Coastal management district
NATURAL HAZARDS RISK AND RESILIENCE
- Flood hazard area - Level 1 - Queensland floodplain assessment overlay*
- Bushfire prone area
- Erosion prone area
- Medium storm tide inundation area
- High storm tide inundation area
TRANSPORT INFRASTRUCTURE
- State-controlled road

Queensland Government
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Map 10

SPP State Controlled Road

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

Department of State Development, Manufacturing, Infrastructure and Planning

Queensland Government

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Metres

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

State-controlled road

State-controlled road

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

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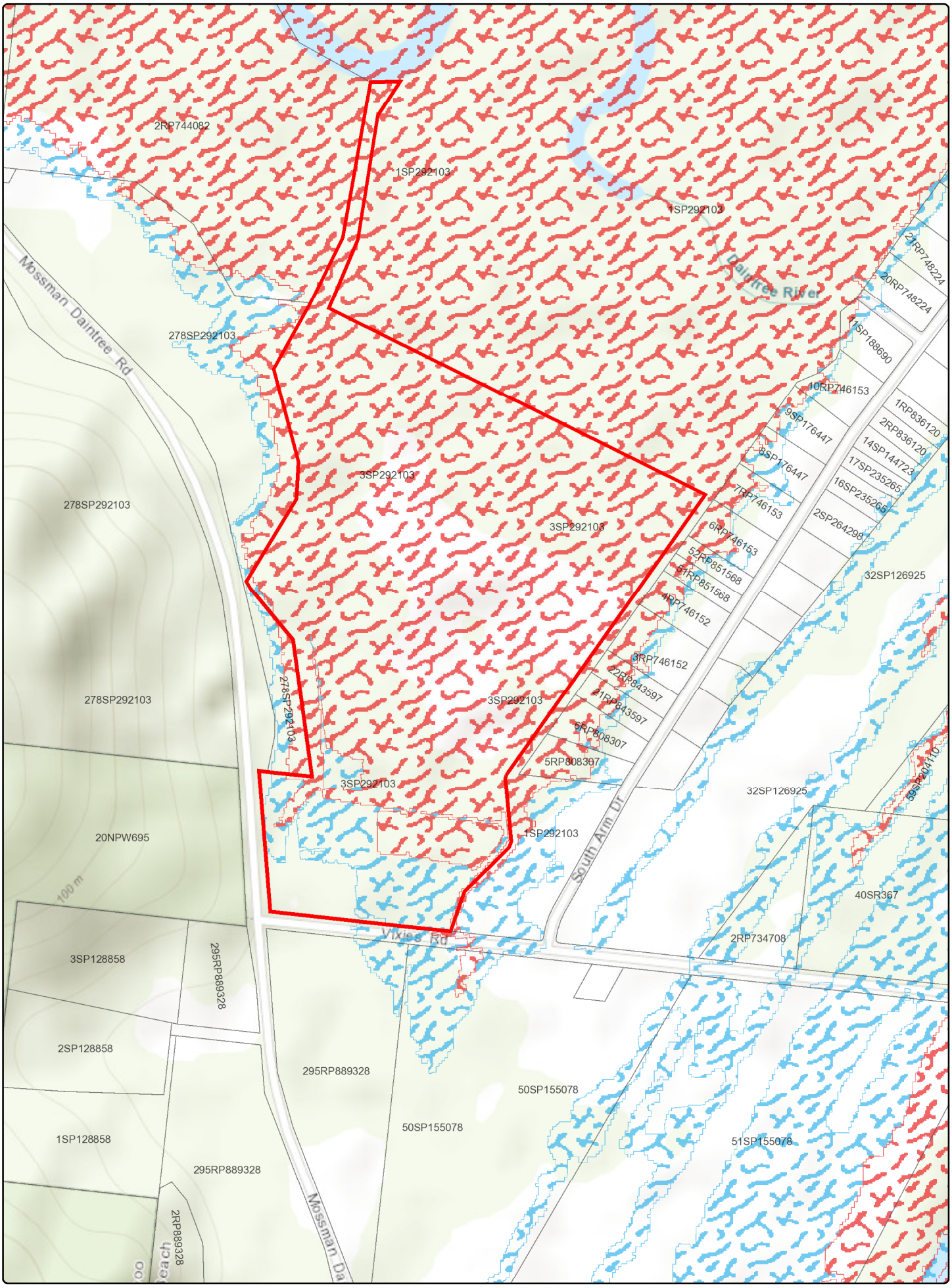
Map 11

SPP Storm Tide



State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

Department of State Development, Manufacturing, Infrastructure and Planning

Queensland Government

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

High storm tide inundation area

High storm tide inundation area

Medium storm tide inundation area

Medium storm tide inundation area

Date: 12/03/2018

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

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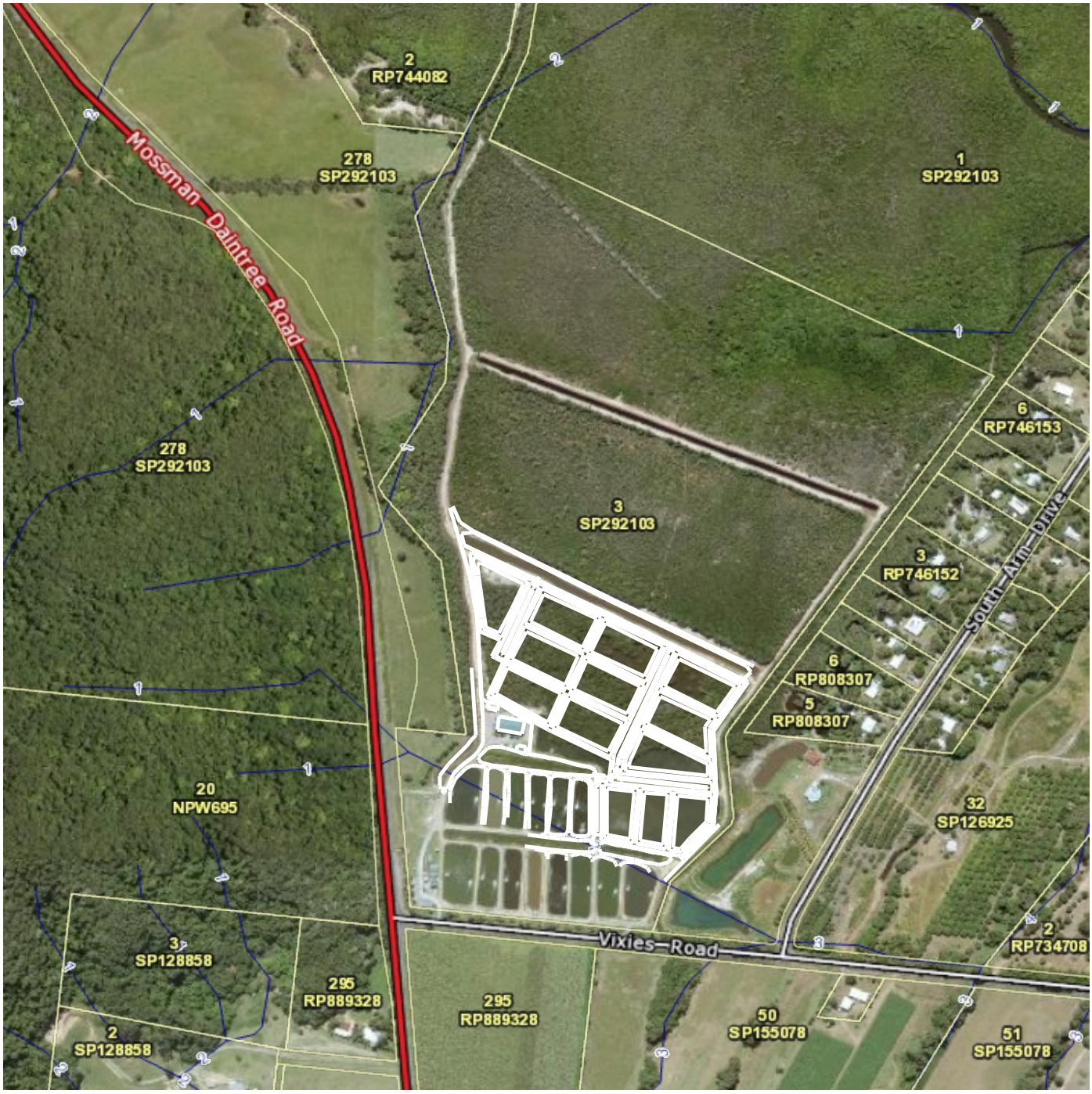
Map 12

MSES - Watercourses



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100 metres

Paper Size: A4
Print Date: 25/3/2018

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Legend

VM watercourse/drainage feature - 1:100 000 and 1:250 000

VM watercourse/drainage - 1:25 000

Road crossing

- Bridge
- Tunnel

Road

- Highway
- Main
- Local
- Private

Natural parcel boundary

Land parcel

- Parcel

Land parcel label

State development area boundaries

Railway

Abbot Point state development area precincts

- Environmental Management/Materials Transportation Precinct
- Industry Precinct
- Infrastucture and Corridors Precinct
- Port Expansion Precinct
- Port Facilities Precinct
- Restricted Development Precinct

Bromelton state development area precincts

- Bromelton Local Service Centre Precinct
- Medium – High Impact Industry Precinct
- Rail Dependant Industry Precinct
- Rural Precinct
- Special Industry Precinct
- Transition Precinct

Bundaberg state development area precincts

- Environmental Management Precinct
- Industry Investigation Precinct
- Infrastructure Corridors and Support Industry Precinct
- Port Related Industry Precinct
- Rural Uses

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Legend

Callide Infrastructure Corridor state development area [boundary]

Gallilee Basin state development area precincts

- Mining Services Precinct
- Rail Corridor Precinct

Gladstone state development area precincts

- Curtis Island Environmental Management Precinct
- Curtis Island Industry Precinct
- High Impact Industry Precinct
- Industry Investigation Precinct
- Low - Medium Impact Industry Precinct
- Materials Transportation and Services Corridor Precinct
- Medium - High Impact Industry Precinct
- Medium - High Impact and Port Related Industry Precinct
- Medium Impact Industry Precinct
- Separation Precinct
- Transition Precinct
- Transport and Support Services Precinct
- Waste Management Precinct

Queensland Childrens Hospital state development area precincts

- Education Precinct
- Health Precinct

Stanwell to Gladstone Infrastructure Corridor state development area [boundary]

Surat Basin Infrastructure Corridor state development area [boundary]

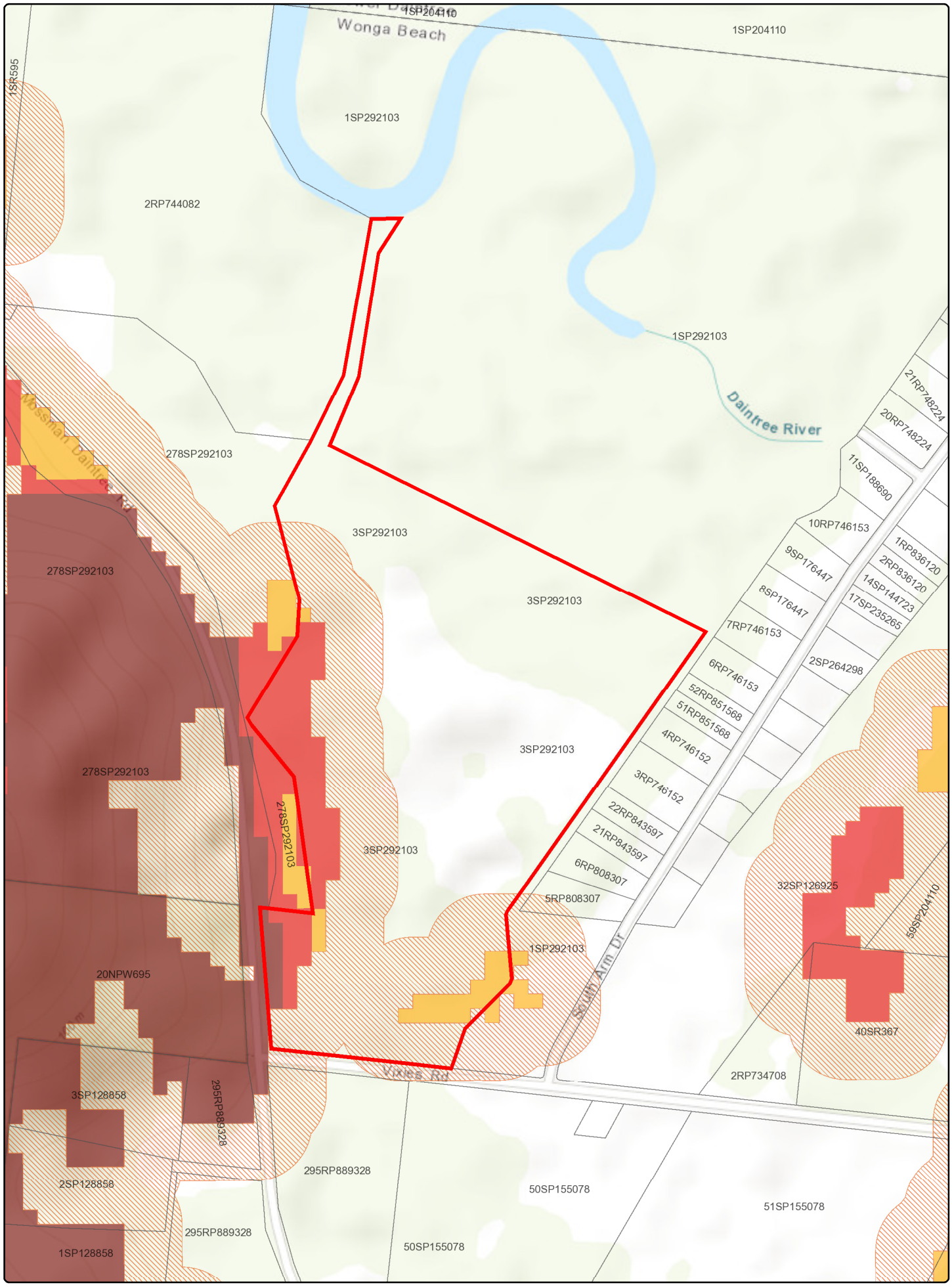
Legend

Townsville state development area precincts

- Buffer Precinct
- Ecological Corridors and Priority Offsets Precinct
- Environmental Conservation Precinct
- High Impact Industry Precinct
- Low - Medium Impact Port Related Industry Precinct
- Low Impact Industry Precinct
- Materials Transportation / Services Corridor Precinct
- Medium - High Impact Industry Precinct
- Medium - High Impact Industry Sub-Precinct
- Medium - High Impact Port Related Industry Precinct
- Medium Impact Port Related Industry Precinct
- Transition Precinct
- Transport and Support Services Precinct
- Transport and Support Services Sub-Precinct

Map 13

SPP Bushfire Hazard 11-3-2018



State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

Department of State Development, Manufacturing, Infrastructure and Planning

Queensland Government

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

Bushfire prone area

Very High Potential Bushfire Intensity

High Potential Bushfire Intensity

Medium Potential Bushfire Intensity

Potential Impact Buffer

Date: 12/03/2018

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Map 14

SPP Flood Hazard

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

Flood hazard area - Level 1 - Queensland floodplain assessment overlay

Flood hazard area - Level 1 - Queensland floodplain assessment overlay

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Date: 12/03/2018

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Map 15

SPP Mapping Agricultural Land

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

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Department of State Development, Manufacturing, Infrastructure and Planning

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Legend

Drawn Polygon Layer

Override 1

Cadastre (10k)

Cadastre (10k)

Agricultural land classification - class A and B

Agricultural land classification - class A and B

Date: 12/03/2018

State Planning Policy

Making or amending a local planning instrument and designating land for community infrastructure

Department of State Development, Manufacturing, Infrastructure and Planning

Queensland Government

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Map 16

October 2017 DSC Pre-lodgement Advice Flood Mapping

Vixies Rd in Wonga

DOUGLAS SHIRE COUNCIL

Land Parcels (Feb 2017)
- Land_Parcels

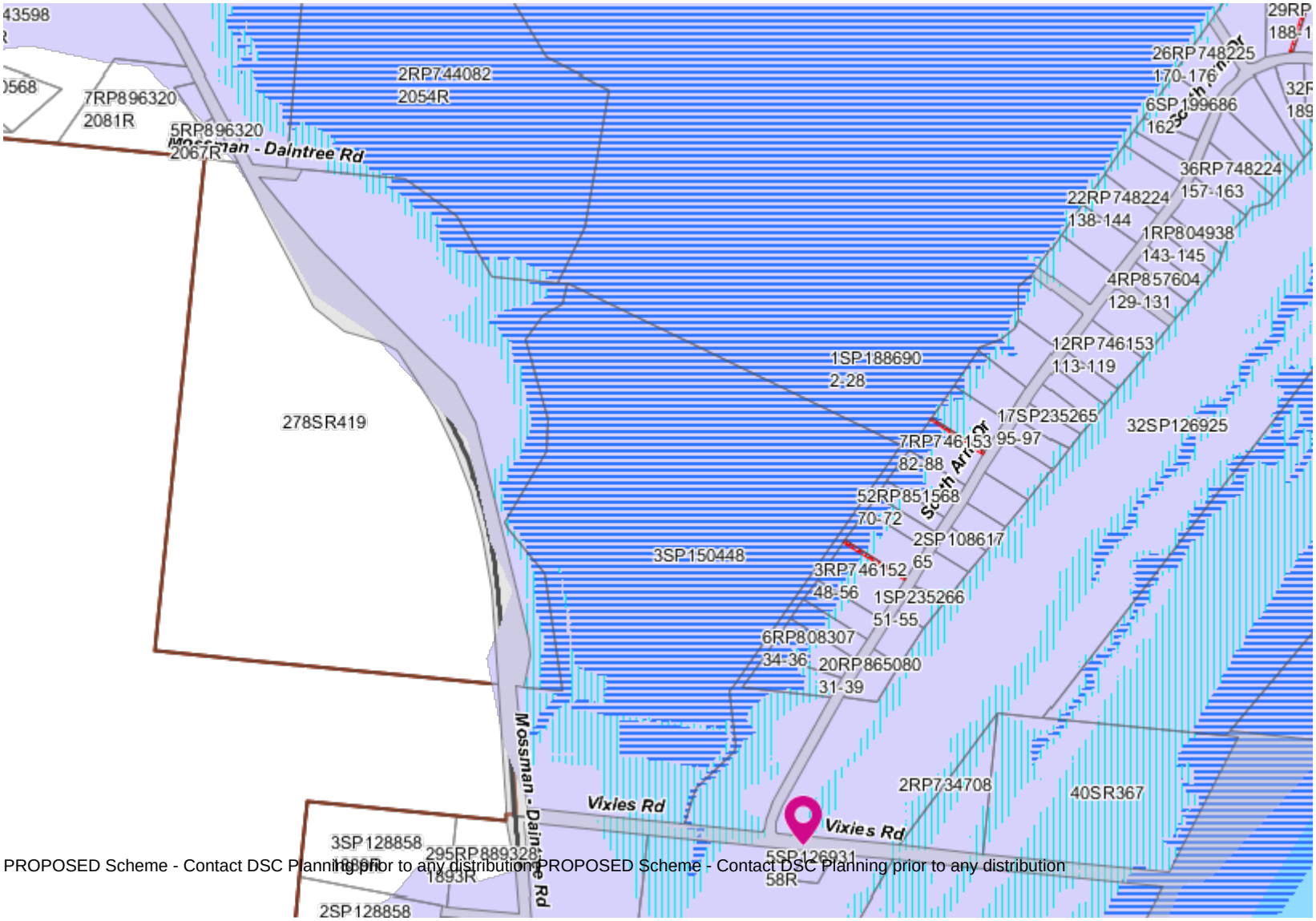
Property Information
- Easements
- Road_Reserves

2016 Planning Scheme - Floo
- Medium Storm Tide Hazar
- High Storm Tide Hazard
- 100 Year ARI - Mossman
- Floodplain Assessment O

Roads
- DSC_Roads
  - State
  - Local
  - Private

Boundaries
- Locality_Boundaries
- Boundary_DSC

Drainage
- Drainage



500 m

N

Scale = 1 : 12152.700

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Attachment 1

DA Form 1 - Development Application Details

DA Form 1 – Development application details

Approved form (version 1.0 effective 3 July 2017) made under section 282 of the Planning Act 2016.

This form **must** be used to make a development application **involving code assessment or impact assessment**, except when applying for development involving building work.

For a development application involving **building work only**, use *DA Form 2 – Building work details*.

For a development application involving **building work associated with any other type of assessable development**, use this form (*DA Form 1*) **and** parts 4 to 6 of *DA Form 2 – Building work details.*

Unless stated otherwise, all parts of this form **must** be completed in full and all required supporting information **must** accompany the development application.

One or more additional pages may be attached as a schedule to this development application if there is insufficient space on the form to include all the necessary information.

Note: *All terms used in this form have the meaning given under the Planning Act 2016, the Planning Regulation 2017, or the Development Assessment Rules (DA Rules).*

PART 1 – APPLICANT DETAILS

1) Applicant details	
Applicant name(s) (*individual or company full name*)	Daintree Saltwater Barramundi Fish Farms Pty Ltd
Contact name *(only applicable for companies)*	Mark Hober
Postal address *(P.O. Box or street address)*	Lot 3 Vixies Road
Suburb	WONGA BEACH
State	QLD
Postcode	4873
Country	Australia
Contact number	07 40987259
Email address *(non-mandatory)*	info@daintreesaltwaterbarramundi.com.au
Mobile number *(non-mandatory)*	0427 450611
Fax number *(non-mandatory)*	07 40987201
Applicant's reference number(s) *(if applicable)*	

2) Owner's consent
2.1) Is written consent of the owner required for this development application?
☒ Yes – the written consent of the owner(s) is attached to this development application ☐ No – proceed to 3)

PART 2 – LOCATION DETAILS

3) Location of the premises *(complete 3.1) or 3.2), and 3.3) as applicable)*

***Note**: Provide details below and attach a site plan for any or all premises part of the development application. For further information, see DA Forms Guide: Relevant plans.*

3.1) Street address and lot on plan

☒ Street address **AND** lot on plan (*all lots must be listed*), ***or***

☐ Street address **AND** lot on plan for an adjoining or adjacent property of the premises *(appropriate for development in water but adjoining or adjacent to land e.g. jetty, pontoon; all lots must be listed).*

a)	Unit No.	Street No.	Street Name and Type	Suburb
		Lot 3	Vixies Road	WONGA BEACH
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
	4873	LOT 3	SP292103	Douglas Shire
b)	Unit No.	Street No.	Street Name and Type	Suburb
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)

3.2) Coordinates of premises *(appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay)*

***Note**: Place each set of coordinates in a separate row. Only one set of coordinates is required for this part.*

☐ Coordinates of premises by longitude and latitude

Longitude(s)	Latitude(s)	Datum	Local Government Area(s) *(if applicable)*
		☐ WGS84 ☐ GDA94 ☐ Other:	

☐ Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) *(if applicable)*
		☐ 54 ☐ 55 ☐ 56	☐ WGS84 ☐ GDA94 ☐ Other:	

3.3) Additional premises

☐ Additional premises are relevant to this development application and their details have been attached in a schedule to this application

☐ Not required

4) Identify any of the following that apply to the premises and provide any relevant details

☒ In or adjacent to a water body or watercourse or in or above an aquifer

Name of water body, watercourse or aquifer:	Tributaries of South Arm Daintree River

☐ On strategic port land under the *Transport Infrastructure Act 1994*

Lot on plan description of strategic port land:	
Name of port authority for the lot:	

☒ In a tidal area

Name of local government for the tidal area *(if applicable)*:	Douglas Shire
Name of port authority for tidal area *(if applicable)*:	

☐ On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*

Name of airport:	

☐ Listed on the Environmental Management Register (EMR) under the *Environmental Protection Act 1994*

EMR site identification:	

☐ Listed on the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*

CLR site identification:

5) Are there any existing easements over the premises?

Note: Easement uses vary throughout Queensland and are to be identified correctly and accurately. For further information on easements and how they may affect the proposed development, see DA Forms Guide.

☐ Yes – All easement locations, types and dimensions are included in plans submitted with this development application

☒ No

PART 3 – DEVELOPMENT DETAILS

Section 1 – Aspects of development

6.1) Provide details about the first development aspect

a) What is the type of development? *(tick only one box)*

☒ Material change of use ☐ Reconfiguring a lot ☐ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☒ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☐ Code assessment ☒ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

13 new Aquaculture ponds over 4.88ha, and the repurposing of two drains and one settlement pond for primary settlement, treatment wetland and final settlement/balancing storage to establish pond wastewater treatment and recirculation system.

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms guide: Relevant plans.*

☒ Relevant plans of the proposed development are attached to the development application

6.2) Provide details about the second development aspect

a) What is the type of development? *(tick only one box)*

☐ Material change of use ☐ Reconfiguring a lot ☒ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☐ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☐ Code assessment ☐ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*

13 new Aquaculture ponds over 4.88ha, and the repurposing of two drains and one settlement pond for primary settlement, treatment wetland and final settlement/balancing storage to establish pond wastewater treatment and recirculation system.

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*

☐ Relevant plans of the proposed development are attached to the development application

6.3) Additional aspects of development

☐ Additional aspects of development are relevant to this development application and the details for these aspects

that would be required under Part 3 Section 1 of this form have been attached to this development application
☐ Not required

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	☒ Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	☐ Yes – complete division 2
Operational work	☒ Yes – complete division 3
Building work	☐ Yes – complete *DA Form 2 – Building work details*

Division 1 – Material change of use

***Note**: This division is only required to be completed if any part of the development application involves a material change of use assessable against a local planning instrument.*

8.1) Describe the proposed material change of use			
Provide a general description of the proposed use	Provide the planning scheme definition *(include each definition in a new row)*	Number of dwelling units *(if applicable)*	Gross floor area (m^2) *(if applicable)*
Aquaculture	Aquaculture		

8.2) Does the proposed use involve the use of existing buildings on the premises?		
☒ Yes		
☐ No		

Division 2 – Reconfiguring a lot

***Note**: This division is only required to be completed if any part of the development application involves reconfiguring a lot.*

9.1) What is the total number of existing lots making up the premises?

9.2) What is the nature of the lot reconfiguration? *(tick all applicable boxes)*	
☐ Subdivision *(complete 10))*	☐ Dividing land into parts by agreement *(complete 11))*
☐ Boundary realignment *(complete 12))*	☐ Creating or changing an easement giving access to a lot from a construction road *(complete 13))*

10) Subdivision 10.1) For this development, how many lots are being created and what is the intended use of those lots:				
Intended use of lots created	Residential	Commercial	Industrial	Other, please specify:
Number of lots created				

10.2) Will the subdivision be staged?	
☐ Yes – provide additional details below ☐ No	
How many stages will the works include?	
What stage(s) will this development application apply to?	

11) Dividing land into parts by agreement – how many parts are being created and what is the intended use of the parts?				
Intended use of parts created	Residential	Commercial	Industrial	Other, please specify:
Number of parts created				

12) Boundary realignment 12.1) What are the current and proposed areas for each lot comprising the premises?			
Current lot		Proposed lot	
Lot on plan description	Area (m^2)	Lot on plan description	Area (m^2)

12.2) What is the reason for the boundary realignment?

13) What are the dimensions and nature of any existing easements being changed and/or any proposed easement? *(attach schedule if there are more than two easements)*				
Existing or proposed?	Width (m)	Length (m)	Purpose of the easement? *(e.g. pedestrian access)*	Identify the land/lot(s) benefitted by the easement

Division 3 – Operational work

***Note**: This division is only required to be completed if any part of the development application involves operational work.*

14.1) What is the nature of the operational work?		
☐ Road work	☐ Stormwater	☐ Water infrastructure
☐ Drainage work	☒ Earthworks	☐ Sewage infrastructure
☐ Landscaping	☐ Signage	☒ Clearing vegetation
☐ Other – please specify:		

14.2) Is the operational work necessary to facilitate the creation of new lots? *(e.g. subdivision)*	
☐ Yes – specify number of new lots:	
☒ No	

14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*
$2,500,000

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application
Douglas Shire Clouncil

16) Has the local government agreed to apply a superseded planning scheme for this development application?
☐ Yes – a copy of the decision notice is attached to this development application
☒ Local government is taken to have agreed to the superseded planning scheme request – relevant documents attached
☐ No

PART 5 – REFERRAL DETAILS

17) Do any aspects of the proposed development require referral for any referral requirements?

***Note**: A development application will require referral if prescribed by the* Planning Regulation 2017.

☐ No, there are no referral requirements relevant to any development aspects identified in this development application – proceed to Part 6

Matters requiring referral to the **chief executive of the Planning Regulation 2017:**

☐ Clearing native vegetation
☐ Contaminated land *(unexploded ordnance)*
☒ Environmentally relevant activities (ERA) *(only if the ERA have not been devolved to a local government)*
☒ Fisheries – aquaculture
☐ Fisheries – declared fish habitat area
☒ Fisheries – marine plants
☐ Fisheries – waterway barrier works
☐ Hazardous chemical facilities
☐ Queensland heritage place *(on or near a Queensland heritage place)*
☐ Infrastructure – designated premises
☐ Infrastructure – state transport infrastructure
☐ Infrastructure – state transport corridors and future state transport corridors
☐ Infrastructure – state-controlled transport tunnels and future state-controlled transport tunnels
☒ Infrastructure – state-controlled roads
☐ Land within Port of Brisbane's port limits
☐ SEQ development area
☐ SEQ regional landscape and rural production area or SEQ Rural living area – community activity
☐ SEQ regional landscape and rural production area or SEQ Rural living area – indoor recreation
☐ SEQ regional landscape and rural production area or SEQ Rural living area – residential development
☐ SEQ regional landscape and rural production area or SEQ Rural living area – urban activity
☒ Tidal works or works in a coastal management district
☐ Urban design
☐ Water-related development – taking or interfering with water
☐ Water-related development – removing quarry material *(from a watercourse or lake)*
☐ Water-related development – referable dams
☐ Water-related development – construction of new levees or modification of existing levees *(category 2 or 3 levees only)*
☒ Wetland protection area

Matters requiring referral to the **local government:**

☐ Airport land
☐ Environmentally relevant activities (ERA) (*only if the ERA have been devolved to local government)*
☐ Local heritage places

Matters requiring referral to the **chief executive of the distribution entity or transmission entity:**

☐ Electricity infrastructure

Matters requiring referral to: • The **chief executive of the holder of the licence**, if not an individual • The **holder of the licence**, if the holder of the licence is an individual ☐ Oil and gas infrastructure
Matters requiring referral to **the Brisbane City Council:** ☐ Brisbane core port land
Matters requiring referral to the **Minister under the Transport Infrastructure Act 1994:** ☐ Brisbane core port land ☐ Strategic port land
Matters requiring referral to the **relevant port operator:** ☐ Brisbane core port land (below high-water mark and within port limits)
Matters requiring referral to the **chief executive of the relevant port authority:** ☐ Land within limits of another port
Matters requiring referral to the **Gold Coast Waterways Authority:** ☐ Tidal works, or development in a coastal management district in Gold Coast waters
Matters requiring referral to the **Queensland Fire and Emergency Service:**
☒ Tidal works, or development in a coastal management district

18) Has any referral agency provided a referral response for this development application?

☐ Yes – referral response(s) received and listed below are attached to this development application
☒ No

Referral requirement	Referral agency	Date of referral response

Identify and describe any changes made to the proposed development application that was the subject of the referral response and the development application the subject of this form, or include details in a schedule to this development application *(if applicable)*.

PART 6 – INFORMATION REQUEST

19) Information request under Part 3 of the DA Rules

☒ I agree to receive an information request if determined necessary for this development application
☐ I do not agree to accept an information request for this development application

***Note**: By not agreeing to accept an information request I, the applicant, acknowledge:*

- *that this development application will be assessed and decided based on the information provided when making this development application and the assessment manager and any referral agencies relevant to the development application are not obligated under the DA Rules to accept any additional information provided by the applicant for the development application unless agreed to by the relevant parties*
- *Part 3 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules.*

Further advice about information requests is contained in the DA Forms Guide.

PART 7 – FURTHER DETAILS

20) Are there any associated development applications or current approvals? *(e.g. a preliminary approval)*

☒ Yes – provide details below or include details in a schedule to this development application
☐ No

List of approval/development application references	Reference number	Date	Assessment manager
☒ Approval ☐ Development application	SPD-0515-017379	5 June 2015	DILGP
☐ Approval ☐ Development application			

21) Has the portable long service leave levy been paid? *(only applicable to development applications involving building work or operational work)*

☐ Yes – the yellow local government/private certifier's copy of the receipted QLeave form is attached to this development application
☐ No – I, the applicant will provide evidence that the portable long service leave levy has been paid before the assessment manager decides the development application. I acknowledge that the assessment manager may give a development approval only if I provide evidence that the portable long service leave levy has been paid
☒ Not applicable

Amount paid	Date paid (dd/mm/yy)	QLeave levy number (A, B or E)
$		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?

☐ Yes – show cause or enforcement notice is attached
☒ No

23) Further legislative requirements

Environmentally relevant activities

23.1) Is this development application also taken to be an application for an environmental authority for an **Environmentally Relevant Activity (ERA)** under section 115 of the *Environmental Protection Act 1994*?

☒ Yes – the required attachment (form EM941) for an application for an environmental authority accompanies this development application, and details are provided in the table below
☐ No

***Note**: Application for an environmental authority can be found by searching "EM941" at www.qld.gov.au. An ERA requires an environmental authority to operate. See www.business.qld.gov.au for further information.*

Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			

☐ Multiple ERAs are applicable to this development application and the details have been attached in a schedule to this development application.

Hazardous chemical facilities

23.2) Is this development application for a **hazardous chemical facility**?

☐ Yes – *Form 69: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application
☒ No

***Note**: See www.justice.qld.gov.au for further information.*

Clearing native vegetation

23.3) Does this development application involve **clearing native vegetation** that requires written confirmation the chief executive of the *Vegetation Management Act 1999* is satisfied the clearing is for a relevant purpose under section 22A of the *Vegetation Management Act 1999*?

☐ Yes – this development application is accompanied by written confirmation from the chief executive of the *Vegetation Management Act 1999* (s22A determination)
☒ No
***Note**: See www.qld.gov.au for further information.*

Environmental offsets

23.4) Is this development application taken to be a prescribed activity that may have a significant residual impact on a **prescribed environmental matter** under the *Environmental Offsets Act 2014*?

☐ Yes – I acknowledge that an environmental offset must be provided for any prescribed activity assessed as having a significant residual impact on a prescribed environmental matter
☒ No
***Note**: The environmental offset section of the Queensland Government's website can be accessed at www.qld.gov.au for further information on environmental offsets.*

Koala conservation

23.5) Does this development application involve a material change of use, reconfiguring a lot or operational work within an assessable development area under Schedule 10, Part 10 of the Planning Regulation 2017?

☐ Yes
☐ No
***Note**: See guidance materials at www.ehp.qld.gov.au for further information.*

Water resources

23.6) Does this development application involve **taking or interfering with artesian or sub artesian water, taking or interfering with water in a watercourse, lake or spring, taking overland flow water or waterway barrier works**?

☐ Yes – the relevant template is completed and attached to this development application
☒ No
***Note**: DA templates are available from www.dilgp.qld.gov.au.*

23.7) Does this application involve **taking or interfering with artesian or sub artesian water, taking or interfering with water in a watercourse, lake or spring, or taking overland flow water** under the *Water Act 2000*?

☐ Yes – I acknowledge that a relevant water authorisation under the *Water Act 2000* may be required prior to commencing development
☒ No
***Note**: Contact the Department of Natural Resources and Mines at www.dnrm.qld.gov.au for further information.*

Marine activities

23.8) Does this development application involve **aquaculture, works within a declared fish habitat area or removal, disturbance or destruction of marine plants?**

☐ Yes – an associated resource allocation authority is attached to this development application, if required under the *Fisheries Act 1994*
☒ No
***Note**: See guidance materials at www.daf.qld.gov.au for further information.*

Quarry materials from a watercourse or lake

23.9) Does this development application involve the **removal of quarry materials from a watercourse or lake** under the *Water Act 2000?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development
☒ No
***Note**: Contact the Department of Natural Resources and Mines at www.dnrm.qld.gov.au for further information.*

Quarry materials from land under tidal waters

23.10) Does this development application involve the **removal of quarry materials from land under tidal water** under the *Coastal Protection and Management Act 1995?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development

☒ No

***Note**: Contact the Department of Environment and Heritage Protection at www.ehp.qld.gov.au for further information.*

Referable dams

23.11) Does this development application involve a **referable dam** required to be failure impact assessed under section 343 of the *Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act)?

☐ Yes – the 'Notice Accepting a Failure Impact Assessment' from the chief executive administering the Water Supply Act is attached to this development application

☒ No

***Note**: See guidance materials at www.dews.qld.gov.au for further information.*

Tidal work or development within a coastal management district

23.12) Does this development application involve **tidal work or development in a coastal management district**?

☒ Yes – the following is included with this development application:

☒ Evidence the proposal meets the code for assessable development that is prescribed tidal work *(only required if application involves prescribed tidal work)*

☐ A certificate of title

☐ No

***Note**: See guidance materials at www.ehp.qld.gov.au for further information.*

Queensland and local heritage places

23.13) Does this development application propose development on or adjoining a place entered in the **Queensland heritage register** or on a place entered in a local government's **Local Heritage Register**?

☐ Yes – details of the heritage place are provided in the table below

☒ No

***Note**: See guidance materials at www.ehp.qld.gov.au for information requirements regarding development of Queensland heritage places.*

Name of the heritage place:		Place ID:	

Brothels

23.14) Does this development application involve a **material change of use for a brothel**?

☐ Yes – this development application demonstrates how the proposal meets the code for a development application for a brothel under Schedule 3 of the *Prostitution Regulation 2014*

☒ No

Decision under section 62 of the *Transport Infrastructure Act 1994*

23.15) Does this development application involve new or changed access to a state-controlled road?

☐ Yes - this application will be taken to be an application for a decision under section 62 of the *Transport Infrastructure Act 1994* (subject to the conditions in section 75 of the *Transport Infrastructure Act 1994* being satisfied)

☒ No

PART 8 – CHECKLIST AND APPLICANT DECLARATION

24) Development application checklist	
I have identified the assessment manager in question 15 and all relevant referral requirement(s) in question 17 ***Note**: See the Planning Regulation 2017 for referral requirements*	☒ Yes
If building work is associated with the proposed development, Parts 4 to 6 of *Form 2 – Building work details* have been completed and attached to this development application	☐ Yes ☒ Not applicable
Supporting information addressing any applicable assessment benchmarks is with development application ***Note**: This is a mandatory requirement and includes any relevant templates under question 23, a planning report and any technical reports required by the relevant categorising instruments (e.g. local government planning schemes, State Planning Policy, State Development Assessment Provisions). For further information, see DA Forms Guide: Planning Report Template.*	☒ Yes
Relevant plans of the development are attached to this development application ***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further*	☒ Yes

information, see DA Forms Guide: Relevant plans.	
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued *(see 21))*	☒ Yes ☐ Not applicable

25) Applicant declaration
☒ By making this development application, I declare that all information in this development application is true and correct ☒ Where an email address is provided in Part 1 of this form, I consent to receive future electronic communications from the assessment manager and any referral agency for the development application where written information is required or permitted pursuant to sections 11 and 12 of the *Electronic Transactions Act 2001* ***Note**: It is unlawful to intentionally provide false or misleading information.*
Privacy – Personal information collected in this form will be used by the assessment manager and/or chosen assessment manager, any relevant referral agency and/or building certifier (including any professional advisers which may be engaged by those entities) while processing, assessing and deciding the development application. All information relating to this development application may be available for inspection and purchase, and/or published on the assessment manager's and/or referral agency's website. Personal information will not be disclosed for a purpose unrelated to the *Planning Act 2016*, Planning Regulation 2017 and the DA Rules except where: • such disclosure is in accordance with the provisions about public access to documents contained in the *Planning Act 2016* and the Planning Regulation 2017, and the access rules made under the *Planning Act 2016* and Planning Regulation 2017; or • required by other legislation (including the *Right to Information Act 2009*); or • otherwise required by law. This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002.*

PART 9 – FOR OFFICE USE ONLY

Date received: | Reference number(s):

Notification of engagement of alternative assessment manager	
Prescribed assessment manager	
Name of chosen assessment manager	
Date chosen assessment manager engaged	
Contact number of chosen assessment manager	
Relevant licence number(s) of chosen assessment manager	

QLeave notification and payment *Note: For completion by assessment manager if applicable*	
Description of the work	
QLeave project number	
Amount paid ($)	
Date paid	
Date receipted form sighted by assessment manager	
Name of officer who sighted the form	

The *Planning Act 2016,* the Planning Regulation 2017 and the DA Rules are administered by the Department of Infrastructure, Local Government and Planning. This form and all other required development application materials should be sent to the assessment manager.

Attachment 2

Applicant Template Owners Consent (Company)

Company owner's consent to the making of a development application under the *Planning Act 2016*

I, Mark Hober

Director and Company Secretary of the company mentioned below.

Of Daintree Saltwater Barramundi Fish Farms Pty Ltd ACN 142 585 046

the company being the owner of the premises identified as follows:

Lot 3 SP292103

consent to the making of a development application under the *Planning Act 2016* by:

Daintree Saltwater Barramundi Fish Farms Pty Ltd [*Insert name of applicant.*]

on the premises described above for:

Material Change of Use for Aquaculture

Company Name and ACN:
Daintree Saltwater Barramundi Fish Farms Pty Ltd
ACN 142 585 046.....

.....
Signature of Director/Secretary

1ST. JUNE 2018.
.....
Date

Attachment 3

DA Form 1 Environmental Authority Application

Application form

Environmental Protection Act 1994

Development application Form 1 - Application details—attachment for an application for an environmental authority

This form is to be attached to the Development application Form 1 - Application details *when making a development application for prescribed environmentally relevant activities (ERAs). Under section 115 of the* Environmental Protection Act 1994 *(EP Act) the development approval application is taken to be an application for an environmental authority for the prescribed ERAs.*

It is recommended that prior to making an application for an environmentally relevant activity (ERA), you read the information on what to provide with an application. This information is located on the Business Queensland website (formerly the Queensland Government's Business and Industry Portal) at www.business.qld.gov.au (use the search term "Environmental licence"). This website also has a diagnostic tool called the "forms and fees finder" which will help identify any fees and supporting information you need to make an application.

Only use this application form if you are applying for a new environmental authority (EA) where:

- ☑ All applicants are registered suitable operators[1].
- ☑ The ERA/s being applied for do not form part of an ERA project under an existing EA.
- ☑ If more than one ERA is being applied for, the ERAs must be carried out as part of a single integrated operation:
  - the ERAs will be carried out under the day to day management of a single responsible individual (e.g. a site manager or operations manager); and
  - all of the ERAs are operationally interrelated, that is, the operation cannot function without all of the ERAs. Separate applications will need to be made for the ERAs that cannot be carried out as a single integrated operation; and
  - the ERA/s are, or will be, carried out at one or more places; and
  - the places where the ERAs will be carried out are close enough to make the integrated day to day management of the activities feasible.
- ☑ The ERA/s being applied for are prescribed under section 19 of the *Environmental Protection Act 1994* (EP Act).
- ☑ If any of the ERAs being applied for are to be carried out on a parcel of land within a state development area and a particular use for the parcel of land is not stated in the approved development scheme, you have applied for, or hold a current approval for the use under section 84(4)(b) of the *State Development and Public Works Organisation Act 1971.*
- ☑ The application is not to dredge or extract more than 10,000 tonnes of material a year in the North Stradbroke Island region.

[1] If you are not a registered suitable operator you cannot apply for a new environmental authority. To become a registered suitable operator apply online through Connect at www.ehp.qld.gov.au/connect or request the form "Application to be a registered suitable operator - ESR/2015/1771" by emailing palm@ehp.qld.gov.au or phoning 1300 130 372 (option 4).

Queensland Government

Privacy statement

Where ERAs are administered by the Queensland Government:

> The Department of Environment and Heritage Protection and Department of Agriculture and Fisheries are collecting the information on this form to process your application for an EA. The collection is authorised under Chapter 5 of the EP Act.
>
> Please note that the administering authority is required to keep this application on a register of documents open for inspection by members of the public under section 540 of the EP Act, and must permit a person to take extracts from the register pursuant to section 542 of the EP Act. Your personal information will not be otherwise disclosed to any other parties unless authorised or required by law. For queries about privacy matters please email privacy@ehp.qld.gov.au or telephone: 13 74 68.

Where ERAs are administered by a local government:

> Contact the local government for their privacy information.

Pre-lodgement meeting

If you would like to have a pre-lodgement meeting:

- for prescribed ERAs 2, 3 and 4—contact the Department of Agriculture and Fisheries by email at livestockregulator@daf.qld.gov.au
- for local government administered ERAs, contact the local government
- for any other ERA—please complete and lodge the form "Application for pre-lodgement services" (ESR/2015/1664[2]), prior to lodging this standard application for an environmental authority.

[2] This application form is available at www.qld.gov.au, using the publication number ESR/2015/1664 as a search term.

The fields marked with an asterisk * are mandatory, if they are not completed then your application may be considered not properly made under section 128 of the *Environmental Protection Act 1994*.

1. Applicant details

To nominate a site or application contact for this application please provide details at Questions 14 and 15.

Is there more than one applicant? *	☒ No—provide applicant's details below. ☐ Yes—provide the principal applicant's details below and all other applicants' details in Attachment 1—*"Joint applicants and appointment of principal applicant"*

Name - individual or contact person if applicant is a organisation* Mark Hober	Suitable Operator Reference Number* RSO001829
Organisation name, including any trading name (*if an organisation) Daintree Saltwater Barramundi Fish Farms Pty Ltd	ABN/ACN (*if an organisation) 142 585 046
Residential or registered business address (not a post office box)* Lot 3 Vixies Road WONGA BEACH QLD 4873	Phone* 07 40987259
Postal address (if same as above, write "AS ABOVE")* AS ABOVE	Facsimile 07 40987201
Email* info@daintreesaltwaterbarramundi.com.au	☒ Indicate if you want to receive correspondence via email

1.1 Nomination of an agent for this application

I/we nominate the below agent to act on my/our behalf and to receive correspondence relating to this application.

Do you want to nominate an agent for this application?* ☐ No → Go to *Question* **Error! Reference source not found.** ☒ Yes → Complete the agent's details here.	
Name of agent – individual or contact person if agent is an organisation Guy Chester	
Organisation name, including trading name if an organisation EcoSustainAbility Pty Lty	ABN/ACN (if an organisation) 098560126
Postal address PO Box 230 Yorkeys Knob QLD 4878	Phone 0407 391211
Email gcecosustainability@gmail.com	☐ Indicate if you do not want to receive correspondence via email

2. Details of the ERA(s) being applied for

Complete the table below by advising which ERA(s) you are applying for. If the ERA has eligibility criteria and standard conditions[3], identify whether you can comply with them. Select "N/A" where there are no eligibility criteria and standard conditions for that ERA. If you cannot comply with all of the applicable standard conditions, select "no" and attach details of the standard conditions you cannot comply with.

[3] ERAs with eligibility criteria and standard conditions are listed at: www.business.qld.gov.au (use the search term "eligibility criteria").

ERA number*	Threshold*	Name of ERA*	I can comply with the eligibility criteria*	I can comply with all the standard conditions*
1 (2)	(a)	Aquaculture	☒ Yes ☐ N/A	☒ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No
			☐ Yes ☐ N/A	☐ Yes ☐ No

☐ I have attached details of the standard conditions that I cannot comply with.

3. Description of land where the ERA/s will be carried out

Where activities will be undertaken at more than one location, provide details in Appendix 2.

Number*	Street Name*	Suburb/Town*	Postcode*
Lot 3	Vixies Road	WONGA BEACH	4873
Real Property Description*		Specific area within the location ie GPS or other descriptor*	
Lot 3 Plan SP292103			
Port (*if applicable)		Project Name (*if applicable)	

4. Details of contaminated land

Is there a site management plan in effect for contaminated land that relates to the land that is the subject of this application?*			
☒ No	Go to *Question 5*.		
☐ Yes	Description of land*		
	Lot and plan number(s)		Local Government Area*
	Lot	Plan	
	Lot	Plan	
	Lot	Plan	
	Lot	Plan	

5. Existing environmental authorities at the location

Do you have any existing environmental authorities at this location?*		
☒ No	Go to *Question 6.*	
☐ Yes	Existing EA number(s)*	Certification*
		☐ I certify that the ERA(s) being applied for do not form part of any existing environmental authority/ies

6. Other related approvals

To avoid the possibility of your environmental authority application being invalid, you need to ensure any other required applications have been made prior to lodging this application. If you are not sure what approvals are required you should contact the planning area of your local government authority or if the area is within a State development area, visit the Department of State Development website at: http://www.statedevelopment.qld.gov.au (search for state development area).

Are you required to obtain any of the following approvals to conduct the ERA(s)?* • e.g. An approval for the use of land under the *State Development and Public Works Organisation Act 1971*					
☐ No	Go to *Question 7*				
☒ Yes	Approval name*	Legislation*	Application number*	Date lodged*	Approval status*
	Material Change of Use				

7. Environmental offsets

An environmental offset, under the *Environmental Offsets Act 2014*, may be required for an ERA where, despite all reasonable measures to avoid and minimise impacts on certain environmental matters, there is still likely to be significant residual impact on one or more of those matters.
You must verify the presence, whether temporary or permanent, of those environmental matters. For more information refer to the Queensland Environmental Offsets Policy and the Siginifcant Residual Impact Guideline at the Queensland Government website at www.qld.gov.au, using the search term “environmental offsets”.

Will the ERA(s) being applied for result in a significant residual impact to a matter of State environmental significance (MSES)?*	
☒ No	Go to *Question 8*.
☐ Yes	You **must** attach supporting information that: 1. Details the magnitude and duration of the likely significant residual impact on each prescribed environmental matter (other than matters of local environmental significance) for the entire activity; and 2. Demonstrates that all reasonable measures to avoid and minimise impacts on each of those matters will be undertaken.

7.1 Notice of election

Has a notice of election been submitted to the administering authority, or is being submitted as part of this application?	
☒ No	Go to *Question 7.2*.
☐ Yes	☐ You can attach the notice of election, if it has not been submitted to the department. Go to *Question 7.3*.

7.2 Staged environmental offsets

Offset delivery can be staged, however for this to occur, the condition of any approved environmental authority needs to state that both the activity and the offset may be staged. As part of your notice of election for each stage under the *Environmental Offsets Act 2014*, you are required to provide a detailed assessment of the quantum of impact of that stage and the offset obligation requirement to be delivered for that stage.

Will the proposed ERA(s) and delivery of an environmental offset be undertaken in stages?	
☐ No	Go to *Question 7.3*

☐ Yes	You **must** attach supporting information that details of how the activity/activities are proposed to be staged.

7.3 Nature conservation environmental offset

Has another authority issued under the *Nature Conservation Act 1992* required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, MSES?	
☒ No	Go to *Question 7.4*
☐ Yes	Provide permit number:

7.4 Marine parks environmental offset

Has marine park permit issued under the *Marine Parks Act 2004* required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, MSES?	
☒ No	Go to *Question 8*
☐ Yes	☐ You **must** attach a copy of the marine park permit to this application.

8. Matters of national environmental significance

There are currently nine matters of national environmental significance (MNES) which have been defined in the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act). These are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development

To determine whether the proposed ERA(s) will have a significant impact on MNES and for referral requirements, please refer to the guidance provided by the Federal Government's Department of Environment on **www.environment.gov.au**.

Would the carrying out of the proposed ERA(s) be likely to have a significant impact on a MNES?*	
☒ No	Go to *Question 9*.
☐ Yes	Has the proposal been referred to the Federal Department of Environment for formal assessment and approval? ☐ No → Go to *Question 9.* ☐ Yes → Go to *Question 8.1*.

8.1 EPBC Act approval for environmental offsets

Has an approval issued under the EPBC Act required an environmental offset for the same, or substantially the same, impact and the same, or substantially the same, MSES?	
☐ No	Go to *Question 9*.
☐ Yes	I have attached a copy of the approval under the EPBC Act.
	Are there any MNES which were assessed under the EPBC Act which are the same, or substantially the same as an MSES, but that were not conditioned in the approval? ☐ No → Go to Question *9* ☐ Yes → List these MNES:

9. Environmental impact statement under the *State Development and Public Works Organisation Act 1971*

Certain stages of the EA application process may not apply if the proposed activities were assessed as part of a coordinated project declared under the *State Development and Public Works Organisation Act 1971* (State Development Act), you are only required to answer Questions 9 to 9.1 if you have a current CG's evaluation report for the project.

Has an environmental impact statement (EIS) process under State Development Act been completed?*	
☒ No	Go to *Question 10*.
☐ Yes	What is the title and project name of the completed EIS?*
	☐ The EIS was **completed for all activities** that are the subject of this application. ☐ The environmental risks or the way the activity/activities are proposed to be carried out **have not changed** since the EIS was completed. ☐ The environmental risks or the way the activity/activities are proposed to be carried out **have changed** since the EIS was completed.
	☐ The EIS was **not completed for all activities** that are the subject of this application. ☐ The environmental risks or the way the activity/activities are proposed to be carried out **have not changed** since the EIS was completed. ☐ The environmental risks or the way the activity/activities are proposed to be carried out **have changed** since the EIS was completed.
	Was the EIS completed for all activities that are the subject of this application?*
	☐ No — Please list the activities that were not included in the EIS or attach documentation with this information to this application: ☐ I have attached the required supporting information.
	☐ Yes

9.1 Coordinator-General's conditions

Are there CG's conditions that relate to the ERA(s) being applied for?*	
☐ No →	Go to *Question 10*.
☐ Yes →	Name of the CG's evaluation report:

10. Assessment of the environmental impact

This question is **not applicable if** an EIS process under the State Development Act has been completed for all the ERA(s) that are the subject of this application and the environmental risks of the activities **and** the way they are proposed to be carried out has not changed since the EIS was completed.
You must attach to this application an assessment of the likely impact of each ERA on environmental values (*if applicable), including:

- a description of the environmental values likely to be affected by each relevant activity
- details of any emissions or releases likely to be generated by each relevant activity
- a description of the risk and likely magnitude of impacts on the environmental values
- details of the management practices proposed to be implemented to prevent or minimise adverse impacts

- details of how the land the subject of the application will be rehabilitated after each relevant activity ceases

☒ I have attached an assessment of the environmental impact and specific supporting information.

11. Details of waste management

Describe the proposed measures for minimising and managing waste generated by the activity/ies below *
The psoposed development includes repurposing settlement poinds and drains into a wetland treatement system with primary settlement, wetland treatment and finals settlement/balancing storage. The proposal involves almost 50% recirculation of wastewater. Nutrient modelling has been undertaken and efficacy of proposed treatment sysetm assessed. The proposal is to have anet nutrient balance between intake and discharge waters such that there is no additional nutrient inpouts to the South Arm of the Daintree River.

☒ I have attached the proposed measures.

12. Take effect date (when fees will commence being charged)

You may nominate when the EA will take effect should it be approved. The date the environmental authority takes effect will be the date from which you can commence the activities as well as the date your annual fees will commence to be charged (your anniversary date). Under section 200 of the EP Act, if a development permit for a material change of use under the *Planning Act 2016* or a State development area (SDA) approval is required in order to carry out the ERA the EA cannot take effect until the development permit or SDA approval takes effect (known as taking effect pending development approval).

Do you want the EA to take effect on the decision date, nominated date, or pending development approval?*	
☒ Decision date	The take effect date will be the date of the decision.
☐ Nominated date	Details of nominated take effect date:

13. Nomination of site contact

An alternative contact nominated by the legal entity which holds, or will in future hold, a relevant authority issued by the department. The department may direct correspondence relating to actual or potential compliance matters to the site contact.

Do you want to nominate a site contact?*		☐ No ☒ Yes, provide details below
Title* Mr	First Name* Mark	Surname* Hober
Email Address* info@daintreesaltwaterbarramundi.com.au		☒ Indicate if you want to receive correspondence via email
Phone		

14. Nomination of application contact

An alternative contact nominated by the legal entity which has submitted, or will in future submit, applications to be assessed by the department. All departmental correspondence relating to the assessment of applications will be directed to the application contact, however, if the application results in the issuing of a relevant authority, the relevant authority will be sent to the applicant.

Name or Position*
Guy Chester
Primary Phone*
0407 391211
Secondary Phone
Email Address*
gcecosustainability@gmail.com

15. Applicant declaration

I declare that the information I have provided is true and correct. I understand that it is an offence under the *Environmental Protection Act 1994* to give information that I know is false, misleading or incomplete.
I will comply with all conditions on my environmental authority as well as any relevant provisions in the *Environmental Protection Act 1994*.
I understand that I am responsible for managing the environmental impacts of these activities, and that approval of this application is not an endorsement by the administering authority of the effectiveness of the management practices proposed or implemented.

Applicant's full name*	Applicant's position*
Mark Hober	Director and Company Secretary
Applicant's signature*	Date*
M. Hober.	1ST JUNE 2018.

Submit attachment, together with any additional information, with all relevant Development application Forms to the assessment manager for the development application.

Attachment 1

Joint applicants and appointment of principal applicant

We are joint applicants for this environmental authority application and hereby appoint _____ as the principal applicant to receive statutory documents relating to this application.

Name - individual or contact person if applicant is an organisation*	Suitable Operator Reference Number*
Organisation name, including trading name (*if an organisation)	ABN/ACN (*if an organisation)
Residential or registered business address (not a post office box)*	Phone*
Postal address (if same as above, state “AS ABOVE”) *	Facsimile
Email*	☐ Indicate if you want to receive correspondence via email
Signature*	Date*

Name - individual or contact person if applicant is an organisation*	Suitable Operator Reference Number*
Organisation name including trading name (*if an organisation)	ABN/ACN (*if an organisation)
Residential or registered business address (not a post office box)*	Phone*
Postal address (if same as above, state “AS ABOVE”)*	Facsimile
Email*	☐ Indicate if you want to receive correspondence via email
Signature*	Date*

Name - individual or contact person if applicant is an organisation*	Suitable Operator Reference Number*
Business name including trading name (*if an organisation)	ABN/ACN (*if an organisation)
Residential or registered business address (not a post office box)*	Phone*
Postal address (if same as above, state “AS ABOVE”)*	Facsimile
Email*	☐ Indicate if you want to receive correspondence via email
Signature*	Date*

Attachment 2

List of locations where the ERA(s) will be carried out.

Where there is more than one location list all locations and which ERA(s) will be conducted at each location.

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Number*	Street Name*	Suburb/Town*	Postcode*	ERA/s*
Real Property Description* Lot Plan		Specific area within the location ie GPS or other descriptor (*if applicable e.g. dredging)		

Attachment 4

Suitable Operator Daintree Saltwater Barramundi

Notice

Environmental Protection Act 1994

Decision on suitable operator application

This notice is issued by the chief executive pursuant to section 318I of the Environmental Protection Act 1994 *to advise you of a decision on an application for registration as a suitable operator*[1].

Daintree Saltwater Barramundi Fish Farms Pty Ltd
Lot 3 Vixies Road
WONGA BEACH QLD 4873

Email: info@daintreesaltwaterbarramundi.com.au

Our reference: RSO001829

Decision on suitable operator application

1. Suitable operator application details

Your application to become a registered suitable operator was received by the chief executive on 10/04/2018.

2. Decision

The chief executive has approved your application.

Your Suitable Operator Reference number is: RSO001829.

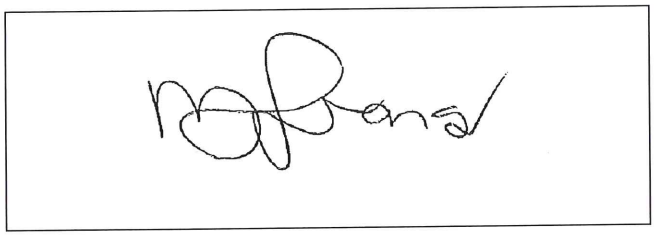
Now that you are a registered suitable operator, you will not need to re-apply for this registration when making an application for an environmental authority. However, you may be asked to quote your suitable operator reference number in correspondence or applications in relation to an environmental authority.

Your registered name, address and business number (if applicable) will be added to a register of suitable operators. This register will be made publicly available. You will remain listed on the register for five years after you cease to hold an environmental authority unless your registration is cancelled or suspended.

Should you have any questions about the notice, please contact Department of Environment and Heritage Protection on the details below.

Queensland Government

Notice



11th April, 2018

Date

Mark Franco
Delegate of chief executive
Department of Environment and Heritage Protection
Environmental Protection Act 1994

Enquiries:

Permit and Licence Management
Department of Environment and Heritage Protection
GPO Box 2454 Brisbane QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au

[1] The Director General of the Department of Environment and Heritage Protection is the chief executive under the *Environmental Protection Act 1994*.

ORIGINAL EHP-LAIS

Queensland Government ABN: 46 640 294 485

Department of Environment and Science

RECEIPT

Received from: Kent D Quinn No.: 4248716
ABN/Address: AR110084

Description	Qty	Unit Val	Extended	Discount	Ext Value	GST	Total Price
ENV AUTH APP TRANSFER FEE PRESC ERA	1	130.90	130.90	0.00	130.90		130.90

Date: 12/04/18 Time: 10:41	DVISA	130.90	Tot Value:		130.90
			GST:		0.00
Brch: dnrbris SPer: eaa			Tot Price:		130.90
			Tendered:		130.90
CYC: 184370 Reg: 92	Tendered	130.90	Change:		0.00

Cheques or other negotiable instruments accepted subject to clearance.

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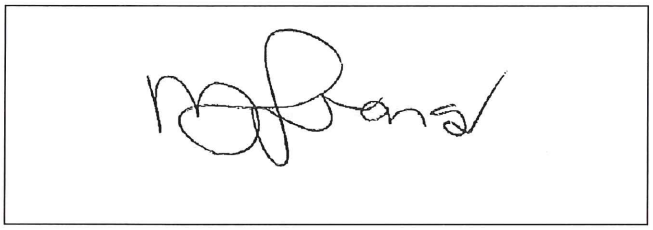

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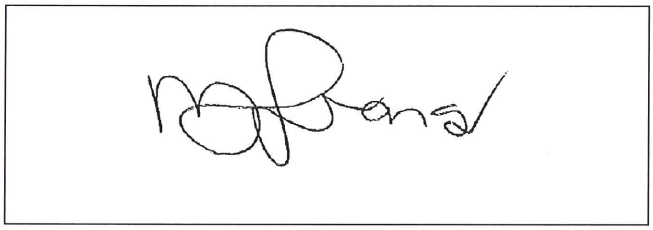

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Queensland Government

Attachment 5

SDAP v2.2 State Code 1

State code 1: Development in a state-controlled road environment

Table 1.2.1: Development in a state-controlled road environment

Performance outcomes	Acceptable outcomes	Comment
Buildings and structures		
PO1 The location of buildings, structures, infrastructure, services and utilities does not create a safety hazard in a state-controlled road, or cause damage to, or obstruct road transport infrastructure.	**AO1.1** Buildings, structures, infrastructure, services and utilities are not located in a state-controlled road. AND	Complies with PO1 and AO1.2. No buildings will be constructed as part of the proposal.
	AO1.2 Buildings, structures, infrastructure, services and utilities can be maintained without requiring access to a state-controlled road.	Complies with PO1 and AO1.2. No buildings will be constructed as part of the proposal.
PO2 The design and construction of buildings and structures does not create a safety hazard by distracting users of a state-controlled road.	**AO2.1** Facades of buildings and structures facing a state-controlled road are made of non-reflective materials. OR	Complies with PO2 and AO2.1. No buildings will be constructed as part of the proposal.
	AO2.2 Facades of buildings and structures do not reflect point light sources into the face of oncoming traffic on a state-controlled road. AND	Complies with PO2 and AO2.2. No buildings will be constructed as part of the proposal.
	AO2.3 External lighting of buildings and structures is not directed into the face of oncoming traffic on a state-controlled road and does not involve flashing or laser lights. AND	Complies with PO2 and AO2.3. No buildings will be constructed as part of the proposal. Any security lighting near the new ponds will face away from the state controlled road.
	AO2.4 Advertising devices visible from a state-controlled road are located and designed in accordance with the Roadside Advertising Guide, Department of Transport and Main Roads, 2013.	Complies with PO2 and AO2.4. No buildings will be constructed as part of the proposal.
PO3 Road, pedestrian and bikeway bridges over a state-controlled road are designed and constructed to prevent projectiles from being thrown onto a state-	**AO3.1** Road, pedestrian and bikeway bridges over a state-controlled road include throw protection screens in accordance with section 4.9.3 of the	Not Applicable (no bridges proposed).

Performance outcomes	Acceptable outcomes	Comment
controlled road.	Design Criteria for Bridges and Other Structures Manual, Department of Transport and Main Roads, 2014.	
Filling, excavation and retaining structures		
PO4 Filling and excavation does not interfere with, or result in damage to, infrastructure or services in a state-controlled road. Note: Information on the location of services and public utility plants in a **state-controlled road** can be obtained from the Dial Before You Dig service. Where development will impact on an existing or future service or public utility plant in a **state-controlled road** such that the service or public utility plant will need to be relocated, the alternative alignment must comply with the standards and design specifications of the relevant service or public utility provider, and any costs of relocation are to be borne by the developer. Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	No acceptable outcome is prescribed.	Not Applicable (no fill or excavation proposed or services in the state controlled road).
PO5 Filling, excavation, building foundations and retaining structures do not undermine, or cause subsidence of, a state-controlled road. Note: To demonstrate compliance with this performance outcome, it is recommended an RPEQ certified geotechnical assessment, prepared in accordance with the Road Planning and Design Manual 2nd Edition: Volume 3, Department of Transport and Main Roads, 2016, is provided. Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome and prepare a geotechnical assessment.	No acceptable outcome is prescribed.	Not Applicable (no fill or excavation proposed or services in the state controlled road).
PO6 Filling, excavation, building foundations and retaining structures do not cause ground water disturbance in a state-controlled road. Note: To demonstrate compliance with this performance outcome, it is recommended an RPEQ certified geotechnical assessment, prepared in accordance with the Road Planning and Design manual 2nd Edition: Volume 3, Department of Transport and Main Roads, 2016, is provided. Refer to the SDAP Supporting Information: Filling, excavation and	No acceptable outcome is prescribed.	Not Applicable (no fill or excavation proposed or services in the state controlled road).

Performance outcomes	Acceptable outcomes	Comment
retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome and prepare a geotechnical assessment.		
PO7 Excavation, boring, piling, blasting or fill compaction during construction of a development does not result in ground movement or vibration impacts that would cause damage or nuisance to a state-controlled road, road transport infrastructure or road works. Note: To demonstrate compliance with this performance outcome, it is recommended an RPEQ certified geotechnical assessment, prepared in accordance with Road Planning and Design Manual 2nd Edition: Volume 3, Department of Transport and Main Roads, 2016, is provided. Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome and prepare a geotechnical assessment.	No acceptable outcome is prescribed.	Complies with PO7.The excavation and fill proposed to build the new aquaculture ponds is downhill of the state controlled road and with sufficient buffer . There will not be any blasting. As the nearest construction of ponds are over 100m from the road, and most compaction will be by sheep's foot roller, with only small (handheld plant) used for localised compaction near culverts, there is not likely to be any resultant ground movement or vibration affects on the state controlled road.
PO8 Development involving the haulage of fill, extracted material or excavated spoil material exceeding 10,000 tonnes per year does not damage the pavement of a state-controlled road. Note: It is recommended a pavement impact assessment is provided. Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, and the Guide to Traffic Impact Assessment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome and prepare a pavement impact assessment.	**AO8.1** Fill, extracted material and spoil material is not transported to or from the development site on a state-controlled road.	Complies with PO8. Import of fill will be only during the construction phase and will be over many months. Trucks will be subject to normal load limits for the use of the road and will not damage the pavement of the state-controlled road. There is not likely to be any need to remove excavated material from the Lot 3.
PO9 Filling and excavation associated with the construction of vehicular access to a development does not compromise the operation or capacity of existing drainage infrastructure for a state-controlled road. Note: Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	No acceptable outcome is prescribed.	Complies with PO9. There will be no filling or excavation of the drainage structures on the state controlled road. The site is downstream of the state controlled road and there will be no construction within these drainage lines.

Performance outcomes	Acceptable outcomes	Comment
PO10 Fill material used on a development site does not result in contamination of a state-controlled road. Note: Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO10.1** Fill material is free of contaminants including acid sulfate content. Note: Soils and rocks should be tested in accordance with AS 1289.0 – Methods of testing soils for engineering purposes and AS 4133.0-2005 – Methods of testing rocks for engineering purposes. AND	Complies with PO10 and AO10.1. Imported fill will be tested prior to acceptance to ensure it is not PASS or AASS material and is free of heavy metal contaminants. The construction site is downstream of the state controlled road. The import and placement of fill material used will not result in contamination of the state-controlled road.
	AO10.2 Compaction of fill is carried out in accordance with the requirements of AS 1289.0 2000 – Methods of testing soils for engineering purposes.	Complies with PO10 and AO10.2. Imported fill will be compacted in accordance with AS1289 2000. The construction site is downstream of the state controlled road. The import and placement of fill material used will not result in contamination of the state-controlled road.
PO11 Filling and excavation does not cause wind-blown dust nuisance in a state-controlled road. Note: Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO11.1** Compaction of fill is carried out in accordance with the requirements of AS 1289.0 2000 – Methods of testing soils for engineering purposes. AND	Complies with PO11 and AO11.1. Imported fill will be conditioned (moistened) to achieve adequate compaction and impermeability in accordance with AS1289 2000 and the QLD Aquaculture Construction Containment Structures Guidelines. Filling and excavation will be managed to avoid dust and will not cause wind-blown dust nuisance in the state-controlled road.
	AO11.2 Dust suppression measures are used during filling and excavation activities such as wind breaks or barriers and dampening of ground surfaces.	Complies with PO11 and AO11.2. Imported fill will be conditioned (moistened) to achieve adequate compaction and impermeability in accordance with AS1289 2000 and the QLD Aquaculture Construction Containment Structures Guidelines. Excavated areas will be watered to reduce dust nuisance when required. Filling and excavation will be managed to avoid dust and will not cause wind-blown dust nuisance in the state-controlled road.
Stormwater and drainage		
PO12 Development does not result in an actionable nuisance, or worsening of, stormwater, flooding or drainage impacts in a state-controlled road. Note: Refer to the SDAP Supporting Information: Stormwater and drainage in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	No acceptable outcome is prescribed.	Complies with PO12. The construction site is downstream of the state controlled road. There is no impacts on the hydraulics of the drainage lines downstream of the state controlled road and the development of the aquaculture ponds will not have flooding impacts on state controlled road. Stormwater from the site goes downstream toward

Performance outcomes	Acceptable outcomes	Comment
		South Arm of the Daintree River.
PO13 Run-off from the development site is not unlawfully discharged to a state-controlled road. Note: Refer to the SDAP Supporting Information: Stormwater and drainage in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO13.1** Development does not create any new points of discharge to a state-controlled road. AND	Complies with PO12 and AO13.1. The proposed development does not create any new points of discharge to a state-controlled road.
	AO13.2 Stormwater run-off is discharged to a lawful point of discharge. Note: Section 3.4 of the Queensland Urban Drainage Manual, Department of Energy and Water Supply, 2013, provides further information on lawful points of discharge. AND	Complies with PO12 and AO13.2. The proposed development will discharge stormwater from the site at a lawful point of discharge into a tributary of South Arm Creek.
	AO13.3 Development does not worsen the condition of an existing lawful point of discharge to the state-controlled road.	Complies with PO12 and AO13.3. The proposed development does not worsen the condition of an existing lawful point of discharge to the state-controlled road.
PO14 Run-off from the development site during construction does not cause siltation of stormwater infrastructure affecting a state-controlled road. Note: Refer to the SDAP Supporting Information: Stormwater and drainage in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO14.1** Run-off from the development site during construction is not discharged to stormwater infrastructure for a state-controlled road.	Complies with PO14 and AO14.1 Run-off from the development site during construction will be discharged to a tributary of South Arm of the Daintree River, downstream of the state controlled road and will not be discharged to the stormwater infrastructure of the state-controlled road
Vehicular access to a state-controlled road		
PO15 Vehicular access to a state-controlled road that is a limited access road is consistent with government policy for the management of limited access roads. Note: Refer to the SDAP Supporting Information: Vehicular access to a state-controlled road, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO15.1** Development does not require new or changed access to a limited access road. Note: Limited access roads are declared by the transport chief executive under section 54 of the *Transport Infrastructure Act 1994* and are identified in the DA mapping system. OR	Complies with PO15 and AO15.1. Development does not require new or changed access to a limited access road.
	AO15.2 A new or changed access to a limited access road is consistent with the limited access policy for the state-controlled road. Note: Limited access policies for limited access roads declared under the *Transport Infrastructure Act 1994* can be obtained by contacting the relevant Department of Transport and Main Roads regional office. AND	N/A

Performance outcomes	Acceptable outcomes	Comment
	AO15.3 Where a new or changed access is for a service centre, access is consistent with the Service centre policy, Department of Transport and Main Roads, 2013 and the Access policy for roadside service centre facilities on limited access roads, Department of Transport and Main Roads, 2013, and the Service centre strategy for the state-controlled road. Note: The Service centre policy, Department of Transport and Main Roads, 2013, Access policy for roadside service centre facilities, Department of Transport and Main Roads, 2013 and the relevant Service centre strategy for a state-controlled road can be accessed by contacting the relevant Department of Transport and Main Roads regional office.	N/A
PO16 The location and design of vehicular access to a state-controlled road (including access to a limited access road) does not create a safety hazard for users of a state-controlled road or result in a worsening of operating conditions on a state-controlled road. Note: Where a new or changed access between the premises and a state-controlled road is proposed, the Department of Transport and Main Roads will need to assess the proposal to determine if the vehicular access for the development is safe. An assessment can be made by Department of Transport and Main Roads as part of the development assessment process and a decision under section 62 of *Transport Infrastructure Act 1994* issued. Refer to the SDAP Supporting Information: Vehicular access to a state-controlled road, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO16.1** Vehicular access is provided from a local road.	Complies with PO16 and AO16.1. Vehicular access is provided from a local road (Vixies Road)
	OR all of the following acceptable outcomes apply: **AO16.2** Vehicular access for the development is consistent with the function and design of the state-controlled road. AND	N/A
	AO16.3 Development does not require new or changed access between the premises and the state-controlled road. Note: A decision under section 62 of the *Transport Infrastructure Act 1994* outlines the approved conditions for use of an existing vehicular access to a **state-controlled road**. Current section 62 decisions can be obtained from the relevant Department of Transport and Main Roads regional office. AND	N/A
	AO16.4 Use of any existing vehicular access to the development is consistent with a decision under section 62 of the *Transport Infrastructure Act 1994*. Note: The development which is the subject of the application must be of an equivalent use and intensity for which the section 62 approval was issued and the section 62 approval must have been granted no more than 5 years prior to the lodgement of the application.	N/A

Performance outcomes	Acceptable outcomes	Comment
	AND	
	AO16.5 On-site vehicle circulation is designed to give priority to entering vehicles at all times so vehicles do not queue in a road intersection or on the state-controlled road.	N/A
Vehicular access to local roads within 100 metres of an intersection with a state-controlled road		
PO17 The location and design of vehicular access to a local road within 100 metres of an intersection with a state-controlled road does not create a safety hazard for users of a state-controlled road. Note: Refer to the SDAP Supporting Information: Vehicular access to a state-controlled road, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO17.1** Vehicular access is located as far as possible from the state-controlled road intersection. AND	Complies with PO17 and AO17.1. No new vehicular access is proposed, the existing approved vehicular access will be used. The development will only involve a few extra staff/contractors during operation and there are not likely to be any consequent traffic impacts on the state controlled road.
	AO17.2 Vehicular access is in accordance with parts, 3, 4 and 4A of the Road Planning and Design Manual, 2nd Edition: Volume 3, Department of Transport and Main Roads, 2016. AND	Complies with PO17 and AO17.1. No new vehicular access is proposed, the existing approved vehicular access will be used. The development will only involve a few extra staff/contractors during operation and there are nit likely to be any consequent traffic impacts on the state controlled road.
	AO17.3 On-site vehicle circulation is designed to give priority to entering vehicles at all times so vehicles do not queue in the intersection or on the state-controlled road.	Complies with PO17. No new vehicular access is proposed, the existing approved vehicular access will be used. The development will only involve a few extra staff/contractors during operation and there are nit likely to be any consequent traffic impacts on the state controlled road.
Public passenger transport infrastructure on state-controlled roads		
PO18 Development does not damage or interfere with public passenger transport infrastructure, public passenger services or pedestrian or cycle access to public passenger transport infrastructure and public	**AO18.1** Vehicular access and associated road access works are not located within 5 metres of existing public passenger transport infrastructure. AND	Complies with PO18 and AO18.1. Vehicular access and associated road access works are not located within 5 metres of existing public passenger transport infrastructure.

Performance outcomes	Acceptable outcomes	Comment
passenger services. Note: Refer to the SDAP Supporting Information: Vehicular access to a state-controlled road, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO18.2** Development does not necessitate the relocation of existing public passenger transport infrastructure. AND	Complies with PO18 and AO18.2. Development does not necessitate the relocation of existing public passenger transport infrastructure.
	AO18.3 On-site vehicle circulation is designed to give priority to entering vehicles at all times so vehicles using a vehicular access do not obstruct public passenger transport infrastructure and public passenger services or obstruct pedestrian or cycle access to public passenger transport infrastructure and public passenger services. AND	Complies with PO18 and AO18.3. Development does not do not obstruct public passenger transport infrastructure and public passenger services or obstruct pedestrian or cycle access to public passenger transport infrastructure and public passenger services.
	AO18.4 The normal operation of public passenger transport infrastructure or public passenger services is not interrupted during construction of the development.	Complies with PO18 and AO18.4. Development will not affect normal operation of public passenger transport infrastructure or public passenger services will not be interrupted during construction of the development.
Planned upgrades		
PO19 Development does not impede delivery of planned upgrades of state-controlled roads.	**AO19.1** Development is not located on land identified by the Department of Transport and Main Roads as land required for the planned upgrade of a state-controlled road. Note: Land required for the planned upgrade of a state-controlled road is identified in the DA mapping system. OR	Complies with PO19 and AO19.1. Development is not located on land identified by the Department of Transport and Main Roads as land required for the planned upgrade of a state-controlled road.
	AO19.2 Development is sited and designed so that permanent buildings, structures, infrastructure, services or utilities are not located on land identified by the Department of Transport and Main Roads as land required for the planned upgrade of a state-controlled road.	N/A

Performance outcomes	Acceptable outcomes	Comment
	OR all of the following acceptable outcomes apply: **AO19.3** Structures and infrastructure located on land identified by the Department of Transport and Main Roads as land required for the planned upgrade of a state-controlled road are able to be readily relocated or removed without materially affecting the viability or functionality of the development. AND	N/A
	AO19.4 Vehicular access for the development is consistent with the function and design of the planned upgrade of the state-controlled road. AND	N/A
	AO19.5 Development does not involve filling and excavation of, or material changes to, land required for a planned upgrade to a state-controlled road. AND	N/A
	AO19.6 Land is able to be reinstated to the pre-development condition at the completion of the use.	N/A
Network impacts		
PO20 Development does not result in a worsening of operating conditions on the state-controlled road network. Note: To demonstrate compliance with this performance outcome, it is recommended that an RPEQ certified traffic impact assessment is provided. Please refer to the Guide to Traffic Impact Assessment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	No acceptable outcome is prescribed.	Complies with PO20. Development is not located on land identified by the Department of Transport and Main Roads as land required for the planned upgrade of a state-controlled road.
PO21 Development does not impose traffic loadings on a state-controlled road which could be accommodated on the local road network.	**AO21.1** The layout and design of the development directs traffic generated by the development to the **local road** network.	Complies with PO21 and AO21.1. The layout and design of the development directs traffic generated by the development to the Vixies Road and local road network.
PO22 Upgrade works on, or associated with, a state-controlled road are built in accordance with	**AO22.1** Upgrade works required as a result of the development are designed and constructed in	N/A

Performance outcomes	Acceptable outcomes	Comment
Queensland road design standards.	accordance with the *Road Planning and Design Manual*, 2nd edition, Department of Transport and Main Roads, 2016. Note: Road works in a state-controlled road require approval under section 33 of the *Transport Infrastructure Act 1994* before the works commence.	

Table 1.2.2: Environmental emissions

Statutory note: Where a **state-controlled road** is co-located in the same transport corridor as a railway, the development should instead comply with table 2.2.2: Environmental emissions in State code 2: Development in a railway environment.

Refer to the SDAP Supporting Information: Environmental emissions in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with the performance outcomes in Table 1.2.2.

Performance outcomes	**Acceptable outcomes**	
Noise		
Accommodation activities		
PO23 Development involving an accommodation activity or land for a future accommodation activity minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in habitable rooms.	**AO23.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria at all facades of the building envelope: a. ≤60 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am ≤40 dB(A)) b. ≤63 dB(A) L_{10} (18 hour) façade corrected (measured L_{90} (8 hour) free field between 10pm and 6am >40 dB(A)) 2. in accordance with chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state-controlled road environment, Department of Transport and Main Roads, 2017. If the building envelope is unknown, the deemed-to-comply setback	N/A

Performance outcomes	Acceptable outcomes	
	distances for buildings stipulated by the local planning instrument or relevant building regulations should be used. In some instances, the design of noise barriers and mounds to achieve the noise criteria above the ground floor may not be reasonable or practicable. In these instances, any relaxation of the criteria is at the discretion of the Department of Transport and Main Roads.	
	OR all of the following acceptable outcomes apply: **AO23.2** Buildings which include a habitable room are setback the maximum distance possible from a state-controlled road or type 1 multi-modal corridor. AND	N/A
	AO23.3 Buildings are designed and oriented so that habitable rooms are located furthest from a state-controlled road or type 1 multi-modal corridor. AND	N/A
	AO23.4 Buildings (other than a relevant residential building or relocated building) are designed and constructed using materials which ensure that habitable rooms meet the following internal noise criteria: 1. ≤35 dB(A) L_{eq} (1 hour) (maximum hour over 24 hours). Note: Noise levels from a state-controlled road or type 1 multi-modal corridor are to be measured in accordance with AS1055.1–1997 Acoustics – Description and measurement of environmental noise. To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state controlled road environment, Department of Transport and Main Roads 2017. **Habitable rooms** of **relevant residential buildings** located within a **transport noise corridor** must comply with the Queensland Development Code MP4.4 Buildings in a transport noise corridor, Queensland Government, 2015. **Transport noise corridors** are mapped on the State Planning Policy interactive mapping system.	N/A

Performance outcomes	Acceptable outcomes	
PO24 Development involving an accommodation activity or land for a future accommodation activity minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in outdoor spaces for passive recreation.	**AO24.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria in **outdoor spaces for passive recreation**: a. ≤57 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight ≤45 dB(A)) b. ≤60 dB(A) L_{10} (18 hour) free field (measured L_{90} (18 hour) free field between 6am and 12 midnight >45 dB(A)) 2. in accordance with chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice – Volume 1 Road Traffic Noise, Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state controlled road environment, Department of Transport and Main Roads 2017 OR	N/A
	AO24.2 Each dwelling has access to an outdoor space for passive recreation which is shielded from a state-controlled road or type 1 multi-modal corridor by a building, solid gap-free fence, or other solid gap-free structure. AND	N/A
	AO24.3 Each dwelling with a balcony directly exposed to noise from a state-controlled road or type 1 multi-modal corridor has a continuous solid gap-free balustrade (other than gaps required for drainage purposes to comply with the Building Code of Australia).	N/A
Childcare centres and educational establishments		N/A
PO25 Development involving a:	**AO25.1** A noise barrier or earth mound is provided which is designed, sited and constructed:	N/A

Performance outcomes	Acceptable outcomes	
1. childcare centre; or 2. educational establishment minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in indoor education areas and indoor play areas.	1. to meet the following external noise criteria at all facades of the building envelope: a. ≤58 dB(A) L_{10} (1 hour) façade corrected (maximum hour during normal opening hours) 2. in accordance with chapter 7 – Integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state controlled road environment, Department of Transport and Main Roads 2017. If the building envelope is unknown, the deemed-to-comply setback distances for buildings stipulated by the local planning instrument or relevant building regulations should be used.	
	OR all of the following acceptable outcomes apply: **AO25.2** Buildings which include indoor education areas and indoor play areas are setback the maximum distance possible from a state-controlled road or type 1 multi-modal corridor. AND	N/A
	AO25.3 Buildings are designed and oriented so that indoor education areas and indoor play areas are located furthest from the state-controlled road or type 1 multi-modal corridor. AND	N/A
	AO25.4 Buildings are designed and constructed using materials which ensure indoor education areas and indoor play areas meet the following internal noise criteria: 1. ≤35 dB(A) L_{eq} (1 hour) (maximum hour during opening hours).	N/A

Performance outcomes	Acceptable outcomes	
	Note: Noise levels from a state-controlled road or type 1 multi-modal corridor are to be measured in accordance with AS1055.1–1997 Acoustics – Description and measurement of environmental noise. To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state controlled road environment, Department of Transport and Main Roads 2017.	
PO26 Development involving a: 1. childcare centre; or 2. educational establishment minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in outdoor education areas and outdoor play areas.	**AO26.1** A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria in each outdoor education area or outdoor play area: a. ≤63 dB(A) L_{10} (12 hour) free field (between 6am and 6pm) 2. in accordance with chapter 7 – Integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state controlled road environment, Department of Transport and Main Roads 2017. OR	N/A
	AO26.2 Each outdoor education area and outdoor play area is shielded from noise generated from a state-controlled road or type 1 multi-modal corridor by a building, solid gap-free fence, or other solid gap-free structure.	N/A
Hospitals		N/A
PO27 Development involving a hospital minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in patient care areas.	**AO27.1** Hospitals are designed and constructed using materials which ensure patient care areas meet the following internal noise criteria: 1. ≤35 dB(A) L_{eq} (1 hour) (maximum hour during	N/A

Performance outcomes	Acceptable outcomes	
	opening hours). Note: Noise levels from a state-controlled road or type 1 multi-modal corridor are to be measured in accordance with AS1055.1–1997 Acoustics – Description and measurement of environmental noise. To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the SDAP Supporting Information: Environmental emissions in a state controlled road environment, Department of Transport and Main Roads 2017.	
Vibration		
Hospitals		N/A
PO28 Development involving a hospital minimises vibration impacts from vehicles using a state-controlled road or type 1 multi-modal corridor in patient care areas.	**AO28.1** Hospitals are designed and constructed to ensure vibration in the treatment area of a patient care area does not exceed a vibration dose value of $0.1m/s^{1.75}$. AND	N/A
	AO28.2 Hospitals are designed and constructed to ensure vibration in the ward area of a patient care area does not exceed a vibration dose value of $0.4m/s^{1.75}$. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified vibration assessment report is provided.	
Air and light		
PO29 Development involving an accommodation activity minimises air quality impacts from a state-controlled road or type 1 multi-modal corridor in outdoor spaces for passive recreation.	**AO29.1** Each dwelling has access to an outdoor space for passive recreation which is shielded from a state-controlled road or type 1 multi-modal corridor by a building, solid gap-free fence, or other solid gap-free structure.	N/A
PO30 Development involving a: 1. childcare centre; or 2. educational establishment minimises air quality impacts from a state-controlled road or type 1 multi-modal corridor in outdoor education areas and outdoor play areas.	**AO30.1** Each outdoor education area and outdoor play area is shielded from a state-controlled road or type 1 multi-modal corridor by a building, solid gap-free fence, or other solid gap-free structure.	N/A

Performance outcomes	Acceptable outcomes	
PO31 Development involving an accommodation activity or hospital minimises lighting impacts from a state-controlled road or type 1 multi-modal corridor.	**AO31.1** Buildings for an accommodation activity or hospital are designed to minimise the number of windows or transparent/translucent panels facing a state-controlled road or type 1 multi-modal corridor. OR	N/A
	AO31.2 Windows facing a state-controlled road or type 1 multi-modal corridor include treatments to block light from a state-controlled road or type 1 multi-modal corridor.	N/A

Table 1.2.3: Development in a future state-controlled road environment

Performance outcomes	Acceptable outcomes	
PO32 Development does not impede delivery of a future state-controlled road.	**AO32.1** Development is not located in a future state-controlled road. OR	N/A
	AO32.2 Development is sited and designed so that permanent buildings, structures, infrastructure, services or utilities are not located in a future state-controlled road.	N/A
	OR all of the following acceptable outcomes apply: **AO32.3** Structures and infrastructure located in a future state-controlled road are able to be readily relocated or removed without materially affecting the viability or functionality of the development. AND	N/A
	AO32.4 Development does not involve filling and excavation of, or material changes to, a future state-controlled road. AND	N/A
	AO32.5 Land is able to be reinstated to the pre-development condition at the completion of the use.	N/A
PO33 Vehicular access to a future state-controlled road is located and designed to not create a safety hazard for users of a future state-controlled road or result in a worsening of operating conditions on a future state-controlled road.	**AO33.1** Development does not require new or changed access between the premises and a future state-controlled road. AND	N/A

Performance outcomes	Acceptable outcomes	
Note: Where a new or changed access between the premises and a future state-controlled road is proposed, the Department of Transport and Main Roads will need to assess the proposal to determine if the vehicular access for the development is safe. An assessment can be made by Department of Transport and Main Roads as part of the development assessment process and a decision under section 62 of *Transport Infrastructure Act 1994* issued.	**AO33.2** Vehicular access for the development is consistent with the function and design of the future state-controlled road.	N/A
PO34 Filling, excavation, building foundations and retaining structures do not undermine, or cause subsidence of, a future state-controlled road. Note: To demonstrate compliance with this performance outcome, it is recommended that an RPEQ certified geotechnical assessment is provided, prepared in accordance with the Road Planning and Design Manual, 2nd edition: Volume 3, Department of Transport and Main Roads, 2016. Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome and prepare a geotechnical assessment.	No acceptable outcome is prescribed.	N/A
PO35 Fill material from a development site does not result in contamination of land for a future state-controlled road. Note: Refer to the SDAP Supporting Information: Filling, excavation and retaining structures in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO35.1** Fill material is free of contaminants including acid sulfate content. Note: Soil and rocks should be tested in accordance with AS1289 – Methods of testing soils for engineering purposes and AS4133 2005 – Methods of testing rocks for engineering purposes. AND	N/A
	AO35.2 Compaction of fill is carried out in accordance with the requirements of AS1289.0 2000 – Methods of testing soils for engineering purposes.	N/A
PO36 Development does not result in an actionable nuisance, or worsening of, stormwater, flooding or drainage impacts in a future state-controlled road. Note: Refer to the SDAP Supporting Information: Stormwater and drainage in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	No acceptable outcome is prescribed.	N/A

Performance outcomes	Acceptable outcomes	
PO37 Run-off from the development site is not unlawfully discharged to a future state-controlled road. Note: Refer to the SDAP Supporting Information: Stormwater and drainage in a state-controlled road environment, Department of Transport and Main Roads, 2017, for further guidance on how to comply with this performance outcome.	**AO37.1** Development does not create any new points of discharge to a future state-controlled road. AND	N/A
	AO37.2 Stormwater run-off is discharged to a lawful point of discharge. Note: Section 3.4 of the Queensland Urban Drainage Manual, Department of Energy and Water Supply, 2013, provides further information on lawful points of discharge. AND	N/A
	AO37.3 Development does not worsen the condition of an existing lawful point of discharge to the future state-controlled road.	N/A

Attachment 6

SDAP v2.2 State Code 8

State code 8: Coastal development and tidal works

Table 8.2.1: All development

Performance outcomes	Acceptable outcomes	Response
Development in the erosion prone area		
PO1 Development does not occur in the erosion prone area unless the development: is one of the following types of development: coastal-dependent development; or temporary, readily relocatable or able to be abandoned; or essential community infrastructure; or redevelopment of an existing permanent building or structure that cannot be relocated or abandoned; and cannot feasibly be located elsewhere.	No acceptable outcome is prescribed.	Complies with PO1. The expansion of the aquaculture production ponds within the footprint of the existing approved aquaculture facility cannot feasibly be undertaken elsewhere by Daintree Saltwater Barramundi. The operation of the aquaculture requires access to saltwater intake. NOTE: Whilst Lot 3 is within the mapped erosion prone area it is more than 1 km from the beach and with five cheniers (relict dunes not part of the active coastal processes) and with residential blocks, a road (South Arm Drive) and mapped future residential land to seaward.
PO2 Development other than coastal protection work: avoids impacting on coastal processes; and ensures that the protective function of landforms and vegetation is maintained. Note: In considering reconfiguring a lot applications, the state may require land in the erosion prone area to be surrendered to the State for coastal management purposes under the *Coastal Protection and Management Act 1995*. Where the planning chief executive receives a copy of a land surrender requirement or proposed land surrender notice under the *Coastal Protection and Management Act 1995*, this must be considered in assessing the application.	No acceptable outcome is prescribed.	Complies with PO2. The expansion of the aquaculture production ponds within the footprint of the existing approved aquaculture facility is within existing bunded ponds removed from coastal processes. No landforms or vegetation outside of this area will be affected. The proposal has been designed to avoid impacting on coastal processes. The proposal has been designed to ensure that the protective function of landforms and vegetation is maintained.

Performance outcomes	Acceptable outcomes	Response
PO3 Development is located, designed and constructed to minimise the impacts from coastal erosion by: locating the development as far landward as practicable; or where it is demonstrated that 1 is not feasible, mitigate or otherwise accommodate the risks posed by coastal erosion.	No acceptable outcome is prescribed.	Complies with PO3. Whilst Lot 3 is within the mapped erosion prone area it is more than 1 km from the beach and with five cheniers (relict dunes not part of the active coastal processes) and with residential blocks, a road (South Arm Drive) and mapped future residential land to seaward. There are negligible risks posed by coastal; erosion.
PO4 Development does not significantly increase the risk or impacts to people and property from coastal erosion.	No acceptable outcome is prescribed.	Complies with PO4. Whilst Lot 3 is within the mapped erosion prone area it is more than 1 km from the beach and with five cheniers (relict dunes not part of the active coastal processes) four swale drainage lines, residential blocks, a road (South Arm Drive) and mapped future residential land to seaward. The development does not significantly increase the risk or impacts to people and property from coastal erosion.
PO5 Development other than coastal protection work avoids directly or indirectly increasing the severity of coastal erosion either on or off the site.	No acceptable outcome is prescribed.	Complies with PO4. The development does not directly or indirectly increase the severity of coastal erosion either on or off the site.
PO6 In areas where a coastal building line is present, building work is located landward of the coastal building line unless coastal protection work has been constructed to protect the development.	No acceptable outcome is prescribed.	N/A
Artificial waterways		
PO7 Development of artificial waterways, canals and dry-land marinas minimises impacts on coastal resources by: maintaining the tidal prism volume of the natural waterway to which it is connected demonstrating a whole-of-life strategy for the disposal of dredged material.	No acceptable outcome is prescribed.	N/A
Coastal protection work		

Performance outcomes	Acceptable outcomes	Response
PO8 Works for beach nourishment minimise adverse impacts on coastal processes and avoid any increase in the severity of erosion on adjacent land by: sourcing sand from an area that does not adversely impact on the active beach system ensuring imported sand is compatible with natural beach sediments and coastal processes of the receiving beach.	No acceptable outcome is prescribed.	N/A
PO9 Erosion control structures are only constructed where there is an imminent threat to buildings or infrastructure of value, and there is no feasible option for either: beach nourishment; or relocation or abandonment of structures. Statutory Note: The monetary value of buildings or infrastructure should be more than the cost of associated erosion control structures.	No acceptable outcome is prescribed.	N/A
PO10 Erosion control structures minimise interference with coastal processes, or any increase to the severity of erosion on adjacent land by: locating the erosion control structure as far landward as practicable and directly adjacent to the structure it is intended to protect where required and feasible, importing sand to the site to mitigate any increase in the severity of erosion the design of the structure.	No acceptable outcome is prescribed.	N/A
Water quality		
PO11 Development: maintains or enhances environmental values of receiving waters achieves the water quality objectives of Queensland waters avoids the release of prescribed water contaminants to tidal waters. Note: See Environmental Protection (Water) Policy 2009 for the relevant water quality objectives.	No acceptable outcome is prescribed.	Complies with PO11. See section 10.7 of MCU Application report. Discharge will have net nutrient balance with the intake waters. In addition, maximum contaminant concentrations at any one time are proposed to ensure. The water quality objectives will be maintained.
Category C and R areas of vegetation		

Performance outcomes	Acceptable outcomes	Response
PO12 Development: avoids impacts on category C areas of vegetation and category R areas of vegetation; or minimises and mitigates impacts on category C areas of vegetation and category R areas of vegetation after demonstrating avoidance is not reasonably possible.	No acceptable outcome is prescribed.	Complies with PO12. There is category R vegetation along the drain/waterway along the eastern boundary. The vegetation along the waterway will not be affected by the construction of aquaculture production ponds within the existing bunded settlement ponds 1 and 2. There is category R vegetation along the drain/waterway within the western boundary of Lot 3. The vegetation along the waterway will not be affected by the construction of aquaculture production ponds within the existing bunded settlement pond 1. Specific protection measures out outlined in Section 4.5 of the MCU Application Report. To avoid any doubt, with the protection measures proposed, impacts on the category R vegetation is unlikely.
Public use of and access to state coastal land		
PO13 Development maintains or enhances public use of and access to and along state coastal land (except where this is contrary to the protection of coastal resources or public safety).	No acceptable outcome is prescribed.	N/A
PO14 Private marine development ensures that works: are used for marine access purposes only minimise the use of state coastal land do not interfere with access between navigable waterways and adjacent properties.	No acceptable outcome is prescribed.	N/A
PO15 Development ensures erosion control structures are located within the premises they are intended to protect unless there is no feasible alternative.	No acceptable outcome is prescribed.	N/A
Matters of state environmental significance		

Performance outcomes	Acceptable outcomes	Response
PO16 Development: avoids impacts on matters of state environmental significance; or minimises and mitigates impacts on matters of state environmental significance after demonstrating avoidance is not reasonably possible; and provides an offset if, after demonstrating all reasonable avoidance, minimisation and mitigation measures are undertaken, the development results in an acceptable significant residual impact on a matter of state environmental significance. Statutory note: For Brisbane core port land, an offset may only be applied to development on land identified as E1 Conservation/Buffer, E2 Open Space or Buffer/Investigation in the Brisbane Port LUP precinct plan. For the Brisbane Port LUP, see **www.portbris.com.au**. Note: Guidance for determining if the development will have a significant residual impact on the matter of state environmental significance is provided in the Significant Residual Impact Guideline, Department of State Development, Infrastructure and Planning, 2014. Where the significant residual impact is considered an acceptable impact on the matter of state environmental significance and an offset is considered appropriate, the offset should be delivered in accordance with the *Environmental Offsets Act 2004*.	No acceptable outcome is prescribed.	Complies with PO16. Refer to the discussion outlined in Sections 8 and 9 of the MCU Application Report. The approach is to ensure there is no disturbance or impact upon matters of state environmental significance by adopting best practice mitigation strategies such as erosion and sediment control and acid sulfate soils management. It is concluded that the proposed action is UNLIKELY to have a significant residual impact as: • The proposal does not involve clearing or disturbance of the of concern regulated vegetation and essential habitat which is on site. • The proposal does not involve clearing or disturbance of the wetland and watercourse vegetation on site. • The permanent removal of marine plants will be limited to a few individuals on the inner bund of settlement pond 2 and less than 25m^2. Further the proposal involves various protection and mitigation strategies to ensure there are no impacts or disturbance to the matters of state environmental significance conservation values during construction and ongoing operation. To avoid any doubt, as the proposal has been designed and planned to not have any disturbance of MSES and therefore no significant residual impact, a formal offset is not offered.

Table 8.2.2: All operational work

Performance outcomes	Acceptable outcomes	Response
Private marine development		
PO17 Private marine development does not require the construction of coastal protection work, shoreline or riverbank hardening or dredging for marine access purposes.	No acceptable outcome is prescribed.	N/A
Disposal of solid waste or dredged material from artificial waterways		
PO18 Solid waste from land and dredged material from artificial waterways is not disposed of in tidal water unless it is for beneficial reuse.	No acceptable outcome is prescribed.	N/A
Disposal of dredged material other than from artificial waterways		
PO19 Dredged material is returned to tidal water where this is needed to maintain coastal processes and sediment volume.	No acceptable outcome is prescribed.	N/A
PO20 Where it is not needed to maintain coastal processes and sediment volume, the quantity of dredged material disposed to tidal water is minimised through beneficial reuse or disposal on land.	No acceptable outcome is prescribed.	N/A
All dredging and any disposal of dredged material in tidal water		
PO21 All dredging and any disposal of dredged material in tidal water is: demonstrated to be safe with regard to protection of the marine environment and by meeting the National Assessment Guidelines for Dredging 2009, Department of Environment and Energy, 2009, or later version; and supported by a monitoring and management plan that protects the marine environment and that complies with the National Assessment Guidelines for Dredging 2009, Department of Environment and Energy, 2009, or later version.	No acceptable outcome is prescribed.	N/A

Performance outcomes	Acceptable outcomes	Response
Reclamation		
PO22 Development does not involve reclamation of land below tidal water, other than for the purposes of: coastal-dependent development, public marine development or community infrastructure; or strategic ports, priority ports, boat harbours or strategic airports and aviation facilities, in accordance with a statutory land use plan or master plan, where there is a demonstrated net benefit for the state or region and no feasible alternative exists; or coastal protection work or work necessary to protect coastal resources or coastal processes.	No acceptable outcome is prescribed.	Complies with PO22. All proposed development is within the existing bunded settlement ponds and within the footprint of previous disturbance. There is no reclamation.

Table 8.2.3: Operational work which is not assessed by local government

Performance outcomes	Acceptable outcomes	Response
PO23 Works are located and designed such that they continue to operate safely during and following a defined storm tide event.	AO23.1 Tidal work is designed and located in accordance with the Guideline: Building and engineering standards for tidal works, Department of Environment and Heritage Protection, 2017.	Complies with PO23. The new aquaculture ponds will have a top of bank of 3.9m AHD. The storm tide level is 2.8m AHD (Wonga Beach, outside wave effects zone). The bunds on the Primary Settlement Pond, Treatment Wetland and Final Settlement/Balancing Storage at 2.0-2.7 m AHD. These settlement and treatment ponds can be overtopped without impact and without any safety issues. They can go back into functionality immediately after a storm tide event.

Attachment 7

SDAP v2.2 State Code 9

State code 9: Great Barrier Reef wetland protection areas

Table 9.2.1: All development

General		
PO1 Development is not carried out in a wetland in a wetland protection area.	No acceptable outcome is prescribed.	Complies with PO1 The proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds. The development is not within the wetland protection area to the west of proposed ponds 24,25 and 27. Specific protection measures are proposed to ensure there a no impacts on the wetland (see Section 4.5 of the MCU Application Report), these include: An undisturbed 2m bench along the existing bund. Silt fence and erosion control during construction of the new pond bund. Immediate erosion stabilisation/revegetation of the new pond bund. Ensuring the existing bund demarks all disturbance during construction (i.e a hard boundary). Offsite discharge will be to the tributary of South Arm to the east of the site and hence not through the wetland. NOTE: Given the hard disturbance boundary and constraining the development to within the existing bunded area (which has been previously cleared and drained) a buffer is not proposed.
PO2 Development provides an adequate buffer surrounding a wetland to: maintain and protect wetland environmental values; and avoid adverse impacts on native vegetation within the wetland and the buffer.	AO2.1 The buffer surrounding a wetland has a minimum width of: 200 metres, where the wetland is located outside a prescribed urban area; or 50 metres, where the wetland is located within a prescribed urban area.	Complies with PO2 as the proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds., the protection measures described above (and refer to Section 4.5 of the MCU Application Report) will ensure that wetland the development maintain**s** and protect**s** wetland environmental values; and

		avoids adverse impacts on native vegetation within the wetland**.** NOTE: Given the hard disturbance boundary and constraining the development to within the existing bunded area (which has been previously cleared and drained) a buffer is not proposed.
Hydrology		
PO3 Development enhances or avoids adverse impacts on the existing surface and groundwater hydrology in a wetland protection area, and, where adverse impacts cannot be reasonably avoided, impacts are mitigated.	No acceptable outcome is prescribed.	Complies with PO3. Given the ponds are to be constructed within the existing bunded settlement ponds, the development has been designed to avoid adverse impacts on the existing surface and groundwater hydrology in the wetland protection area.
Water quality		
PO4 Development avoids adverse impacts to the water quality of the wetland in the wetland protection area and in the wetland buffer and where adverse impacts cannot be reasonably avoided, impacts are mitigated.	No acceptable outcome is prescribed.	Complies with PO4 The proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds. The development is not within the wetland protection area to the west of proposed ponds 24,25 and 27. Specific protection measures are proposed to ensure there a no impacts on the wetland (see Section 4.5 of the MCU Application Report), these include: An undisturbed 2m bench along the existing bund. Silt fence and erosion control during construction of the new pond bund. Immediate erosion stabilisation/revegetation of the new pond bund. Ensuring the existing bund demarks all disturbance during construction (i.e a hard boundary). Offsite discharge will be to the tributary of South Arm to the east of the site and hence not through the wetland. NOTE: Given the hard disturbance boundary and constraining the development to within the existing

		bunded area (which has been previously cleared and drained) a buffer is not proposed.
PO5 Development does not use the wetland in the wetland protection area for stormwater treatment.	No acceptable outcome is prescribed.	Complies with PO5. Stormwater discharge will not be through the wetland protection area.
Land degradation		
PO6 Development avoids land degradation in the wetland protection area and, where land degradation cannot be reasonably avoided, it is mitigated.	No acceptable outcome is prescribed.	Complies with PO6. The proposed development is entirely within the footprint of disturbance of the existing bunded settlement ponds. The development is not within the wetland protection area to the west of proposed ponds 24,25 and 27. Specific protection measures are proposed to ensure there a no impacts on the wetland (see Section 4.5 of the MCU Application Report), these include: An undisturbed 2m bench along the existing bund. Silt fence and erosion control during construction of the new pond bund. Immediate erosion stabilisation/revegetation of the new pond bund. Ensuring the existing bund demarks all disturbance during construction (i.e a hard boundary). Offsite discharge will be to the tributary of South Arm to the east of the site and hence not through the wetland.
Vegetation		
PO7 Development outside the wetland and its buffer: avoids impacts on category C areas of vegetation and category R areas of vegetation; or minimises and mitigates impacts on category C areas of vegetation and category R areas of vegetation after demonstrating avoidance is not reasonably possible.	No acceptable outcome is prescribed.	Complies with PO7. The development avoids and will not impact upon Category R areas.
Fauna management		
PO8 Development:	No acceptable outcome is prescribed.	Complies with PO8. The proposed development has

protects wetland fauna from any impacts associated with noise, light or visual disturbance protects the movement of wetland fauna within and through a wetland protection area; and does not introduce pest plants, pest animals or exotic species into a wetland and its buffer.		been designed to ensure the ongoing protection of wetland fauna from any impacts associated with noise, light or visual disturbance. The proposal does not affect the movement of wetland fauna within and through a wetland protection area; and does not introduce pest plants, pest animals or exotic species into a wetland and its buffer. Refer to Sections 4, 6, 8 and 9 of the MCU Application Report.
Matters of state environmental significance		
PO9 Development outside the wetland: avoids impacts on matters of state environmental significance; or minimises and mitigates impacts on matters of state environmental significance after demonstrating avoidance is not reasonably possible; and provides an offset if, after demonstrating all reasonable avoidance minimisation and mitigation measures are undertaken, the development results in an acceptable significant residual impact on a matter of state environmental significance. Note: Guidance for determining if the development will have a significant residual impact on the matter of state environmental significance is provided in the Significant Residual Impact Guideline, Department of State Development, Infrastructure and Planning, 2014. Where the significant residual impact is considered an acceptable impact on the matter of state environmental significance and an offset is considered appropriate, the offset should be delivered in accordance with the *Environmental Offsets Act 2004.*	No acceptable outcome is prescribed.	Complies with PO16. Refer to the discussion outlined in Sections 8 and 9 of the MCU Application Report. The approach is to ensure there is no disturbance or impact upon matters of state environmental significance by adopting best practice mitigation strategies such as erosion and sediment control and acid sulfate soils management. It is concluded that the proposed action is UNLIKELY to have a significant residual impact as: • The proposal does not involve clearing or disturbance of the of concern regulated vegetation and essential habitat which is on site. • The proposal does not involve clearing or disturbance of the wetland and watercourse vegetation on site. • The permanent removal of marine plants will be limited to a few individuals on the inner bund of settlement pond 2 and less than 25m^2. Further the proposal involves various protection and mitigation strategies to ensure there are no impacts or disturbance to the matters of state environmental significance conservation values during construction and ongoing operation. To avoid any doubt, as the proposal has been designed and planned to not have any disturbance of MSES and therefore no significant residual impact, a formal offset is not offered.

Attachment 8

SDAP v2.2 State Code 11

State code 11: Removal, destruction or damage of marine plants

Table 11.2.2: Operational works

Performance outcomes	Acceptable outcomes	Response
All development		
PO1 There is a demonstrated need for the development, and alternatives (locations and designs) which do not involve removal, destruction or damage of marine plants and impacts to fisheries resources and fish habitats are not viable.	For development associated with a public health or safety purpose: AO1.1 Development is for: signage or aids to warn the public of a safety hazard (for example, within a waterway to warn of submerged rocks, crocodiles, marine stingers); or prevention of an impending public safety issue; or the mitigation of a hazard to public safety that has resulted from a specific unforeseen event (for example, a fallen tree that is a danger to safe navigation); or placement of a cyclone mooring identified under a cyclone contingency plan by the harbour master or controlling port authority, and is located in accordance with the plan; or a public health purpose that has been endorsed in writing by Queensland Health or the relevant local government. For any other development, no acceptable outcome is prescribed. Note: The application should identify and document the impacts of alternative proposals.	Complies with PO1. The construction of new aquaculture ponds within the footprint of existing settlement ponds 1 and 2 will involve removal of a few *Excoecaria agallocha* isolated individuals growing on the margins of the settlement pond 2. This will be a total of less than 25m^2, therefore no likely significant residual impact. See Section 3 of the MCU Application, Appendix 7 includes the marine plants surveys. Existing settlement pond 3 will be managed as a treatment wetland. It does have marine plants within, but these will not be cleared, damaged or disturbed. rather they will have a more (nutrient rich) constant saline flow which may encourage more recruitment and productivity. This pond has no connection to fisheries habitat owing to the bunds, there are presently no crab burrows. To avoid any doubt the design, construction and operation has been planned to ensure the avoidance of impacts on marine plants.

Performance outcomes	Acceptable outcomes	Response
PO2 Only those aspects of a development that have a functional requirement to be located on tidal land create the requirement to remove, destroy or damage marine plants. Ancillary elements (for example: car and trailer parks, rest rooms, offices) occur outside of tidal land. Note: Tidal land within the development site should be accurately identified on plans provided with the application, together with the location of highest astronomical tide, mean high water spring and mean low water spring tide heights. The extent, location, species and condition of marine plants that are proposed for removal, damage or destruction and retained have been clearly and accurately identified and mapped to enable risks and impacts to be properly assessed.	No acceptable outcome is prescribed.	Complies with PO2. The only disturbance of tidal land will be the construction of the discharge point being a weir outlet and erosion protection on the outlet side. See Section 3 for a map of marine plants and for the location of tidal planes on the site.
PO3 Development impacting marine plants: directly abuts land that has full riparian access rights; or provides a public facility. Note: Further guidance on rights in context of fisheries resources and fish habitats is provided in the operational policy provisions of Management and protection of marine plants and other tidal fish habitats (FHMOP 001), Department of Primary Industries and Fisheries, 2007. The provision of owners consent to lodge the development application does not confer rights.	No acceptable outcome is prescribed.	Complies with PO3. The proposed development has been planned to ensure that the construction will not have any significant residual impact on marine plants.
PO4 The spatial extent of disturbance to marine plants is minimised. Note: For more information, refer to relevant fish habitat management operational policies and fish habitat guidelines:	For work associated with private development that is a jetty, pontoon or boat ramp only: AO4.1 Only one structure adjoins the property. Note: A structure includes boat ramps, jetties and pontoons	Complies with PO4 and AO4.1. The construction of new aquaculture ponds within the footprint of existing settlement ponds will not involve significant removal, destruction or damage of marine plants. See Section 3 and 4 of the MCU Application, Appendix 7 includes the marine plants surveys. Existing settlement pond 3 will be managed as a

Performance outcomes	Acceptable outcomes	Response
Management and protection of marine plants and other tidal fish habitats (FHMOP 001), Department of Primary Industries and Fisheries, 2007 Tidal fish habitats, erosion control and beach replenishment (FHMOP 010), Department of Primary Industries and Fisheries, 2007 Dredging, extraction and spoil disposal activities (FHMOP 004), Department of Primary Industries, 1998 Departmental procedures for permit applications assessment and approvals for insect pest control in wetlands (FHMOP 003), Department of Primary Industries, 1996 Fisheries guidelines for fish-friendly structures (FHG 006), Department of Primary Industries and Fisheries, 2006.	AND	treatment wetland. It does have marine plants within, but these will not be cleared, damaged or disturbed. rather they will have a more (nutrient rich) constant saline flow which may encourage more recruitment and productivity.
	AO4.2 The extent of marine plants removed, damaged or destroyed does not exceed two metres along the waterway frontage (width). AND	Complies with PO4 and AO4.2. The construction of new aquaculture ponds within the footprint of existing settlement ponds will not involve significant removal, destruction or damage of marine plants.
	AO4.3 The long-term use and and operability of the development will not result in ongoing adverse impacts or new adverse impacts or additional development. For example, a proposed jetty will not result in the need to dredge navigation access to the development in the future.	Complies with PO4 and AO4.3. The construction of new aquaculture ponds within the footprint of existing settlement ponds will not involve the significant removal, destruction or damage of marine plants. NOTE: Some removal of mangrove seedlings in accordance with the existing permit (Appendix 4A) may be necessary in the long term. This will not involve any greater disturbance than what is already permitted.
	AND one of the following acceptable outcomes apply AO4.4 The extent of marine plant removal, damage or destruction for a jetty or pontoon development has a maximum: area of 30 square metres; and width of two metres along the shoreline (highest astronomical tide); and length of 15 metres from highest astronomical tide (measured perpendicular to the shore). OR	N/A
	AO4.5 The boat ramp development has a maximum development footprint of 45 square metres. For any other development, no acceptable outcome is prescribed.	N/A

Performance outcomes	Acceptable outcomes	Response
PO5 The timing of works avoids marine plant flowering, fish spawning and fish migration periods.	No acceptable outcome is prescribed.	Complies with PO5. There will be no, destruction of marine plants communities or disturbance of fisheries habitat.
PO6 Development of or adjacent to, fish habitats avoids the unnecessary loss, degradation or fragmentation of fish habitats and their values and the loss of fish movement. Note: For more information, refer to relevant fish habitat management operational policies and fish habitat guidelines: Management and protection of marine plants and other tidal fish habitats (FHMOP 001), Department of Primary Industries and Fisheries, 2007 Tidal fish habitats, erosion control and beach replenishment (FHMOP 010), Department of Primary Industries and Fisheries, 2007 Dredging, extraction and spoil disposal activities (FHMOP 004), Department of Primary Industries, 1998 Departmental procedures for permit applications assessment and approvals for insect pest control in wetlands (FHMOP 003), Department of Primary Industries, 1996 Fisheries guidelines for fish-friendly structures (FHG 006), Department of Primary Industries and Fisheries, 2006.	No acceptable outcome is prescribed.	N/A the areas adjacent to Lot 3 are not a declared Fish Habitat Area. Nonetheless complies with PO6. The proposal avoids the loss, degradation or fragmentation of fish habitats and their values and the loss of fish movement. There is an offer to open an old bund in settlement pond 4, this will iincrease tidal connectivity in this area and allow some recovery of productive fish habitat.
PO7 Development does not increase the risk of mortality, disease or injury, or compromise the health, productivity, marketability or suitability for human consumption of fisheries resources, having regard to (but not limited to): biotic and abiotic conditions, such as water and sediment quality substances that are toxic to plants or toxic to or cumulative within fish design of structures	No acceptable outcome is prescribed.	Complies with PO7. The proposal avoids the loss, degradation or fragmentation of fish habitats and their values and the loss of fish movement it does not increase the risk of mortality, disease or injury, or compromise the health, productivity, marketability or suitability for human consumption of fisheries resources. There is an offer to open an old bund in settlement pond 4, this will iincrease tidal connectivity in this area and allow some recovery of productive fish habitat.

Performance outcomes	Acceptable outcomes	Response
impacts on reproductive success effect on fish energy reserves whether fish may be physically damaged, killed, trapped or stranded fish passage and access to habitats generally; and the impacts of pest fish and other relevant pest species. Note: A fish salvage plan may be required to demonstrate compliance with the performance outcome and may form a condition of any approval. Permits or other authorities may be required under the *Fisheries Act 1994* for the use of regulated fishing apparatus and to posess fisheries resources.		
PO8 Works are undertaken to encourage fish habitats and fisheries resource values to naturally regenerate. Note: Substitution of fish habitats is not supported. A condition of approval for any marine plant restoration is likely to require a post-works monitoring and maintenance program appropriate for the scale of the restoration works.	No acceptable outcome is prescribed.	Complies with PO8. There is an offer to open an old bund in settlement pond 4, this will increase tidal connectivity in this area and allow fish habitats and fisheries resource values to naturally regenerate.
PO9 Development likely to cause drainage or disturbance to acid sulfate soils, prevents the release of contaminants and impacts on fisheries resources and fish habitats. Note: Management of acid sulfate soil is consistent with the current Queensland acid sulfate soil technical manual: Soil management guidelines v4.0, Department of Science, Information Technology, Innovation and the Arts, 2014.	No acceptable outcome is prescribed.	Complies with PO9. Section 12 (and Appendix 6) of the MCU Application sets out a preliminary Acid Sulfate Soils Management Plan. The footprint of disturbance of ASS during construction is entirely within the existing bunded settlement ponds. Importantly there are plans for the bunded storage and treatment of any leachate and the bunded storage and treatment of any stockpiled ASS/PASS material that is excavated. The overall approach is to "drain, lime treat and cover" the ASS within the settlement ponds. Excavation will be restricted to the new drains.

Performance outcomes	Acceptable outcomes	Response
		There are contingency plans for storage and treatment of leachate at all stages of construction to avoid any likely release which could affect fisheries resources and fish habitats.
PO10 Tidal and freshwater inundation and drainage patterns, extent and timing are maintained or restored such that ecological processes continue and associated fish habitat values and condition are maintained.	For bridges: AO10.1 Bridges are designed with abutments above the highest astronomical tide. AND For water, sewer or stormwater infrastructure: AO10.2 Infrastructure is placed below the existing natural substrate surface level, and natural substrate, surface levels and habitat condition and values are reinstated. For any other development, no acceptable outcome is prescribed.	Complies with PO10. The development of new aquaculture production ponds within the footprint of two the existing bunded settlement ponds will not affect the tidal and freshwater inundation and drainage patterns, extent and timing. Ecological processes in the waterways (with marine plants) to the east and west of the site will continue and associated fish habitat values and condition are maintained. There is an offer to open an old bund in settlement pond 4, this will increase tidal connectivity in this area and allow fish habitats and fisheries resource values to naturally regenerate.
PO11 Development: maintains natural processes of erosion and accretion unless there is an immediate and significant threat; and does not result in increased risk of waterway bed or bank scour or erosion or shoreline or foreshore erosion.	No acceptable outcome is prescribed.	Complies with PO11. The site is already modified with bunds which were created decades ago along old drainage lines. The construction of new aquaculture production ponds within the footprint of two the existing bunded settlement ponds will not affect natural processes of erosion and accretion; and will not result in increased risk of waterway bed or bank scour or erosion. Section XX sets out the erosion and sediment control approach.
PO12 The development is designed, sited and constructed to ensure its long-term use and operability will not result in ongoing adverse impacts or new adverse impacts or additional development including: dredging to maintain access trimming of marine plants	No acceptable outcome is prescribed.	Complies with PO12. The maintenance of the bunds around the perimeter of the developed site will ensure ongoing access to the water ways and marine plants. The areas of trimming required (and are as per existing approval). No dredging will be required. There are currently no warning signs or protective structures and these are unlikely to be required.

Performance outcomes	Acceptable outcomes	Response
warning signs or protective structures.		
PO13 Development does not restrict or reduce public use of or access to tidal land and waterways (areas host to fisheries resources).	For development for a material change of use or reconfiguration of a lot: AO13.1 Tidal land and fish habitats are separated from development and are available for public use. For any other development, no acceptable outcome is prescribed.	Complies with PO13. There is no public access via Lot 3 to the adjoining tidal wetlands and water ways. That said the development of the new aquaculture ponds within the existing bunded settlement ponds will not affect public access to any tidal waterways.
PO14 Development does not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access. Note: In some cases, compensation for impact on fisheries access, operations and/or productivity may be necessary. The Guideline on fisheries adjustment provides advice for proponents on relevant fisheries adjustment processes and is available by request from the Department of Agriculture and Fisheries.	AO14.1 The development does not alter existing infrastructure or existing community access arrangements.	Complies with PO14. The development does not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access.
PO15 Development does not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities. Note: In some cases, compensation for impact on fisheries access, operations and/or productivity may be necessary. The Guideline on fisheries adjustment provides advice for proponents on relevant fisheries adjustment processes and is available by request from the Department of Agriculture and Fisheries.	No acceptable outcome is prescribed.	Complies with PO15. The Development does not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities.
Private maritime infrastructure		
PO16 Evidence of a relevant development approval for the removal, damage or destruction or marine plants is required if a material change of use or reconfiguration of a lot occurred since 1 March 2005.	No acceptable outcome is prescribed.	N/A The development is not private maritime infrastructure. That said, Section 2.4 of the MCU Application Report sets out the current and past approvals.
Erosion control structures and beach replenishment		
PO17 Removal, destruction or damage to marine plants as a result of erosion control structures or beach replenishment only occurs where there is an	No acceptable outcome is prescribed.	N/A

Performance outcomes	Acceptable outcomes	Response
immediate and significant threat of erosion to: the use of the land for its existing or approved purpose; and infrastructure, structures or buildings are not expendable or not able to be relocated. Note: Further detail on erosion control is provided in Tidal fish habitats, erosion control and beach replenishment (FHMOP 010), Department of Primary Industries and Fisheries, 2007.		
PO18 The area that the beach replenishment is to be carried out on is a high-energy, sandy sediment shoreline with biological communities adapted to mobile sediments.	No acceptable outcome is prescribed.	N/A
PO19 Erosion control structures including beach replenishment does not create terrestrial land, unless it is a sacrificial dune or beach which forms an integral part of the erosion control design.	No acceptable outcome is prescribed.	N/A
PO20 The beach replenishment work is undertaken in a way that minimises the need for other erosion control activities or works.	No acceptable outcome is prescribed.	N/A
PO21 The beach replenishment work is undertaken in a way that minimises the frequency of any ongoing replenishment requirements.	AO21.1 Beach replenishment will not require maintenance more often than every two years. AND	N/A
	AO21.2 A source of replenishment material for future maintenance is identified and secured.	N/A
PO22 Erosion control structures are located parallel to the shoreline and as far landward as possible to avoid impacts to tidal land and marine plants.	No acceptable outcome is prescribed.	N/A
Dredging		
PO23 Capital dredging is to create or provide access to public infrastructure. Note: Privately owned marina facilities or maritime infrastructure development that is open to the general public and facilitates unrestricted public use for fishing purposes may be considered public infrastructure Dredging for access to private structures that do not provide	No acceptable outcome is prescribed.	N/A

Performance outcomes	Acceptable outcomes	Response
unrestricted public use is not supported.		
PO24 Maintenance dredging is consistent with an existing development approval for dredging; and within approved profiles for navigational purposes.	No acceptable outcome is prescribed.	N/A
PO25 Disposal of dredge spoil avoids adverse impacts on marine plants.	AO25.1 Dredge spoil is not deposited on tidal land.	N/A
Temporary works		
PO26 Fish habitats and the fisheries resources they support are restored to pre-existing or improved condition and extent when the temporary works has ceased.	No acceptable outcome is prescribed.	N/A
PO27 Temporary works will be in place or are undertaken for a specified period and for the shortest possible time.	No acceptable outcome is prescribed.	N/A
PO28 A temporary structure is in place for a specified period and is designed to be completely removed.	No acceptable outcome is prescribed.	N/A
Restoration		
PO29 Restoration does not: compromise condition of fish habitats or fisheries productivity; or substitute a particular fish habitat for another type of habitat, for example, creation of mangrove communities from other tidal fish habitats; or substitute a natural fish habitat for artificial fish habitat; or deliver fish habitats that are likely to be regularly disturbed, such as through predictable sediment removal or maintenance dredging; or deliver fish habitats that will predictably be at a high risk of contamination and/or further disturbance. Note: For further guidance refer to Restoration of fish habitats: Fisheries guidelines for marine areas (FHG 002), Department of Primary Industries, 1998.	No acceptable outcome is prescribed.	PO29 is not directly applicable as there will be no destruction or degradation of marine plant communities or fish habitat needing restoration.. That said, there is an offer to open an old bund in settlement pond 4, this will increase tidal connectivity in this area and allow fish habitats and fisheries resource values to naturally regenerate.

Performance outcomes	Acceptable outcomes	Response
Restoration works authorised through an endorsed restoration plan under the code for self- assessable development MP06 – Minor impact works in a declared fish habitat area or involving the removal, destruction or damage of marine plants, Department of Agriculture, Fisheries and Forestry, 2013, do not require a development permit.		
PO30 Marine plants to be used for revegetation purposes have local provenance.	PO30.1 Marine plants used in restoration works are collected within a 100 kilometre radius of the site.	N/A
Matters of state environmental significance		
PO31 Development: avoids impacts on matters of state environmental significance; or minimises and mitigates impacts on matters of state environmental significance after demonstrating avoidance is not reasonably possible; and provides an offset if, after demonstrating all reasonable avoidance, minimisation and mitigation measures are undertaken, the development results in an acceptable significant residual impact on a matter of state environmental significance. Statutory note: For Brisbane core port land, an offset may only be applied to development on land identified as E1 Conservation/Buffer, E2 Open Space or Buffer/Investigation in the Brisbane Port LUP precinct plan. For the Brisbane Port LUP, see www.portbris.com.au. Note: For the purpose of this code, the matter of state environmental significance assessed is marine plants under the *Fisheries Act 1994*. Guidance for determining if the development will have	No acceptable outcome is prescribed.	Complies with PO31. Refer to the discussion outlined in Sections 8 and 9 of the MCU Application Report. The approach is to ensure there is no disturbance or impact upon matters of state environmental significance by adopting best practice mitigation strategies such as erosion and sediment control and acid sulfate soils management. It is concluded that the proposed action is UNLIKELY to have a significant residual impact as: • The proposal does not involve clearing or disturbance of the of concern regulated vegetation and essential habitat which is on site. • The proposal does not involve clearing or disturbance of the wetland and watercourse vegetation on site. • The permanent removal of marine plants will be limited to a few individuals on the inner bund of settlement pond 2 and less than 25m^2. Further the proposal involves various protection and mitigation strategies to ensure there are no impacts or disturbance to the matters of state environmental significance conservation values during construction and ongoing operation. To avoid any doubt, as the proposal has been designed and planned to not have any disturbance of MSES and therefore no significant residual impact, a

Performance outcomes	Acceptable outcomes	Response
a significant residual impact on the matter of state environmental significance is provided in the Significant Residual Impact Guideline, Department of State Development, Infrastructure and Planning, 2014. Where the significant residual impact is considered an acceptable impact on the matter of state environmental significance under the Environmental Offsets framework and an offset is considered appropriate, the offset should be delivered in accordance with the *Environmental Offsets Act 2014*.		formal offset is not offered.

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Attachment 9

SDAP v2.2 State Code 17

State code 17: Aquaculture

Table 17.2.2: Material change of use

Performance outcomes	Acceptable outcomes	Response
Location		
PO1 The aquaculture development is suitably located for the type and scale of aquaculture activity proposed. Note: Aquaculture Development Areas (ADAs) are to be developed in accordance with the Queensland Aquaculture Policy Statement 2016. As ADAs are designated and recognised linkages to information about them will be provided here. Note: To assist in demonstrating sound site selection, an applicant should provide details of how issues have been addressed.	For development within a marine park AO1.1 Aquaculture development in a marine park is located in a zone where aquaculture is supported as a use or entry with permission. Note: Refer to the relevant marine park zoning plan: **(1) Marine parks (Great Barrier Reef Coast) zoning plan 2004** **(2) Marine parks (Great Sandy) zoning plan 2006** **(3) Marine parks (Moreton Bay Marine) zoning plan 2008.** **(4)** **(5) For any other development no acceptable outcome is prescribed**	Complies with PO1. The development of new aquaculture production ponds in old settlement ponds 1 and 2 and repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing development permit for aquaculture SPD-0515-017379.
PO2 Aquaculture development is located to avoid or minimise impacts on the natural environment.	No acceptable outcome is prescribed.	Complies with PO2. The development of new aquaculture production ponds in old settlement ponds 1 and 2 and repurposing of two drains for settlement and repurposing old settlement pond 3 as a treatment wetland is entirely within the footprint of the existing aquaculture structures and has been planned and designed to minimise impacts on the natural environment though: • avoiding disturbance to the regulated vegetation and essential habitat in settlement pond 4 on the north of the site (and offering to open and old bund to restore tidal connectivity); • avoiding water quality impact by ensuring a net nutrient (contaminant) balance between intake waters and discharge, with a majority recirculation system minimising actual discharge volumes.

Performance outcomes	Acceptable outcomes	Response
Development and construction of an aquaculture development		
PO3 Aquaculture development does not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access. Note: In some cases, compensation for impact on fisheries access, operations and/or productivity may be necessary. The Guideline on fisheries adjustment provides advice for proponents on relevant fisheries adjustment processes and is available by request from the Department of Agriculture and Fisheries.	AO3.1 The development does not alter existing infrastructure or existing community access arrangements to fisheries resources and fish habitats.	Complies with PO3. The proposed new aquaculture ponds and repurposed drains and settlement ponds within the existing footprint of disturbance and within the area of the existing development permit for aquaculture SPD-0515-017379 entirely within the privately owned Lot 3 SP292103 will not adversely impact on community access to fisheries resources and fish habitats including recreational and indigenous fishing access.
PO4 Aquaculture development does not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities Note: In some cases, compensation for impact on fisheries access may be necessary. The Guideline on fisheries adjustment provides advice for proponents on relevant fisheries adjustment processes and is available by request from the Department of Agriculture and Fisheries.	No acceptable outcome is prescribed.	Complies with PO4. The proposed new aquaculture ponds and repurposed drains and settlement ponds within the existing footprint of disturbance and within the area of the existing development permit for aquaculture SPD-0515-017379 not adversely impact on commercial fishing access and linkages between a commercial fishery and infrastructure, services and facilities.
PO5 Aquaculture development does not increase the risk of mortality, disease or injury, or compromise the health and productivity of, fisheries resources by: maintaining suitable habitat conditions controlling the use of toxic substances avoiding the trapping or stranding of fish.	No acceptable outcome is prescribed.	Complies with PO4. The proposed new aquaculture ponds will be managed in accordance with current practices undertake on the existing farm development permit for aquaculture SPD-0515-017379. The new ponds will not disturb habitat (see comments on PO2 above), will not involve any additional use or any release of toxic substances and as the new ponds are within the existing bunded are and not disturbing water courses will not trap or strand fish.
PO6 Aquaculture development likely to cause drainage or disturbance to acid sulfate soils prevents the release of contaminants and impacts on fisheries resources and fish habitats. Note: Management of acid sulfate soil is consistent with the current Queensland acid sulfate soil technical manual: Soil management guidelines v4.0, Department of Science, Information Technology, Innovation and the Arts, 2014.	No acceptable outcome is prescribed.	Complies with PO6. See Section 12 and Appendix 6 of the MCU Application Report. A preliminary acid sulfate soils management plan has been developed and this will be upgraded to a final ASSMP prior to construction. The location of the new ponds is assumed to have actual acid sulfate soils, which will be drained, limed and capped during construction of the new ponds.

Performance outcomes	Acceptable outcomes	Response
		The excavation of ASS has been minimised in the design. The existing drain (which will become the Primary Settlement Pond) will be used to hold any waters from within the construction area and to enable liming/treatment to neutralise (reduce acidity) if required prior to discharge. The area immediately to the east of the current workshop will be used to stockpile any excavated ASS material for lime treatment prior to use as underlying fill. This area will be bunded to ensure no acid runoff.
PO7 Aquaculture development is designed, constructed and operated: to not hold or produce fish classified as restricted matted under the *Biosecurity Act 2014*; and for the aquaculture of local endemic species; or to eliminate the hazards and risks associated with non-endemic aquaculture species. Note: Further guidance is available in the aquaculture policy Management arrangements for translocation of live aquatic organisms (transport between bioregions) for aquaculture FAMOP015, Department of Employment, Economic Development and Innovation, 2011.	No acceptable outcome is prescribed.	Complies with PO7. The extension of ponds is planned for the Barramundi aquaculture, the species grown will be as per with existing development permit for aquaculture SPD-0515-017379.
PO8 Aquaculture development is designed to maintain the integrity of the aquaculture product through: lawful methods of harvesting of the aquaculture product; and ensuring food safety and ethical standards will be met.	No acceptable outcome is prescribed.	Complies with PO8. The operation of the farm will be as per the existing development permit for aquaculture SPD-0515-017379. Daintree Saltwater Barramundi uses net and drain harvesting and has full food safety certification for its packing facility (Attachment 11).
PO9 Aquaculture development is designed to provide for the management of disease. Note: Further information can be found in the Health management technical guidelines for aquaculture: Technical guidelines for health management for aquaculture, including aquaculture undertaken under the self-assessable code, Department of Primary Industries and Fisheries (currently Department of Agriculture and Fisheries), 2008.	AO9.1 The aquaculture development is designed such that any fish mortalities and processing wastes (including filter residues) are treated and disposed of in accordance with the Australian Government Department of Agriculture, Fisheries and Forestry AQUAVETPLAN (as updated from time to time). Note: AQUAVETPLAN is available on the Australian Government Department of Agriculture, Fisheries and Forestry website.	Complies with PO8. The operation of the farm will be as per the existing development permit for aquaculture SPD-0515-017379. Daintree Saltwater Barramundi has compliant processes in place for handling mortalities and has contingency plans for the management of disease.
Land-based aquaculture development		
PO10 Ponds, tanks, containers, aquaria and drainage	AO10.1 A risk assessment has been undertaken with	Complies with PO10 and AO10.1 Section XX of the

Performance outcomes	Acceptable outcomes	Response
systems are designed, constructed and operated to avoid leakage.	regards to site and design options, and the outcomes of the risk assessment are applied to the development proposed. Note: Risk assessment considerations can be found in the Guidelines for constructing and maintaining aquaculture containment structures: Guidelines for best practice in-ground pond construction for aquaculture, Department of Agriculture, Fisheries and Forestry, 2007.	MCU sets out the design and construction and reviews the proposal against the QLD Aquaculture Construction Containment Structures Guidelines. In summary, ponds will be lined with an impermeable clay liner to ensure no leakage.
PO11 The aquaculture development is designed and constructed to mitigate biosecurity and disease risks on the natural environment.	AO11.1 Aquaculture development is designed and constructed to prevent impacts on waterways and wetlands by: being located away from important natural features such as waterways and wetlands: (1) for tidal habitats: 100 metres from highest astronomical tide outside an urban area; or 50 metres from highest astronomical tide within an urban area for non-tidal habitats: 50 metres from bankfull width outside an urban area; and 25 metres from bankfull width within an urban area constructing all ponds above the highest astronomical tide measures ensuring that all waters (e.g. ponds, tanks, containers and aquaria) on the premises are screened to prevent the escape of any aquaculture fisheries resources (eggs, juveniles or adults) into Queensland waters for land-based freshwater aquaculture, not allowing discharge from ponds and tanks to enter Queensland waters. (2) (3) Note: The exception for point 4 is constructed storage dams located above Q100 limits and used for the purposes of water storage and reuse only. AND	Complies with PO11 and AO11.1. The new ponds will be constructed entirely within the existing bunds of existing settlement ponds. Key points are: The floor of the new ponds is above HAT (HAT is 1.76 n AHD, pond floors are 1.8-1.85, AHD. The top of the bunds is at 3.9m AHS with the local storm tide level being 2.8m AHD) The ponds do not encroach on the waterways to the west or east of the existing farm. The discharge water will be treated though a Primary Settlement Pond, Treatment Wetland, Final Settlement/Balancing Storage to ensure to control discharge water quality. Pond drains will be screened to ensure no escapes.
	AO11.2 The design of the aquaculture facility provides control at all times over the containment and release of water from all ponds, tanks and drainage systems within the approved aquaculture area.	Complies with PO11 and AO11.12 The farm has been planned and designed to ensure control at all times over the containment and release of water from all ponds, tanks and drainage systems within the approved aquaculture area. Releases will be managed though a Primary Settlement Pond, Treatment Wetland, Final Settlement/Balancing

Performance outcomes	Acceptable outcomes	Response
		Storage to ensure to control discharge water quality. A majority recirculation system is proposed.
PO12 Ponds, tanks, containers, aquaria and drainage systems are designed, constructed and operated to ensure immunity from flooding and inundation.	AO12.1 The development is not located on flood prone land. AND	Complies with PO12 and AO12.1. The development is not within the Q100 mapping area as per the Douglas Shire Planning Scheme.
	AO12.2 Ponds, tanks, containers and aquaria used to cultivate aquaculture fisheries resources are constructed with the lowest point of the top of wall at least the height of the Q100 flood level, or no lower than the highest known or recorded flood level if Q100 is unavailable. AND	Complies with PO12 and AO12.1. The top of the wall is at 3.9 m AHD, this is over 1 meter above the storm tide level and well above site flood levels.
	AO12.3 Ponds, tanks, containers and aquaria solely for treatment and settlement (free of aquaculture fisheries resources) are constructed so that the lowest point on the top of wall is at least the height of the Q50 flood level. AND	Complies with PO12 and AO12.3. The bunds of the Primary Settlement Pond, Treatment Wetland and Final Settlement Pond are at 1.8 m AHD which is above HAT and above local flood levels.
	AO12.4 All in-ground structures, including any structure or impoundment used for the collection or treatment of wastewater, are constructed to prevent the ingress of stormwater run-off e.g. by constructing a bund or levee wall around the structure or impoundment.	Complies with PO12 and AO12.4. The Primary Settlement Pond, Treatment Wetland and Final Settlement Pond have bunds at 1.8 m AHD which will prevent the ingress of stormwater run-off.
PO13 All juvenile or adult wild fauna (excepting zooplankton) are excluded from land-based aquaculture development through: the design, construction, and operation preventing entry of fauna; and the screening of water introduced into the aquaculture development.	No acceptable outcome is prescribed.	Complies with PO13. The intake is screened to prevent the introduction of juvenile or adult wild fauna into the aquaculture development.
PO14 Aquaculture development that hold fish capable of overland escape are designed to prevent overland escape.	AO14.1 The aquaculture development is secured to prevent the overland escape of aquaculture product by maintaining a perimeter barrier that is impervious to all size classes of the aquaculture fisheries resources.	Complies with PO14. The pond bunds, with HDPE liner on pond banks, 0.5m freeboard and 4m wide roadway on each bund will prevent the overland escape of Barramundi.
PO15 Bioremediation practices for the purpose of aquaculture are designed, constructed, and operated to minimise impacts on fisheries resources.	No acceptable outcome is prescribed.	Complies with PO15. The Primary Settlement Pond, Treatment Wetland and Final Settlement Pond will be the bioremediation process for treatment of recirculation and discharge waters, as these areas are nor currently estuarine systems and do not have tidal connectivity, this will not have any effect on fisheries resources.
Tidal aquaculture developments		
PO16 Aquaculture furniture or other structures on tidal	No acceptable outcome is prescribed.	Complies with PO16. The only additional "aquaculture

Performance outcomes	Acceptable outcomes	Response
land are designed and maintained to prevent stranding or entanglement of native fauna, including, but not limited to: fisheries resources birds marine mammals reptiles.		furniture" will be the discharge weir, this will not cause stranding or entanglement of native fauna.
PO17 The type of aquaculture fisheries resource selected minimises risks to, and avoid impacts on, wild fisheries resources and other indigenous flora and fauna specific to that area. Note: Aquaculture fisheries resources must be carefully placed within an authorised area to avoid release or escape of the aquaculture fisheries resource from the approved area.	AO17.1 Aquaculture fisheries resources are not released to or placed in Queensland waters unless they are free of disease and parasites, of the same species and the same genetic stock as the resident population of that area. AND	Complies with PO17 and AO17.1 The extension of ponds is planned for Barramundi aquaculture, the species grown will be as per with existing development permit for aquaculture SPD-0515-017379. Fingerlings are sourced from hatcheries with appropriate genetic stock. That said, there is no likely release of the cultured barramundi.
	AO17.2 Tidal aquaculture is only of native Queensland fish species that are endemic to the location of the development. AND	Complies with PO17. The extension of ponds is planned for Barramundi aquaculture, the species grown will be as per with existing development permit for aquaculture SPD-0515-017379. Fingerlings are sourced from hatcheries with appropriate genetic stock.
	AO17.3 The aquaculture fisheries resource can and will be produced from sufficient broodstock sourced from the area to ensure appropriate genetic diversity to minimise risks to the environment.	Complies with PO17. The extension of ponds is planned for Barramundi aquaculture, the species grown will be as per with existing development permit for aquaculture SPD-0515-017379. Fingerlings are sourced from hatcheries with appropriate genetic stock.
PO18 Structures that hold and contain aquaculture fisheries resources are designed, constructed and operated to prevent the escape or release of aquaculture fisheries resources under the full range of conditions that could be expected at the site.	No acceptable outcome is prescribed.	Complies with PO18. The new ponds will be constructed with the floor above HAT (HAT is 1.76 n AHD, pond floors are 1.8-1.85 m AHD) and the top of the bunds is at 3.9 m AHD with the local storm tide level being 2.8 m AHD. The pond bunds with HDPE liner on pond banks, 0.5m freeboard and 4m wide roadway on each bund will prevent the overland escape of Barramundi. The proposed ponds are designed and will be constructed and operated to prevent the escape or release of aquaculture fisheries resources under the full range of conditions that could be expected on Lot 3.
PO19 Structures associated with aquaculture development are designed, constructed, correctly deployed and operated at all times to prevent movement of the structure from the intended point of placement, anchoring or mooring.	No acceptable outcome is prescribed.	Complies with PO19. The ponds proposed are permanent earthworks.

Performance outcomes	Acceptable outcomes	Response
PO20 Aquaculture furniture and other infrastructure is designed, constructed, managed and maintained to avoid impacts to fisheries resources.	AO20.1 Aquaculture furniture does not interfere with natural ecosystems, such as seagrass communities, marine plants or other fisheries resources such as coral. AND	Complies with PO 20 and AO20.1. The only additional "aquaculture furniture" will be the discharge weir, this will not interfere with natural ecosystems, such as seagrass communities, marine plants or other fisheries resources such as coral.
	AO20.2 Aquaculture furniture and other infrastructure is temporary and does not include any fixed structures in the substrate (except for supporting posts). AND	N/A
	AO20.3 All materials used in the construction of aquaculture furniture or placed within the premises, are of a chemically inactive and non-hazardous nature. AND	Complies with PO 20 and AO20.1. The only additional "aquaculture furniture" will be the discharge weir, this will be of concrete steel and may have timber wier boards, which are chemically inactive and non-hazardous nature.
	AO20.4 Other structures, including break walls, fences, boat ramps and jetties, are not constructed on areas allocated for prescribed aquaculture.	N/A
PO21 Aquaculture development that involves oyster farming within Moreton Bay Marine Park is consistent with the current Oyster Industry Plan for Moreton Bay Marine Park, Department of Primary Industries and Fisheries, 2015. Note: Further information can be found in the Oyster Industry Plan for Moreton Bay Marine Park, Department of Primary Industries and Fisheries, 2015.	No acceptable outcome is prescribed.	N/A
PO22 Facilities for the aquaculture of pearl oysters are designed, constructed, maintained, managed and operated to meet pearl oyster quarantine management requirements for Queensland. Note: Further pearl oyster quarantine information can be found on the Department of Agriculture and Fisheries website.	No acceptable outcome is prescribed.	N/A
Aquaculture of barramundi for inland catchments		
PO23 Aquaculture development does not compromise the ecological integrity of fauna in inland catchments (west of the Great Dividing Range). Note: Aquacultured barramundi west of the Great Dividing Range (in inland catchments shared with other states) are not to be used for non-food purposes, including stocking	AO23.1 Development is designed to prevent the spread of disease or the introduction of barramundi into catchments where it does not naturally occur, through: ensuring no water or organisms originating from the aquaculture of barramundi and co-cultured species is permitted to reach Queensland waters without treatment/sterilisation appropriate to render nodavirus	N/A

Performance outcomes	Acceptable outcomes	Response
Queensland waters or dams.	nonviable. This includes during the transportation of aquacultured product aquacultured barramundi and co-cultured species must not be sold, traded, stocked into Queensland waters or given away for non-food purposes all containers used to aquaculture barramundi are screened to exclude predators (for example birds) without causing injury to such predators.	
Exotic fish		
PO24 No water or organisms originating from the aquaculture of exotic fish reaches Queensland waters with the exception of waters within constructed storage dams located above Q100 limits and used for the purposes of water storage and reuse only.	AO24.1 Culture of exotic fish does not occur in open or flow-through systems that discharge into waterways. AND	N/A
	AO24.2 All containers used to aquaculture exotic fish are screened to exclude predators (for example birds) without causing injury to such predators.	N/A
PO25 Commonwealth quarantine protocols have successfully been completed for any fish proposed for production.	No acceptable outcome is prescribed.	N/A
Aquaculture of rare, threatened and endangered species recognised in Commonwealth and state legislation		
PO26 Aquaculture development involving rare, threatened or endangered fish that are recognised under state or Commonwealth legislation: (4) provides a net benefit to management of the chosen species (5) avoids or acceptably minimises biosecurity risks (6) manages any risks to rare, threatened or endangered fish. Note: For example, considering the risks of obtaining broodstock, maintaining the genetic integrity of restricted populations, translocation and disease. Examples of such species include Queensland lungfish, Mary and Murray River cods, silver perch, honey blue-eye and Oxleyan pygmy perch.	No acceptable outcome is prescribed.	N/A
For aquaculture development in the Great Sandy Strait Marine Park		
PO27 Aquaculture development in the Great Sandy Strait Marine Park: (7) is within a designated aquaculture area identified in the Great Sandy Regional Marine Aquaculture Plan (GSRMAP)	No acceptable outcome is prescribed.	N/A

Performance outcomes	Acceptable outcomes	Response
(8) is consistent with the type of aquaculture approved for the designated area; and (9) complies with the assessment criteria and conditions of the GSRMAP. Note: Further information for applicants can be found in the Implementation guide for Great Sandy Regional Marine Aquaculture Plan, Department of Employment, Economic Development and Innovation (Fisheries Queensland), 2011.		

Attachment 10

SDAP v2.2 State Code 22

State code 22: Environmentally relevant activities

Table 22.2.2: Material change of use

Performance outcomes	Acceptable outcomes	Response
All ERAs		
PO1 Development is suitably located and designed to avoid or mitigate environmental harm to the acoustic environment.	AO1.1 Development meets the acoustic quality objectives for sensitive receptors identified in the Environmental Protection (Noise) Policy 2008.	Complies with PO1 and A01.1 The development will not cause noise nuisance or environmental harm. The aquaculture operation involves very quiet pumps and aerators and vehicles. There are no large tonal or impulsive noises. The nearest sensitive receptors are residential properties to the east along South Arm Drive. In more than two decade of operation of the current aquaculture farm there has never been a noise complaint from South Arm Drive residents. The Environmental objective will be met as the aquaculture operation will be operated in a way that protects the environmental values of the acoustic environment. The performance outcome is met as sound from the activity is not audible at sensitive receptors.
PO2 Development is suitably located and designed to avoid or mitigate environmental harm to the air environment.	AO2.1 Development meets the air quality objectives of the Environmental Protection (Air) Policy 2008.	Complies with PO2 and AO2.1. The operation of the aquaculture farm does not involve any significant air emissions. When ponds are emptied they are dried out, however there have not been dust issues in the existing ponds operation and none are expected with the new ponds. There are backup diesel generators and farm vehicles with exhaust emissions. The proposal meet the Environmental objective as the activity will be operated in a way that protects the environmental values of air. The proposal meets the Performance outcomes as there is no discharge to air of contaminants that may cause an adverse effect on the environment from the operation of the activity.
PO3 Development, other than intensive animal industry for poultry farming, is suitably located and	No acceptable outcome is prescribed.	Complies with PO3. The operation of the aquaculture farm does not involve any significant odour emissions. When ponds are emptied they are dried out, however

Performance outcomes	Acceptable outcomes	Response
designed to avoid or mitigate environmental harm on adjacent sensitive land uses caused by odour.		there have not been odour issues in the existing ponds operation and none are expected with the new ponds. The nearest sensitive receptors are residential properties to the east along South Arm Drive. In more than two decades of operation of the current aquaculture farm there has never been an odour complaint from South Arm Drive residents.
PO4 Development is suitably located and designed to avoid or mitigate environmental harm to the receiving waters environment.	AO4.1 Development meets the management intent, water quality guidelines and objectives of the Environmental Protection (Water) Policy 2009.	Complies with PO4. See section 10 of the MCU Application Report. Importantly the proposal is to have net nutrient (contaminant) balance between the intake waters a discharge.
PO5 Development is designed to include elements which: prevent or minimise the production of hazardous contaminants and waste as by-products; or contain and treat hazardous contaminants on-site rather than releasing them into the environment; and provide secondary containment to prevent the accidental release of hazardous contaminants to the environment from spillage or leaks.	No acceptable outcome is prescribed.	Complies with PO5. The farm does have diesel stored on site. This is an overhead tank which is bunded and stored in accordance with AS 1940.
PO6 Environmentally hazardous materials located on site are stored to avoid or minimise their release into the environment due to inundation during flood events.	No acceptable outcome is prescribed.	Complies with PO6. The fuel store is on the workshop which is at 3.27 m AHD, well above local flood level and above the storm tide level of 2.8m AHD.
All development – matters of environmental significance		
PO7 Development: avoids impacts on matters of state environmental significance; or minimises and mitigates impacts on matters of state environmental significance after demonstrating avoidance is not reasonably possible; and provides an offset if, after demonstrating all reasonable avoidance, minimisation and mitigation measures are undertaken, the development results in an acceptable significant residual impact on a matter of state	No acceptable outcome is prescribed.	Complies with PO4. Refer to the discussion outlined in Sections 8 and 9 of the MCU Application Report. The approach is to ensure there is no disturbance or impact upon matters of state environmental significance by adopting best practice mitigation strategies such as erosion and sediment control and acid sulfate soils management. It is concluded that the proposed action is UNLIKELY to have a significant residual impact as:

Performance outcomes	Acceptable outcomes	Response
environmental significance. Statutory note: For Brisbane core port land, an offset may only be applied to development on land identified as E1 Conservation/Buffer, E2 Open Space or Buffer/Investigation in the Brisbane Port LUP precinct plan. For the Brisbane Port LUP, see www.portbris.com.au. Note: Guidance for determining if the development will have a significant residual impact on a matter of state environmental significance is provided in the Significant Residual Impact Guideline, Department of State Development, Infrastructure and Planning, 2014. Where the significant residual impact is considered an acceptable impact on the matter of state environmental significance and an offset is considered appropriate, the offset should be delivered in accordance with the *Environmental Offsets Act 2014*.		• The proposal does not involve clearing or disturbance of the of concern regulated vegetation and essential habitat which is on site. • The proposal does not involve clearing or disturbance of the wetland and watercourse vegetation on site. • The permanent removal of marine plants will be limited to a few individuals on the inner bund of settlement pond 2 and less than $25m^2$. Further the proposal involves various protection and mitigation strategies to ensure there are no impacts or disturbance to the matters of state environmental significance conservation values during construction and ongoing operation. To avoid any doubt, as the proposal has been designed and planned to not have any disturbance of MSES and therefore no significant residual impact, a formal offset is not offered.
Category C areas and category R areas of vegetation		
PO8 Development: avoids impacts on category C areas of vegetation and category R areas of vegetation; or minimises and mitigates impacts on category C areas and category R areas of vegetation after demonstrating avoidance is not reasonably possible.	No acceptable outcome is prescribed.	Complies with PO8. There will be no disturbance to category C or R areas of vegetation.
Intensive animal industry – poultry farming (ERA 4(2))		
PO9 Poultry farming development (where farming more than 200,000 birds) is suitably located and designed to avoid or mitigate environmental harm on adjacent sensitive land uses caused by odour.	AO9.1 For poultry farming involving 300,000 birds or less, development meets the separation distances as determined using the S-factor methodology to: a sensitive land use in a rural zone; and boundary of a non-rural zone. OR	N/A
	AO9.2 Development meets the separation distances as determined by odour modelling using the following criteria: 2.5 odour units, 99.5 percent, 1 hour average for a sensitive land use in a rural zone; or 1.0 odour units, 99.5 percent, 1 hour average for the	N/A

Performance outcomes	Acceptable outcomes	Response
	boundary of a non-rural zone. Statutory note: Guidance for determining if the development will cause environmental harm caused by odour is provided in the Development of Meat Chicken Farms in Queensland, Department of Agriculture and Fisheries, 2016 and the Guideline – Odour Impact Assessment from Developments, Department of Environment and Heritage Protection, 2013.	

Attachment 11

Food Safety Certificate

Accreditation Number: 121541000

safe:food queensland

Certificate of Accreditation

R04

Issued to: Daintree Saltwater Barramundi Fish Farms Pty Ltd
Lot 3 Vixie Road
WONGA QLD 4873

Details of your accreditation

Not transferable

Under the Food Production (Safety) Act 2000

Authorised to produce under the food safety scheme for	**Seafood**
Accredited activity	**Producing**
Place where production occurs	**Lot 3 Vixie Road WONGA QLD 4873**

Expires 31 December 2018

Conditions (see over)

1042067-SEM-000196-ASA001-00314

Appendix 1A

2016 SARA Pre-lodgement Meeting

Queensland Government

Department of Infrastructure, Local Government and Planning

Our reference: SPL-1216-035627
Your reference:

22 December 2016

Daintree Saltwater Barramundi
c/- EcoSustainAbility
PO Box 230
Yorkeys Knob 4878

Att: Guy Chester

Dear Sir / Madam

Pre-lodgement meeting record—proposed development
Offsets in relation to aquaculture activities on Lot 3 on SP150448 situated at Vixies Road Wonga Beach

This pre-lodgement record provides a summary of the matters discussed at the pre-lodgement meeting in addition to providing further advice prepared subsequent to the meeting. This record provides initial advice in relation to offsets as requested by the applicant for the pre-lodgement meeting. While this pre-lodgement advice is provided in good faith, if the proposal is changed to that which was discussed with the department during the pre-lodgement meeting, this advice is not binding.

Reference information

Departmental role	Concurrence agency
Jurisdiction:	Schedule 7 Table 2 Item 28 – Material change of use for aquaculture (ERA 1 and environmental authority required under the *Environmental Protection Act 1994*, refer to advice below) Schedule 7 Table 2 Item 32 – Removal, destruction of damage of marine plants
Pre-lodgement meeting date:	12 December 2016
Meeting attendees:	

Far North Queensland Regional Office
Ground Floor, Cairns Port Authority
PO Box 2358
Cairns QLD 4870

Name	Position	Organisation
Mark Hober	Manager	Daintree Saltwater Barramundi Fish Farms Pty Ltd
Guy Chester	Director	EcoSustainability
Richard Stewart	Principal Fisheries Officer	Department of Agriculture and Fisheries
Andrew Fielding	Principal Environmental Officer	Department of Environment and Heritage Protection (DEHP)
Tiffany Harrington	Policy Officer	DEHP
Kristin Keane	Senior Planning Officer	Department of Infrastructure, Local Government and Planning (the department)

Site details

Street address:	Vixies Road Wonga Beach
Real property description:	3 SP150448
Site area:	50 hectares (approx.)
Local government area:	Douglas Shire
Local government zone:	Rural
Existing use:	Aquaculture
Relevant site history:	Aquaculture

Proposed development details

Development type:	Material change of use
Development description:	Proposed expansion of production ponds

Supporting information

Plan / Report title	Author	Reference no.	Version and date
Request for pre-lodgement advice form	G. Chester	-	7/12/2016
MyDAS SPL-1014-015101	-	-	2014

Meeting minutes

Item	Discussion and advice
Background	
1.	Proposal to add an additional 10 hectares to settlement ponds 1 and 2. Settlement pond 2 will become a managed wetland (including mangroves and marine plants including

Item	Discussion and advice
	samphires), and will include the construction of bunds to assist with water quality treatments. Settlement pond 4 is being offered as an offset for the additional 10 hectares. Further details are required to determine how off-sets will apply, and confirmation is requested in relation to whether the commonwealth as well as the state will require an offset. There is no referral proposed to be submitted to the Department of the Environment and Energy for the *Environment Protection and Biodiversity Conservation Act 1999*. However, an application to the Great Barrier Reef Marine Park Authority may be required in relation to the requirements under the Great Barrier Reef Marine Park Regulations 1983 for aquaculture.
Department of Agriculture and Fisheries	
2.	Marine plants Marine plants are protected under the *Fisheries Act 1994*, regardless of whether they are re-growth.
3.	Habitat assessments In relation to the proposed offset the following assessments will be required to justify the proposal: - Settlement pond 3: A habitat condition assessment to ascertain a grading for the marine plants. - Settlement pond 4: A marine plant and habitat assessment to identify the species, diversity and general community structure. Include an option that will serve to improve the area, for example removing the wall that is currently obstructing tidal access within Settlement Pond 4.
4.	Supporting information Demonstrate how impacts to marine plants will be avoided, and include details on how mitigation measures will be implemented to assist with the protection of remaining values.
Department of Environment and Heritage	
5.	Interaction between the *Environmental Protection Act 1994* and *the Great Barrier Reef Marine Park (aquaculture) Regulations 2000* The proposed Aquaculture facility would require an ERA 1 for Aquaculture from the DEHP and an additional approval under the *Great Barrier Reef Marine Park (aquaculture) Regulations 2000.*
6.	Offset policy DEHP will make reference to the Queensland Environmental offsets Policy version 1.2.
7.	Significant residual impact Assessment is required against the DILGP Significant Residual Impact Guideline to determine the requirement for off-sets and to calculate the requirement.
8.	Requirement The ratio for offsets is based on 1 hectare of disturbance: 4 hectares as an offset (please refer to the Further Advice table for further information).
General	
9.	It is proposed that another pre-lodgement meeting is to be undertaken to discuss the actual

Item	Discussion and advice
	lodgement of the application and other technical agency and departmental requirements.

It is considered that the above summary is an accurate record of the matters discussed at the pre-lodgement meeting.

Actions:

- **Department of Environment and Heritage Protection:** to identify whether duplication of offsets will occur should the Commonwealth have offset requirements relating to the potential for an approval under the Great Barrier Reef Marine Parks Regulations 1983.

  Response: Refer to item 11.

  Action: completed

The following information is provided as further advice prepared subsequent to the meeting.

Further advice

Item	Further advice
Other applications	
1.	The applicant will need a development permit for material change of use for for environmentally relevant activity (ERA) 1 (aquaculture) under the *Environmental Protection Act 1992*, and an environmental authority.
2.	The applicant is to determine whether permit is required in relation to the following matters: • *Great Barrier Reef Marine Park Act 1975* • *Marine Parks Act 20014*
Environmental Offsets	
3.	The proposed site is located within and adjacent to areas that are mapped as matters of State environmental significance MSES including: • Essential habitat for *Casuarius casuarius johnsonii* (southern cassowary - southern population); • Wetland of high ecological significance (HES wetland); and • Marine plants.
4.	In accordance with the *Environmental Offsets Act 2014* (EO Act) it will be required that information to demonstrate how impacts to each MSES above has been avoided to the greatest extent possible. Where impacts cannot be reasonably avoided, it must be demonstrated that the impacts have been mitigated to the greatest extent possible. In some instances it can be possible to ensure a significant residual impact is not had on a prescribed environmental matter by avoidance and mitigation measure. This can remove any possible requirements to provide an environmental offset.
5.	Once avoidance and mitigation measures have been exhausted, an assessment against the DILGP Significant Residual Impact Guideline for each MSES will need to be undertaken to determine whether it is likely the activity will have a significant residual

Item	Further advice
	impact on any of the MSES. The following sections of the guideline will need to be used: • Section 3.1.1 – Essential Habitat (EH) and section 3.5 – Protected wildlife habitat to determine if a significant residual impact will be had on cassowaries or their habitat; • Section 3.3 – Wetlands and watercourses to determine if a significant residual impact will be had on the HES wetland; and • Section 3. 9 – Marine plants to determine if a significant residual impact will be had on marine plants.
6.	If the assessment against the guideline determines there will be a significant residual impact on any matter, any application submitted should detail the quantity of significant residual impact for each matter in hectares and provide a suitable description or spatial representation (e.g. reference to a plan) of the location and extent of the significant residual impact for each matter.
7.	If the assessment against the guideline determines the activity will have a significant residual impact on any of these matters an environmental offset may be required. If an offset is required and considered a suitable outcome an offset condition will be placed on the authority. Please note that an offset is not always a suitable outcome. Applying for an environmental offset does not mean that a proposal with unacceptable impacts will be approved. Whether an offset is a suitable outcome will be determined on a case-by-case basis.
8.	The EO Act allows applicants to submit a notice of election and enter into an agreed delivery arrangement before or after the authority is granted.
9.	The EO Act and subordinate legislation (regulation and policy) prescribes a range of requirements that an environmental offset must meet. Please refer to the legislation to determine any requirements that will need to be considered when planning an offset.
10.	The Queensland offsets framework states that an offset must be of a size and scale proportionate to the significant residual impact and that it must achieve a conservation outcome for the prescribed environmental matter impacted on as a result of the prescribed activity. Section 4.2 of the policy defines the multiplier prescribed to each prescribed environmental matter. Cassowary habitat, wetlands and mangroves are all set at 4. While the maximum multiplier of 4 (i.e. a maximum of 4 times the area of the significant residual impact can be offset) has been set for offsets in Queensland, it is possible that a conservation outcome can be achieved using a smaller multiplier. However, how this will be achieved must be clearly demonstrated in any offset delivery plan submitted.
11.	GBRMPA has a procedure in place with Department of National Parks, Sport and Racing and Department of Environment and Energy where negotiation is facilitated across departments when assessing applications for the same activity. If all relevant applications are submitted concurrently, the applicant can state in the application to EHP that an integrated approach across departments to determine offset requirements is preferred. In this instance EHP will be able to facilitate negotiation with GBRMP to ensure the same impact to the same prescribed environmental matter does not require an offset across multiple permits. The impact will likely have to be of the same size and scale and to the same prescribed environmental matter for this to occur. GBRMP have a generic email address which the applicant can use to ask questions

Item	Further advice
	regarding the process GBRMPA use when multiple permits under multiple jurisdictions are required and the negotiations taken across the relevant departments. The email address is assessments@gbrmpa.qld.gov.au

If you require any further information, please contact Kristin Keane, Senior Planning Officer, SARA Far North Qld, on 4037 3220 who will be pleased to assist.

Yours sincerely

Brett Nancarrow
Manager (Planning)

Appendix 1B

2015 SARA Pre-lodgement Advice

Queensland Government

Department of Infrastructure, Local Government and Planning

Our reference: SDA-1115-025961
Your reference: ROL 1110/2015

11 December 2015

Chief Executive Officer
Douglas Shire Council
PO Box 723
Mossman QLD 4873

Att: Jenny Elphinstone

Dear Sir / Madam

Concurrence agency response—with conditions
Development application for a reconfiguration of a lot (boundary realignment) on land located at Vixies Road, Mossman-Daintree Road and 2-28 South Arm, Wonga Beach and more particularly described as Lot 3 on SP150448, Lot 278 on SR419 and Lot 1 on SP188690
(Given under section 285 of the *Sustainable Planning Act 2009*)

The referral agency material for the development application described below was received by the Department of Infrastructure, Local Government and Planning under section 272 of the *Sustainable Planning Act 2009* on 23 November 2015.

Applicant details

Applicant name:	Daintree Saltwater Barramundi Fish Farm Pty Ltd
Applicant contact details:	Lot 3 Vixies Road Wonga Beach QLD 4873 daniel.lamond@uqconnect.edu.au

Site details

Street address:	Vixies Road, Mossman-Daintree Road and 2-28 South Arm, Wonga Beach
Lot on plan:	Lot 3 on SP150448, Lot 278 on SR419 and Lot 1 on SP188690
Local government area:	Douglas Shire Council

Far North Queensland Regional Office
Ground Floor, Cairns Port Authority
PO Box 2358
Cairns QLD 4870

Application details

Proposed development: Development permit for a reconfiguration of a lot (boundary realignment)

Aspects of development and type of approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Reconfiguring a Lot	Development permit	Reconfiguration of a Lot (Boundary Realignment) for the purpose of formalising an existing water inlet.	Code Assessment

Referral triggers

The development application was referred to the department under the following provisions of the *Sustainable Planning Regulation 2009*:

Referral trigger: Schedule 7, Table 2, Item 14 – Tidal work, or development in coastal management district

Conditions

Under section 287(1)(a) of the *Sustainable Planning Act 2009*, the conditions set out in Attachment 1 must be attached to any development approval.

Reasons for decision to impose conditions

Under section 289(1) of the *Sustainable Planning Act 2009*, the department must set out the reasons for the decision to impose conditions. These reasons are set out in Attachment 2.

Further advice

Under section 287(6) of the *Sustainable Planning Act 2009*, the department offers advice about the application to the assessment manager—see Attachment 3.

Approved plans and specifications

The department requires that the following plans and specifications set out below and in Attachment 4 must be attached to any development approval.

Drawing/Report Title	Prepared by	Date	Reference no.	Version/Issue
Aspect of development: Reconfiguration of lot				
Site plan – Reconfiguration of a lot (Boundary realignment),	Consultant, Design & Draft, Town Planning & Project Management Services	20/09/2015	NC2915 (Sheet A3, Page 1)	-

A copy of this response has been sent to the applicant for their information.

For further information, please contact Joanne Manson, Principal Planning Officer, SARA Far North QLD on 4037 3228, or email joanne.manson@dilgp.qld.gov.au who will be pleased to assist.

Yours sincerely

Robin Clark
Manager (Planning)

cc: Daintree Saltwater Barramundi Fish Farm Pty Ltd, email: daniel.lamond@uqconnect.edu.au

enc: Attachment 1—Conditions to be imposed
Attachment 2—Reasons for decision to impose conditions
Attachment 3—Further advice
Attachment 4—Approved Plans and Specifications

Our reference: SDA-1115-025961
Your reference: ROL (Boundary realignment)

Attachment 1—Conditions to be imposed

No.	Conditions	Condition timing
Development permit for a reconfiguration of a lot (boundary realignment)		
Schedule 7, Table 2, Item 14 – Tidal work, or development in a coastal management district — Pursuant to section 255D of the *Sustainable Planning Act 2009*, the chief executive administering the Act nominates the Director-General of the **Department of Environment and Heritage Protection** to be the assessing authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following condition(s):		
1.	The development must be carried out generally in accordance with the following plans: • Site plan – Reconfiguration of a lot (Boundary realignment), prepared by Consultant, Design & Draft, Town Planning & Project Management Services, dated 20/09/2015, reference NC2915 (Sheet A3 Page 1)	At all times
2.	Submit the final plan of survey to the Department of Environment and Heritage Protection , Permit and License Management, Implementation and Support Unit, GPO Box 2454, Brisbane QLD 4001 or email: sara@ehp.qld.gov.au	Within ten (10) business days from the registration of the plan of survey

Our reference: SDA-1115-025961
Your reference: ROL (Boundary realignment)

Attachment 2—Reasons for decision to impose conditions

The reasons for this decision are:

- to ensure the development is carried out generally in accordance with the plans of development submitted with the application.
- to ensure the department has accurate information on property boundaries
- to ensure the development achieves the outcomes in 10.1 Tidal works, or development in a coastal management district state code in the State Development Assessment Provisions version 1.6.

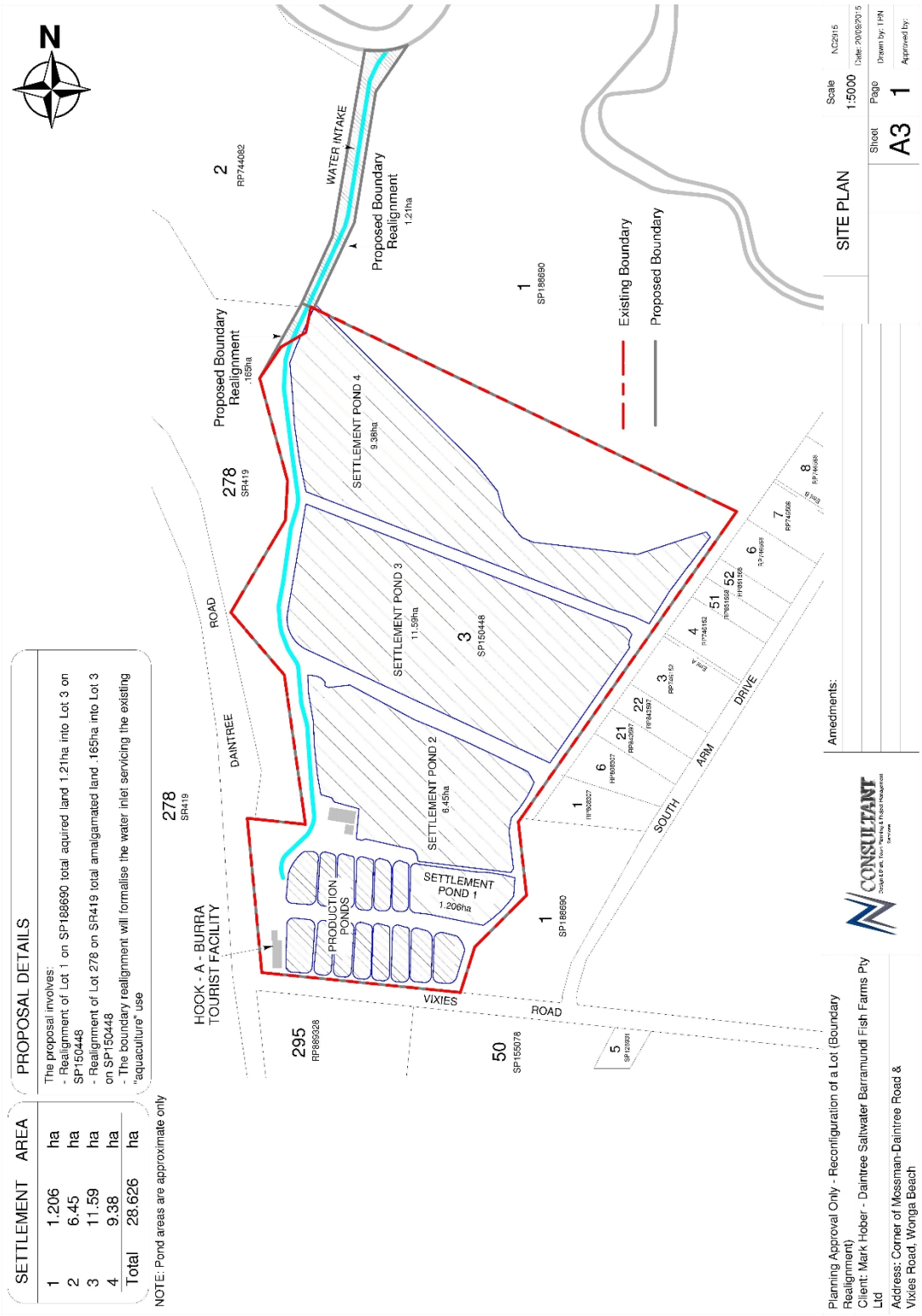
Our reference: SDA-1115-025961
Your reference: ROL 1110/2015

Attachment 3—Further advice

General advice	
Ref.	State Planning Policy July 2014 interim development assessment provisions
1.	Douglas Shire Council, in its role as assessment manager, must assess the development application against the State Planning Policy July 2014, and in particular the interim development assessment provisions (Part E), such Coastal environment and Natural hazards, risk and resilience and to the extent it is relevant to the proposed development.

Our reference: SDA-1115-025961
Your reference: ROL (Boundary realignment)

Attachment 4—Approved plans and specifications



Appendix 1C

2017 SARA Pre-lodgement Advice

Queensland Government

Department of Infrastructure, Local Government and Planning

Our reference: 1709-1202 SPL

28 September 2017

Daintree Saltwater Barramundi
c/- Ecosustainability Pty Ltd
PO Box 230
Yorkeys Knob QLD 4878
gcecosustainability@gmail.com

Attention: Guy Chester

Dear Sir / Madam

Pre-lodgement advice

Thank you for your correspondence received on 4 September 2017 in which you sought pre-lodgement advice from the Department of Infrastructure, Local Government and Planning regarding the proposed development described below.

Reference information

Departmental role:	Referral agency
Departmental jurisdiction:	**Schedule 10, Part 3, Division 4, Table 3, Item 1** – Clearing native vegetation (if applicable) **Schedule 10, Part 5, Division 4, Table 2, Item 1** – Non-devolved environmentally relevant activities **Schedule 10, Part 6, Division 1, Subdivision 3, Table 1, Item 1** – Aquaculture **Schedule 10, Part 6, Division 3, Subdivision 3, Table 2, Item 1** – Removal, destruction or damage of marine plants **Schedule 10, Part 9, Division 4, Table 2, Item 4** – State transport corridor or that is a future State transport corridor **Schedule 10, Part 17**, **Division 3, Table 6, Item 1**- Tidal works or work in a coastal management district (if applicable) **Schedule 10, Part 20, Division 4, Table 3, Item 1** – Premises in a wetland protection area (if applicable)

Location details

Street address:	Cnr Mossman-Daintree Road and Vixies Road, Wonga Beach
Real property description:	3SP292103
Local government area:	Douglas Shire Council

Far North Queensland regional office
Ground Floor, Cnr Grafton and Hartley Street, Cairns
PO Box 2358, Cairns QLD 4870

Existing use:	Aquaculture facility

Details of proposal

Development type:	Material change of use
Development description:	Expansion of the aquaculture facility at Daintree Saltwater Barramundi and an Environmentally Relevant Activity for Aquaculture

Supporting information

Drawing/report title	Prepared by	Date	Reference no.	Version/issue
Request for Pre-lodgement advice	Guy Chester	4 September 2017	-	-
State Assessment and Referral Agency Lot plan report	Queensland Government (Department of Infrastructure, Local Government and Planning)	04/09/2017	Lot Plan: 3SP292103	-
Regulation vegetation management map	Queensland Government (Department of Natural Resources and Mines)	04/09/2017	Lot:3 Plan:292103	-
Protected Plants Fora Survey Trigger Map	Queensland Government (Department of Environment and Heritage Protection)	27/09/2017	Lot:3 Plan:292103	-
Pre-lodgment meeting record	Department of Infrastructure, Local Government and Planning	22 December 2017	SPL-1216-035627	-
Pre-lodgment meeting record	Former Department of State Development, Infrastructure and Planning	27 November 2014	SPL-1014-015101	-

The department has carried out a review of the information provided and the impacts of the proposal. The following advice outlines the matters of interest to the department and matters that should be addressed if you lodge your development application with the assessment manager.

Please note this pre-lodgement advice is valid for a period of 9 months from the date of issue, unless a change in legislation or statutory instrument occurs that affects the advice.

Proposal

1. The proposal is for a material change of use for an expansion of Daintree Saltwater Barramundi aquaculture facility and a material change of use for an environmentally relevant activity to allow discharge.

Local government requirements

2. This pre-lodgement advice does not include any local government requirements. Please contact Douglas Shire Council on 4099 9944 or email enquires@douglas.qld.gov.au to discuss its requirements.
3. If the proposal is assessable against council's planning scheme, then council will be the assessment manager for the development application. Alternatively, if council is not the assessment manager

then department will be assessment manager under Schedule 8, Table 4 of the Planning Regulation 2017.

Regulated vegetation

4. The subject lot contains the following features and vegetation types:
    - Category B area (containing least concern and of concern regional ecosystems)
    - Category R area (regrowth watercourse and drainage feature area)
    - Category X area
    - Essential Habitat as shown on the essential habitat map; and,
    - A watercourse/drainage feature as shown on the vegetation management watercourse and drainage feature map.

5. The mapped regional ecosystems on the subject lot are:
    - 7.1.1
    - 7.3.25, and
    - 7.3.20.

6. A description of the regional ecosystems can be found on the regional ecosystem database.
7. Mangroves, which are categorised as regional ecosystem 7.1.1, are not included in the definition of vegetation under section 8 of the *Vegetation Management Act 1999.*
8. Based on the information provided the department is not able to confirm at this stage if the proposed development will trigger referral agency assessment for native vegetation clearing.
9. In order for the Department of Natural Resources and Mines to be satisfied that no clearing could occur as a result of the proposed development, a development plan would need to be provided that shows:
    - The subject Lot on Plan, development plan title, plan reference number, version number, date and author.
    - Mapped regulated vegetation over the subject and adjoining lots.
    - Existing and proposed infrastructure including buildings, fences, roads, service and utility connections (including underground services) including any proposed building envelopes. To avoid referral, building envelopes must be located the relevant firebreak/safety buffer distances from adjacent mapped Category B area on the subject and adjoining lots.
    - Location of operational areas associated with the proposed development.
    - Proposed firebreaks and/or safety buffers. The Department of Natural Resources and Mines will use a width of 20 metres or 1.5 times the height of the tallest adjacent tree to the infrastructure, whichever is the greater, based on the relevant regional ecosystem description to calculate the applicable firebreak/safety buffer, unless alternative evidence is outlined in the development application.
    - Evidence must include tree height measurements and photographs of the tallest vegetation adjacent to the proposed infrastructure. Each photograph should include a survey staff or object of known height and be accompanied by a record of its GPS location.
10. The development plan can be submitted to the department by requesting further pre-lodgement advice through MyDAS2. Once submitted the department can confirm if the proposed development will require referral agency assessment and if there is any requirement to obtain a Section 22A relevant purpose determination under the *Vegetation Management Act 1999* from the Department of Natural Resources and Mines.

11. To request further pre-lodgement advice, use the 'related actions' tab in your 1709-1202 SPL record and select 'Further pre-lodgement advice'. You will be given an option to select either a meeting or written advice.

Environmentally relevant activities (ERA)

12. The proposed development requires a development permit for prescribed (concurrence) ERA1 Aquaculture.
13. The development application should include a full response against State code 22: Environmentally relevant activities of the current State Development Assessment Provisions (SDAP).
14. The development application must address the performance outcomes for the environmental objectives of the operational assessment prescribed in Schedule 5, Table 1 of the Environmental Protection Regulation 2008. The application must include a technical assessment of the environmental risks to the receiving environment in relation to air, water, noise, land and waste associated with the activity(s).
15. The development application must show how the performance outcomes for each environmental objective are met. Technical guidelines detailing the minimum information that should be supplied to support an application are available on the Queensland Government's Business and Industry Portal and include:
    - Air
    - Land
    - Noise
    - Water
    - Waste
16. Please address the standard criteria as defined in Schedule 4 Dictionary of the *Environmental Protection Act 1994* in regards to the proposed activity (including the dredging aspects and disposal of dredge spoil aspects).
17. The diagnostic tool function can be used to generate a report that will tell you how and where to apply, the application and annual fees that apply, how to determine environmental impacts/relevant Environmental Protection Policies, guidance materials to assist in the preparation of supporting information and additional resources.

Aquaculture

18. The proposed development will require a development permit for a material change of use for the expansion to the existing aquaculture facility.
19. The development application should include a full response against State code 17: Aquaculture of the current SDAP. The Department of Agriculture and Fisheries is finalising guidelines to assist applicants in preparing an application addressing SDAP. State code 17 guideline is not yet available, however please check the website for updates.
20. Particular attention should be paid to the following performance outcomes (PO) in State code 17:
    - All aquaculture development – PO1 to PO9;
    - Land based aquaculture – PO10 to PO15; and
    - Tidal aquaculture – PO16 to PO22.

21. In accordance with PO5 of SDAP State code 17, the applicant will be required to demonstrate that measures are taken to ensure the health and productivity of fisheries resources. Demonstrating compliance with this PO must include, but is not limited to, the following:

    - Provision of an aquaculture site management plan which includes details of environmental management practices that are to be adopted to avoid or minimise environmental impact of the aquaculture development. This document may include the following:

        - o rehabilitation of marine plant environment;
        - o restoration of the area following construction;
        - o feeding regimes to reduce nutrient loading;
        - o nutrient dispersal or disposal;
        - o controlled administration of chemicals;
        - o ensuring the area is maintained and free of rubbish;
        - o processes to ensure the release of fisheries resources;
        - o ensuring aquaculture furniture is not placed in positions which would cause damage to the environment or fisheries resources;
        - o settlement and/or waste water treatment ponds;
        - o overland discharge and land-based irrigation of discharge waters, and
        - o nutrient stripping of effluent prior to discharge.

22. In accordance with PO6 of SDAP State code 17, the applicant must outline measures that will identify, control and treat any acid sulfate soils as part of the development application process.

23. The applicant will be required to provide a site plan that identifies areas where acid sulfate soils are located within the development area. An acid sulfate soil management plan should address the impact of development and demonstrate the quantity of acid sulfate soils, and how they will be managed and treated.

24. In accordance with PO12 of SDAP State code 17, the applicant must demonstrate that containment structures used for aquaculture are not prone to flooding.

25. Aquaculture containment structures used to cultivate aquaculture fisheries resources are required to be constructed so the lowest part of the top of the wall is above the 1% AEP flood level; aquaculture containment structures which are used solely for treatment and settlement and do not contain aquaculture fisheries resources are required to be constructed so the lowest part of the top of the wall is above the 2% AEP flood level.

26. The development application will also include to include relevant plans as per the department's DA Forms guide: Relevant plans, showing:

    - A survey plan or chart clearly showing the location of the development (including GPS coordinates and zone reference – GDA94 preferred) and important features, such as water courses, wetlands and mangroves, in the surrounding area;
    - Specific details of the proposed development, including dated, scaled and referenced plans identifying footprints of the aquaculture facility and ancillary features (in square meters or hectares). These plans should include detailed, specific and accurate geographic information describing the proposed expansion of settlement ponds 1 and 2;
    - A scaled site plan showing the location of the aquaculture facility in relation to any waterways or wetlands. The site plan must also show the location of each of the

containment structures that are part of the aquaculture facility;

- Identification of any potential constraints (e.g. flood-prone land, protected marine vegetation, acid sulfate soils, etc.) and how impacts on the natural environment will be avoided or minimised through the siting of the aquaculture development;
- Details of any buffers proposed between the aquaculture activities and all freshwater areas or systems; and
- An operational management plan detailing:
    - Species, including scientific and common names, to be farmed;
    - production ponds;
    - water supply system;
    - water storage;
    - water distribution system;
    - drainage;
    - water treatment;
    - discharge system; and
    - storage of feed etc.

Marine plants

27. A desktop review undertaken by the Department of Agriculture and Fisheries confirms that Lot 3 on SP292103 experiences tidal influence and is supportive of marine flora protected by the *Fisheries Act 1994.*
28. Marine plants include:
    - any plant (a tidal plant (including marine algae) that usually grows on or adjacent to tidal lands whether it is living, dead, standing or fallen; or
    - any plant material on tidal land (up to the level of Highest Astronomical Tide (HAT)).
29. Plants such as mangroves, mangrove fern, saltcouch or samphire species are considered marine plants regardless of whether or not they are above or below the level of HAT.

    Marine plants do not include:
    - a plant that is prohibited matter or restricted matter under the *Biosecurity Act 2014*; or
    - a plant that is controlled biosecurity matter or regulated biosecurity matter under the *Biosecurity Act 2014.*
30. Marine plant protection applies irrespective of the tenure (e.g. unallocated state land and all state tenured lands, including private freehold and leasehold lands) of the land on which the plant occurs, the time the plant has been growing at the location, or the degree of or purpose of the disturbance.
31. A development permit for the removal, destruction or damage or marine plants is required.
32. The development application should include a full response against State code 11: Removal, destruction or damage of marine plants of the current SDAP. The Department of Agriculture and Fisheries is finalising to guidelines to assist applicants in preparing an application addressing SDAP. State code 11 guideline is not yet available, however please check the website for updates.
33. Particular attention should be paid to the following POs in State code 11:
    - All development – PO1 to PO15;

- (If applicable) Temporary works – PO26 to PO28; and
- Matters of state environmental significance – PO31.

34. In accordance with PO31 of SDAP State Code 11, the department maintains an 'avoid, mitigate, offset' hierarchy that applies to all proposed developments that impact on marine plants, a matter of state environmental significance.
35. Depending on the type of works being proposed and the amount of marine plants to be disturbed, the works may have a Significant Residual Impact (SRI).
36. The applicant will need to provide details on how impacts to fisheries resources will be avoided or minimised, and where this cannot be reasonably achieved, offset.
37. The Environmental offsets and the planning framework fact sheets and guidelines prepared by the department provides for further detail.
38. Refer to the department's Significant Residual Impact Guideline to determine whether an SRI is likely.
39. In accordance with the Department of Environment and Heritage Protection's Queensland Environmental Offsets policy, the ratio for offsets is based on:

Disturbance	Offset
1 hectare	4 hectares

40. The information submitted with the pre-lodgement request, describes a proposal to add an additional 10 hectares to settlement ponds 1 and 2, offset by surrendering settlement pond 4 to the state. It appears unlikely that settlement pond 4 would be able to return a sufficient offset to satisfy the ratio mentioned above.

State transport corridor

41. The subject site is mapped within 25 metres the Mossman-Daintree Road, a state-controlled road and within 100m of a state-controlled road intersection.
42. The proposed development will trigger referral agency assessment for a material change of use of premises near a State transport corridor unless the proposal can meet the excluded material change of use criteria as defined in Schedule 24 (Dictionary) of the Planning Regulation 2017.
43. An excluded material change of use means a material change of use of premises that—

(a) does not involve a new or changed access between the premises and any of the following—

(i) a State transport corridor;

(ii) a road that intersects with a State-controlled road;

(iii) a road that intersects with a railway crossing; and

(b) is for—

(i) 1 or more of the following uses—

(A) a dwelling house;

(B) a secondary dwelling;

(C) a domestic outbuilding associated with a dwelling house on the premises;

(D) a dwelling unit;

(E) a dual occupancy;

(F) caretaker's accommodation;

(G) a community residence; or

(ii) a use other than a service station, fast food outlet, telecommunication facility or use stated in subparagraph (i), and all of the following apply—

(A) the premises have a gross floor area of no more than 100m^2 and the material change of use does not increase the gross floor area;

(B) the material change of use does not involve building work, other than building work that is wholly inside a building;

(C) if the material change of use involves building or extending a hardstanding area—the hardstanding area or extension is not more than 25m2.

44. The information submitted with the pre-lodgement request indicates the proposed development does not involve a new or changed access between the premises and a road that intersects with a State-controlled road, and the subject site contains approximately 7 buildings on site associated with the operations of the approved aquaculture farm and the tourist facility. It appears from a desktop assessment that the premises has a gross floor area more than 100m^2.

45. Whilst the proposal can meet part (a)(i) and (a)(ii) (does not involve a new or changed access between the premises) of the excluded material change use definition, the proposed development is not compliant with subparagraph (ii) (A) of the definition as the premises have a gross floor area of no more than 100m^2; therefore, the proposed development will trigger referral agency assessment for development near a state transport corridor.

46. The development application should provide a full response against State code 1: Development in a state-controlled road environment of the current SDAP.

Tidal works or work in a coastal management district

47. The subject site is mapped in the coastal management district and is mapped as an erosion prone area.

48. A material change of use involving operational work completely or partly in an erosion prone area in the coastal management district and is extracting, excavating or filling 1,000m^3 or more requires referral agency assessment.

49. The development application should include a full response against SDAP State code 8: Coastal development and tidal works; and include:

- a detailed description of the proposed development and a description of the existing site conditions of the proposed development location
- a detailed description of the property address, tenure and real property description of the land
- location of all built structures, or structures to be modified or demolished, as a result of the proposed development
- description of any operational works occurring on site including expected timeframes
- any machinery to be used or stored on the site
- staging of the development if applicable
- a set of detailed and appropriately scaled ‘for construction’ drawings and/or plans which clearly identify the location of proposed development in relation to:
    - o adjacent real property boundaries
    - o adjacent riverbanks, walls, sandbanks, structures, the limit of vegetation, and/or other principal features of the immediate area

- relevant tidal planes (eg. Highest Astronomical Tide, Mean High Water Springs)
- the location and setting out details for cross-sections; and
- any other information required to accurately define the area and to allow the site to be readily identified from the plan.

- All plans/drawings should include title, date and numbering suitable to identify the plan and should be mapped to GDA94 projection.

50. To assist in the prompt and accurate assessment of the development application, please provide georeferenced KML and/or KMZ files of the proposed development footprint.
51. Mapping indicates the erosion prone area exists within the site. Development is generally not supported within the erosion prone area unless it can be justified in the performance outcomes of SDAP State code 8: Coastal development and tidal works.
52. Adequate justification for any permanent structure/s proposed within the erosion prone area or information on how the hazards associated with the development will be avoided or mitigated should be included with the application.
53. Particular attention should be paid to thoroughly addressing SDAP State Code 8, POs 1 to 6 in Table 8.2.1 to justify why the development cannot be relocated outside the high coastal hazard area.
54. The Department of Environment and Heritage Protection's Coastal Hazard Technical Guideline provides information on coastal hazards as well as information on recalculating the erosion prone area using a standard, approved formula should you feel that the currently mapped erosion prone area is not a true indicator of the potential hazard.
55. To address SDAP State Code 8, PO16 in Table 8.2.1 you will be required to determine if there are any Matters of State Environmental Significance (MSES) on or adjacent to the proposed development site.
56. The Department of Environment and Heritage Protection's Environmental Reports Online can be used to conduct a desktop analysis to identify any mapped MSES that exists on (using the lot on plan option to search) and near the proposed site/s (using the central coordinates option to search).
57. Where MSES are identified:
    - Provide a targeted assessment to ground truth any MSES identified.
    - Demonstrate how the development avoids adverse impacts on each MSES to the greatest extent practicable.
    - Where the above is not reasonably possible, demonstrate how impacts on MSES have or will be minimised and/or mitigated to the greatest extent practicable.
    - Demonstrate whether the development will have a Significant Residual Impact on any identified MSES using the department's Significant Residual Impact Guideline.
    - An assessment will need to be undertaken for each MSES to determine whether the proposed development will result in a significant residual impact.
    - Identify any potential offset obligation.
58. For further advice on environmental offsets please visit the following website.
59. The following tools may be helpful in your desktop analysis and assessment:
    - Map of Referable Wetlands
    - Regulated Vegetation Mapping
    - Wetland information

- Protected Plants Flora Survey Trigger Map
- Species List
- Queensland Wetland Buffer Guideline
- State Planning Policy mapping

Wetland Protection Area

60. The subject site is mapped in a wetland protection trigger area and contains a wetland protection area.
61. If the proposal involves operational work that is high impact earthworks and in a wetland protection area, referral agency assessment is required.
62. The development application should include a full response against SDAP State code 9: Great Barrier Reef wetland protection areas.

Application requirements

63. The development application will need to include DA Form 1 and any applicable DA form template. The DA form templates are available on the department's website under resources.
64. To assist applicants, the department has prepared the DA forms guide: Forms 1 and 2.
65. The department has also prepared the DA Forms guide: Relevant plans guideline to assist applicants when submitting relevant plans with a development application.

State development assessment provisions (SDAP)

66. SDAP version 2.1 took effect on 11 August 2017. The department has prepared response templates to assist applicants in addressing the SDAP criteria.
67. The SDAP response templates are available on the department's new Queensland's Planning System website under the resources tab.

Development application fees

68. **Schedule 10, Part 3, Division 4, Table 1, Item 8 – Clearing native vegetation** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. If the proposal requires referral agency assessment for clearing native vegetation, the potential fee is $6,260.00 as the subject site contains of concern regional ecosystem.
69. **Schedule 10, Part 5, Division 4, Table 2, Item 1, Item 8 – Non-devolved environmentally relevant activities** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. If the aggregate environmental score is for the ERA is 25 or less the assessment fee is $1,564.00, or if the aggregate environmental score is more than 25, but no more than 75 the assessment fee is $3,131.00.
70. **Schedule 10, Part 6, Division 1, Subdivision 3, Table 1, Item 8 – Aquaculture** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. The fee is $6,620.00 based on the proposed the aquaculture being carried out in a pond that covers an area of 100ha or less and is expected to discharge waste into Queensland waters.
71. **Schedule 10, Part 6, Division 3, Subdivision 3, Table 2, Item 8 – Removal, destruction or damage of marine plants** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. Not knowing the full extent of marine plant disturbance, the department is unable to confirm the potential fee. The assessment fee is dependent on the area of marine plant disturbance and is scaled at $3,130.00 or $6,260.00 or $12,518.00.

72. **Schedule 10, Part 9, Division 4, Table 2, Item 8 – State transport corridor or that is a future State transport corridor** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. The assessment fee is $1,564.00 as the proposal is not considered a dwelling and does not involve a new relevant vehicular access to the State transport corridor.
73. **Schedule 10, Part 17**, **Division 3, Table 6, Item 8 - Tidal works or work in a coastal management district** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. The assessment fee is $3,130.00.
74. **Schedule 10, Part 20, Division 4, Table 3, Item 8 – Premises in a wetland protection area** of the Planning Regulation 2017 prescribes the assessment fee where the department is a referral agency. The assessment fee is $3,130.00.
75. Please note development assessment fees are subject to change and you should always check in the latest Planning Regulation 2017.

Further permits

76. In Queensland, all native plants are considered "protected plants" under the *Nature Conservation Act 1992*. Anyone proposing to clear protected plants 'in the wild' for any reason may require a permit from the Department of Environment and Heritage Protection.
77. The Protected Plants Flora Survey Trigger map identifies the subject site in a high risk area. The trigger map can be requested on the Department of Environment and Protection's website.
78. In a high risk area, a flora survey must be undertaken and a clearing permit may be required for clearing endangered, vulnerable and near threatened plants ('EVNT plants') and their supporting habitat.
79. Further information on protected plants can be found on the Department of Environment and Heritage Protection's Operational Policy.
80. Please contact the Department of Environment and Heritage Protection's Permit and Licence Management Division on 1300 130 372 or via email palm@ehp.qld.gov.au for information regarding clearing requirements under the *Nature Conservation Act 1992* protected plant framework.

This pre-lodgement advice does not constitute an approval or an endorsement that the department supports the development proposal. Additional information may be required to allow the department to properly assess the development proposal when a formal application has been lodged.

For further information please contact Joanne Manson, Principal Planning Officer, SARA Far North QLD on 4037 3228 or via email CairnsSARA@dilgp.qld.gov.au who will be pleased to assist.

Yours sincerely

Graeme Kenna
Manager (Planning)

Appendix 1D

2018 SARA Further Pre-lodgement Advice

PA6-L

Queensland Government

Department of
State Development,
Manufacturing,
Infrastructure and Planning

Our reference: 1802-4138 SPL

1 March 2018

Daintree Saltwater Barramundi
c/- Ecosustainability Pty Ltd
PO Box 230
Yorkeys Knob QLD 4878
gcecosustainability@gmail.com

Attention: Guy Chester

Dear Sir / Madam

Further pre-lodgement advice

Thank you for your correspondence received on 25 February 2018 in which you sought further pre-lodgement advice from the Department of State Development, Manufacturing, Infrastructure and Planning regarding the proposed development described below.

Location details

Street address:	Vixies Road, Wonga Beach
Real property description:	Lot 3 on SP292103
Local government area:	Douglas Shire Council
Existing use:	Aquaculture facility

Details of proposal

Development type:	Material change of use
Development description:	Expansion of the aquaculture facility at Daintree Saltwater Barramundi and an Environmentally Relevant Activity for Aquaculture

Supporting information

Drawing/report title	Prepared by	Date	Reference no.	Version/issue
Proposed Pond Layout Lot 3 on SP292103, Mossman Daintree Road, Wonga Beach	Gary T Pozzi Cadastral Surveyor	Feb 18	18/3	A
Daintree Saltwater Barramundi Regulated Veg Overall & Design	Ecosustainability Pty Ltd	24/2/2018	-	-

Far North Queensland regional office
Ground Floor, Cnr Grafton and Hartley Street, Cairns
PO Box 2358, Cairns QLD 4870

(regulated vegetation)				
Daintree Saltwater Barramundi Regulated Veg Overall & Design (regulated vegetation categories)	Ecosustainability Pty Ltd	24/2/2018	-	-

The department has carried out a review of the information provided and the impacts of the proposal in relation to the clearing of native vegetation only. The pre-lodgement advice issued under 1709-1202 SPL dated 28 September 2018 remains current, noting this pre-lodgement request is in response to points 9 to 11 of 1709-1202 SPL.

Please note the pre-lodgement advice is valid for a period of nine months from the date of issue, unless a change in legislation or policy occurs that would affect the pre-lodgement advice.

Item	Advice
Clearing of native vegetation	
1.	The provision of this pre-lodgement advice is conditional upon the extent of the development shown in the proposal plan referenced as "Proposed Pond Layout Lot 3 on SP292103, Mossman Daintree Road, Wonga Beach, Drawing number 18/03, Revision: A, Dated Jan 2018" (**Attachment 1**).
2.	Due to the location of the proposed development in relation to the Category B area mapped on Lot 3 on SP292103, no clearing of native vegetation will occur as a result of the proposed development and no new clearing exemptions are created by the proposal. The current proposal will not trigger referral agency assessment under Schedule 10, Part 3, Division 4, Table 3, Item 1 – Clearing native vegetation of the Planning Regulation 2017. Should the location of the proposed development be amended, this pre-lodgement advice may be invalid and the applicant will need to reconsider if any amended proposal triggers referral for clearing of native vegetation.

This pre-lodgement advice does not constitute an approval or an endorsement that the department supports the development proposal. Additional information may be required to allow the department to properly assess the development proposal when a formal application has been lodged.

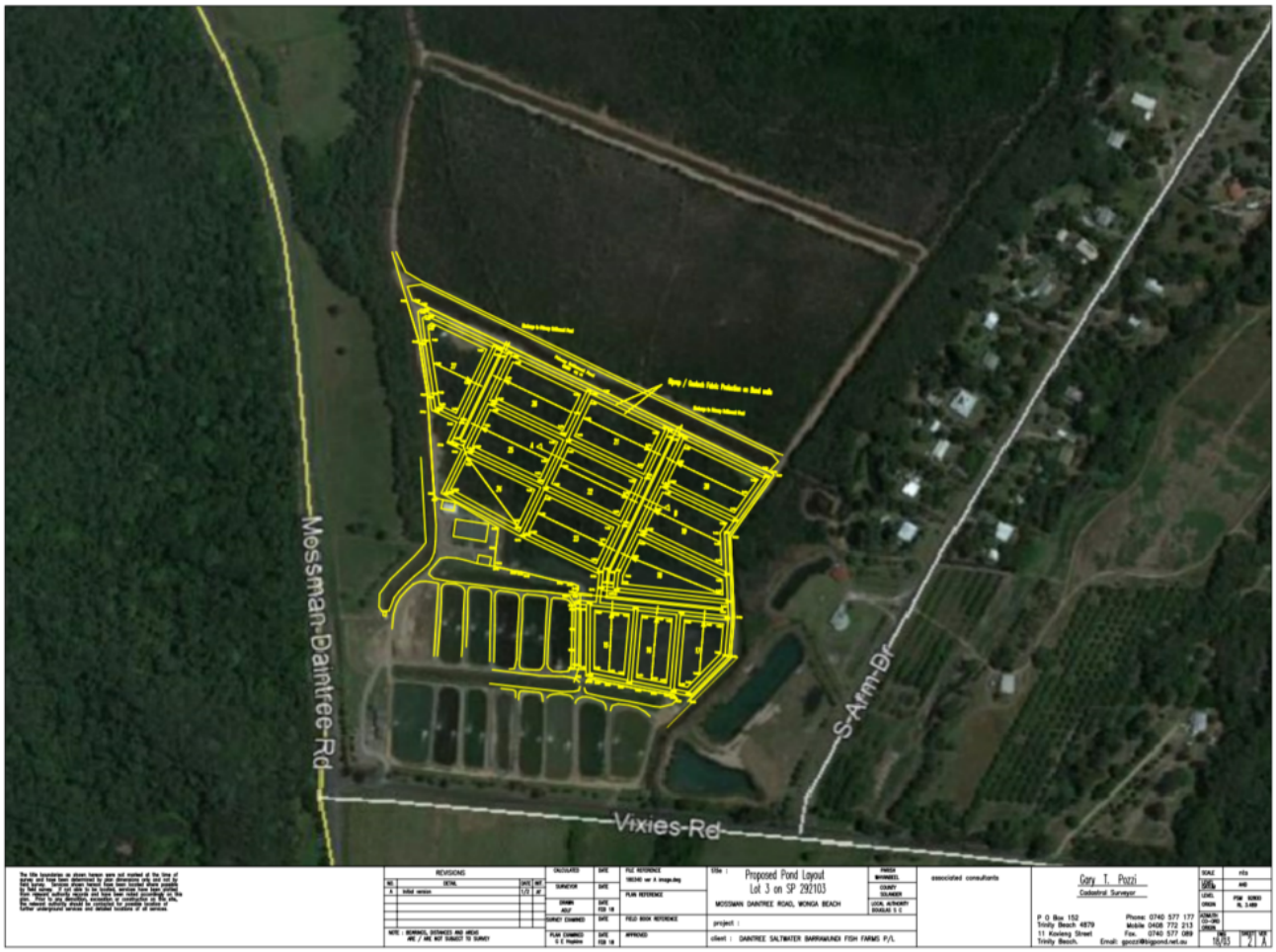
For further information please contact Joanne Manson, Principal Planning Officer, on SARA Far North QLD 4037 3228 or via email CairnsSARA@dilgp.qld.gov.au who will be pleased to assist.

Yours sincerely

Brett Nancarrow
Manager (Planning)

Enc. Attachment 1 – Proposal plan

Attachment 1 – Proposal plan



Far North Queensland regional office
Ground Floor, Cnr Grafton and Hartley Street, Cairns
PO Box 2358, Cairns QLD 4870

Appendix 1E

2015 DSC Pre-lodgement Meeting

DOUGLAS
SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

YOUR REF:
OUR REF: D#455390

25 May 2015

Mr Mark Hober
Daintree Salt Water Barramundi Fish Farms
L3 Vixies Road
WONGA BEACH QLD 4873

dswbarra@bigpond.com

Dear Sir

RE PRELODGEMENT ENQUIRY RESPONSE FOR LOT 3 ON SP150448, L1 SP188690 AND L278 ON SR419 BEING AT L3 VIXIES ROAD, 2-28 SOUTH ARM DRIVE AND L278 MOSSMAN- DAINTREE ROAD WONGA BEACH

Council refers to your prelodgement meeting with Council's Jenny Elphinstone on 1 May 2015, concerning the above land.

Existing land Use

It is understood that the use of the land for the purpose of aquaculture commenced circa March 1988 at a time when the Planning Scheme in effect nominated the use as "as-of-right." At that time the use was over part of the historical parent title of Lot 1 on RP749715.

It is understood that in 2004 the use amounted to a use of some 3.34 hectares and at that time was operated under a license issued by the Department of Primary Industry to Mr Vixie Scomazzon.

It is understood from discussions that the fish farm activity has always utilised a drain from the farm to the South Arm of the Daintree River to gain a water resource for the activity. At the time the activity commenced this drain was generally in the historical parent title Lot 1 on RP749715.

In 2002 the parent title being Lot 1 on RP749715 was reconfigured into two lots: Lots 1 and 3 on SP150448. The fish farm, excluding part of the drain to the South Arm of the Daintree River is situated on Lot 3. In 2006 Lot 1 on SP150448 was reconfigured through a boundary realignment and has generally become Lot 1 on SP188690. The balance of the drain generally lies on Lot 1 on SP188690.

Council holds no detailed survey of the land to clarify that the water resource drain to the South Arm of the Daintree River is only situated on Lot 1 on SP188690. That is, that the drain does not also lie on any part of any neighbouring land to the west.

Aquaculture License

You have advised that you operate under existing and continuing licencing achieved from the State Government.

PMAV Mapping

A Property Map of Assessable vegetation (PMAV 2006/007816) was issued for Lot 3 on SP150448 on 29/9/2006 by the Department of Natural Resources, Mines and Water. This map identifies the majority of the southern portion of the land to be in Category X and a strip of land adjacent to the northern boundary to be an, *"Area subject to Certified Regional Ecosystem Mapping or other PMAV's may apply."*

A review of aerial mapping generally correlates the Category X land to the fish farm and its associated settling ponds and the South Arm of the Daintree River mangrove wetlands as the *"Area subject to Certified Regional Ecosystem Mapping or other PMAV's may apply."* There appears an inconsistency with the alignment of the two areas having regard to the PMAV and aerial imagery.

Council has no record of a PMAV for the neighbouring land to the north, Lot 1 on SP188690 on which part of the drain lies.

Proposed Developments

It is understood from your enquiries that you seek the following:

A. A boundary realignment to include the water resource drain with the land on which the farm operates;
B. An expansion of the barramundi farm to include additional levees and ponds; and
C. An extractive industry approval for land on the western side of the Mossman-Daintree Road for use of levees for the expansion of the barramundi farm.

Planning comments on each of these proposed developments is detailed below.

A. Boundary Realignment For Inclusion Of Existing Drain

Your discussion sought comment regarding a proposed boundary realignment of the Lot 3 on SP150448 and Lot 1 on SP188690 to enable the whole of the activity (fish farm and all of the resource water drain) being incorporated into a single land parcel.

This proposed boundary realignment would require a Development Permit to reconfigure the lots. The reconfiguration requires a code assessable approval from Council and this application does not undergo public notification.

You will also need to submit:

1. IDAS Forms 1 and 7. Note consent of all land owners is required;
2. A plan of the new lots.
3. A report that assesses the development against the Planning Scheme codes. Given the intent of the boundary realignment has regard to the water resource drain survey details of this drain should be included in the application material; and
4. The application fee.

Application forms are available on the State Government website at the following link: http://www.dsdip.qld.gov.au/forms-templates/sara-idas-forms.html .

Care needs to be taken regarding the position of the drain. A review of aerial photographs indicates the drain is located close to the western boundary of Lot 1 on SP188690 and neighbouring lots to the west of this land. A cadastral survey will need to be undertaken to assure Council that the reconfiguration is over the required land. It is recommended you engage a Licensed Survey to provide such detail. The Surveyor may be able to provide you with the proposed lot plan.

The application would need to include all land on which the drain lies. Consent for the application would need to be given by all land owners.

A copy of Council's Planning Scheme is available on Council's website at http://douglas.qld.gov.au/development/planning-services/douglas-shire-planning-scheme/

The planning report needs to address the following codes:

- Rural Areas and Rural Settlements Locality Code
- Rural Planning Area Code
- Natural Areas and Scenic Amenity Code
- Reconfiguring a Lot Code

Council's application fees (current financial year) are as follows.

- Development Application, Reconfiguration of a Lot (boundary realignment) $1,033.95.
- Signing and dating of Survey Plan, $467.25 plus $86.00 per lot.

State Referrals

Schedule 7 of the *Sustainable Planning Regulation 2009* nominates referrals required for applications. The responsibility for referrals and compliance with State codes is a matter for the Applicant. You are referred to the *Sustainable Planning Regulation 2009* and the State Government mapping for referrals, see the following link: http://www.statedevelopment.qld.gov.au/about-planning/da-mapping-system.html

On a review of Schedule 7 it is understood that referral would be required to the State for:

- Sch7, Table 2, No.4 – vegetation; and
- Sch 7, Table 2, No.14 – coastal management district.

It is recommended that you contact the Department of Infrastructure, Local Government and Planning to clarify the State referrals and requirements. The Northern Region's Cairns Office contact details are as follows:

Telephone:	+61 7 4037 3400
Fax:	+61 7 4039 8855
Location:	Level 11, Cairns Corporate Tower, 15 Lake Street, Cairns
Postal Address:	PO Box 3038, Cairns, Queensland 4870

Considerations for Boundary Realignment

Council is bound by the *Sustainable Planning Act 2009* to a concurrence agency response. Given the general concern for wetlands and sensitive environmental areas consideration of the reconfiguration may be conditional on environmental covenants or transfer to the State of sensitive areas. The decision on the application is a matter for Council to determine.

B. Expansion of Barramundi Farm

It is understood that this application will be over the land on which the existing farm operates and will also need to include the water resource drain to the South Arm of the Daintree River.

State Referrals

It is understood you have commenced discussions with the Department of Primary industries regarding the proposed expansion of the aquaculture facility.

While the PMAV has been created for the farm it does not include the water resource drain.

It is strongly recommended you discuss the proposal with the State in respect to the Vegetation Management Act, wetlands, fish habitat areas, coastal management district and the state-controlled road in regards to mapping and state interests. It is likely that these issues are integral to achieving an approval and the determining of particular conditions. You are referred to the Department of Infrastructure, Local Government and Planning and the *Sustainable Planning Regulation 2009* as initial point of reference. The extent of referral is dependent on the nature and attributes of the proposed development.

Council Issues

The proposed expansion is considered to be a material change of use and this requires an impact assessable approval from Council. The material change of use application requires public notification.

The application would need to include all land on which the drain lies. Consent for the application would need to be given by all land owners.

A copy of Council's Planning Scheme is available on Council's website at http://douglas.qld.gov.au/development/planning-services/douglas-shire-planning-scheme/

For the material change of use application the planning report needs to address the whole of the Scheme, including the Desired Environmental Outcomes and following codes:

- Rural Areas and Rural Settlements Locality Code;
- Rural Planning Area Code;
- Acid Sulfate Soils Code;

- Aquaculture and Intensive Animal Husbandry Code;
- Filling and Excavation Code;
- Landscaping Code;
- Natural Areas and Scenic Amenity Code; and the
- Vehicle Parking and Access Code.

Attention needs to be given to achieving compliance with the Aquaculture and Intensive Animal Husbandry Code, in particular the Purpose, Performance Criteria and Acceptable solution relevant to setback from a Residential 1 Planning Area and a Rural Settlement Planning Area. Your application should discuss amenity impacts relevant to the use such as general farm and tourist activities, noise, odours, dust, impacts on adjacent vegetation including settling areas for waste discharge and any other nuisances. Buffers including landscaping should be identified in the application. Essentially the impacts of the activity need to be contained on the land.

The land is mapped by the State as having a high stormtide hazard. Implications on the impact of stormtide inundation will need to be submitted as part of the application details.

You will also need to submit:

1. IDAS Forms 1 5 (Material Change of Use) and 25 (Aquaculture). Other forms may be required depending on the nature of the development proposed. You are advised to discuss this issue with the State. Note consent of all land owners is required;
2. A plan of the proposed expansion.
3. A report that assesses the development against the Planning Scheme codes and any relevant State codes; and
4. The application fee.

Council's application fees (current financial year) are as follows.

- Development Application, Material Change of Use (Aquaculture) $5,838.90

Should an approval issue, a separate approval for a Development Permit for Operational Work would also be required to undertake the construction of the levees and new ponds etc.

Considerations for Expansion of Aquaculture

Any further prelodgement enquiry on this component of the development should be accompanied by qualified reports regarding amenity impacts. Officer advice is provided on a without prejudice basis. An application of this nature will be reported to Council for determination and consideration will be given to properly made submissions.

Please note persons who lodge properly made submissions hold appeal rights in respect to Council's decision on the application.

C. Extractive Industry on Lot 295 on RP889328

This land straddles the Mossman Daintree Road. From discussions it was understood that you propose to extract earth from the land on the western side of the Mossman-Daintree Road.

While the whole of the land is included in the Rural Planning Area the land west of the Mossman-Daintree road is constrained by hill slopes and significant vegetation. Extraction of earth from the land on the west side of the Mossman-Daintree Road is also likely to result in scarring and may result cause slope instability.

The undertaking of an extractive industry is impact assessable development in the Rural Planning Area. This type of application requires public notification.

The application is assessed against the whole of the Planning Scheme including the Desired Environmental Outcomes and the following codes:

- Rural Areas and Rural Settlements Locality Code
- Rural Planning Area Code
- Acid Sulfate Soils Code
- Natural Hazards Code
- Extractive Industry Code
- Filling and Excavation Code
- Landscaping Code
- Natural Areas and Scenic Amenity Code
- Vehicle Parking and Access Code

Council will require the following details to be provided:

1. IDAS Forms 1, 5 (Material Change of Use). Other forms may be required depending on the nature of the development proposed. You are advised to discuss this issue with the State and having regard to the *Sustainable Planning Regulation 2009*. Note consent of all land owners is required;
2. A plan of the proposed development including details of the area and depth of extraction, section profile of proposed extraction area, and detail of the amount of extraction material sought. Where the extraction is to take place on the west side of the Highway, the hillslopes, then you will need to provide a geotechnical engineers report and a visual amenity report on the impact of the resulting cut(s). Where the extraction is to occur on the east side of the Highway details of possible acid sulphate soils is required to be submitted in bore logs as well as engineering advice on resulting dams, and stormtide etc;.
3. A report that assesses the development against the Planning Scheme codes and any relevant State codes; and
4. The application fee.

Council's application fees are as follows.

- Development Application, Material Change of Use (Extractive Industry):

Up to one (1) Ha Application	$8,620.60
For each Ha or part thereof exceeding one (1) Ha	$193.75 per hectare
For temporary and minor extractive operations involving an area no greater than 4000m2 and/or extracting a volume of material no greater than 4000m3 for a duration of no greater than six (6) months.	$5,838.90

Considerations for Extractive Industry

Any further prelodgement enquiry on this component of the development should be accompanied by qualified reports. Officer advice is provided on a without prejudice basis. An application of this nature will be reported to Council for determination and consideration will be given to properly made submissions.

Please note persons who lodge properly made submissions hold appeal rights in respect to Council's decision on the application.

Other

State Government mapping is available online at the following link.
http://www.statedevelopment.qld.gov.au/about-planning/da-mapping-system.html

Given the nature of applications and the sensitivity of the environment it is highly recommended that you seek professional assistance in preparing the development applications. Council's roles in these matters are as a regulator and assessment manager.

The above advice is provided on a without prejudice basis.

Should you require further assistance on this matter please contact Jenny Elphinstone by telephone on (07) 4099 9482 or by email on jenny.elphinstone@douglas.qld.gov.au .

Yours faithfully

Donna Graham
Manager Development And Environment

Appendix 2

1988 DSC - Aquaculture As of Right

DOUGLAS SHIRE COUNCIL

P.O. BOX 357
MOSSMAN Q. 4873

TELEPHONE (070) 98 1555 - ADMINISTRATION OFFICES
98 1644 - WORKS DEPOT
98 1822 - ENGINEERING OFFICE
FAX No. (070) 98 1902

ALL COMMUNICATIONS TO BE ADDRESSED TO
THE SHIRE CLERK

IF CALLING OR TELEPHONING ON THIS MATTER ASK FOR:-
Mr A. J. Twomey
QUOTE REFERENCE
T2 AJT tb
YOUR REFERENCE

88/308

V. Scomazzon Esq.,
P O Box 70
Mossman
Queensland 4873

9th March 1988

Dear Sir

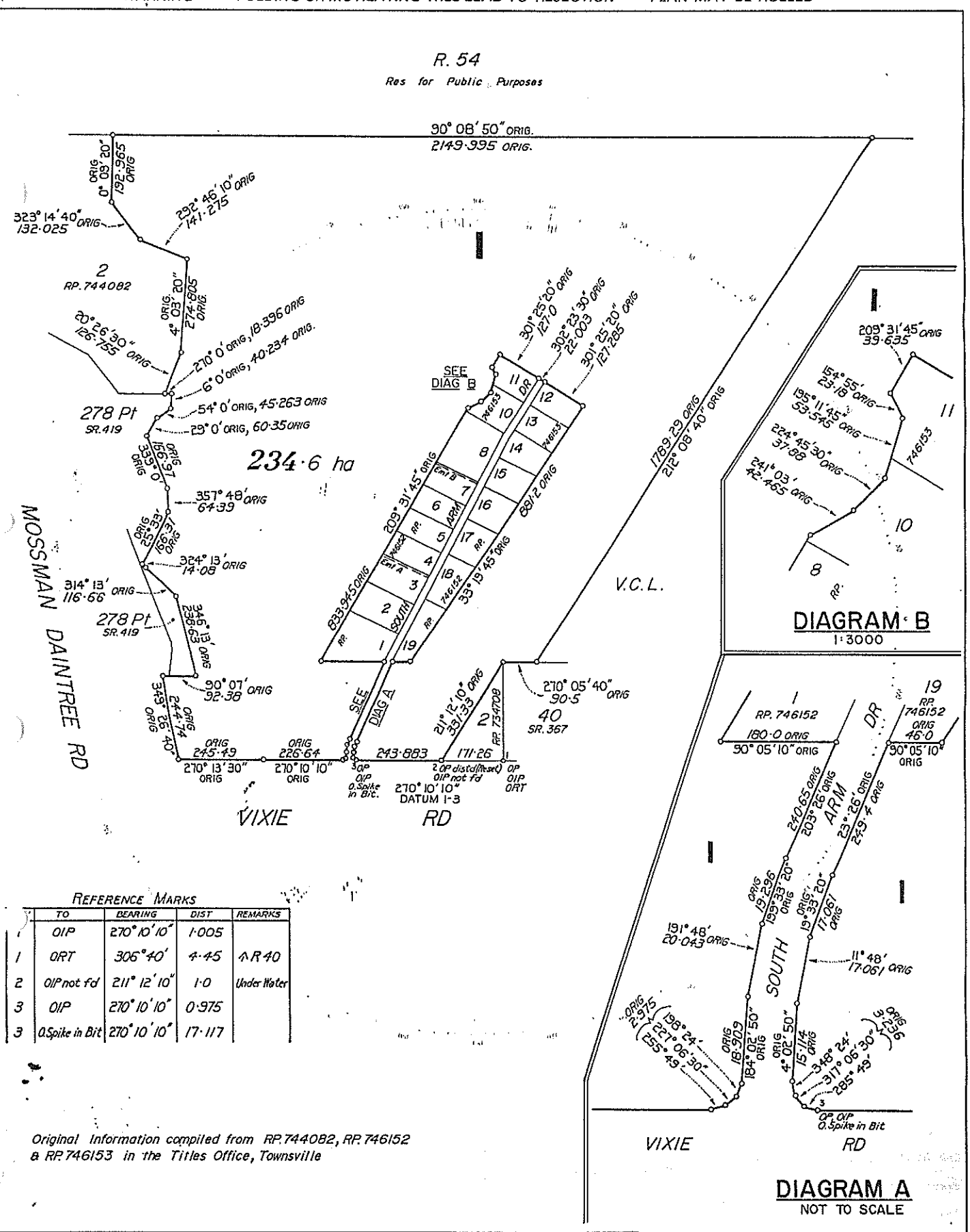
Re: Aquaculture Project - Part of Lot 1 on R.P. 746359, Parish of Whyanbeel

I refer to your letter dated 13th January 1988 advising of your application to the Queensland Department of Primary Industries for an Aquaculture Permit on the abovementioned land, and advise that under the provisions of Council's Town Planning Scheme Aquaculture is an "as of right" use for the zone in which the subject land is situated.

Yours faithfully

A. J. Twomey
SHIRE CLERK

GW WARNING - FOLDING OR MUTILATING WILL LEAD TO REJECTION - PLAN MAY BE ROLLED



REFERENCE MARKS

	TO	BEARING	DIST	REMARKS
1	OIP	270° 10' 10"	1.005	
1	ORT	306° 40'	4.45	∧R40
2	OIP not fd	211° 12' 10"	1.0	Under Water
3	OIP	270° 10' 10"	0.975	
3	⌀Spike in Bit	270° 10' 10"	17.117	

NO FIELD NOTES LODGED

ORIGINAL GRANT

Vol. N1085 Fol. 168

PLAN OF Lot 1

REDUCED

Cancelling The Balance of Lot 1 on RP 744082

ORIG. PORTION 348

TOWN

PARISH WHYANBEEL

COUNTY Solander

MAP REF.	PROCLAIMED SURVEY AREA	SURVEYED BY PETER STOPFORD 29.7.1987	MERIDIAN OF SR. 665	SCALE 1:10 000	REGISTERED PLAN 746359
PM					

CROWN COPYRIGHT RESERVED, REGISTRAR OF TITLES, QUEENSLAND

746359 746359 746359 746359
PLAN MUST BE DRAWN WITHIN BLUE LINES
PLAN MUST BE DRAWN WITHIN BLUE LINES

Appendix 3

1991 Clean Waters Act Permit

Department of Environment and Heritage

Renewal of Licence no. W860

Clean Waters Act 1971-1990
Clean Waters Act 1973 (Regulation 11)

Form 6

Pursuant to the provisions of the Clean Waters Act 1971-1990 licence number **W860** issued to **Scomazzon V**
of **P O Box 70**
MOSSMAN QLD 4873 is renewed.

This renewal of licence is granted and is in all respects subject to the said Act and Regulations made thereunder and shall expire on the thirty-first day of March, 1992, unless sooner suspended or cancelled.

This renewal of licence is granted subject to the conditions set out in the Schedule hereunder.

Schedule

Conditions as per attached schedule

Signed _____
as delegate of chief executive (Clean Waters Act)

Date 10 September 1991

FM 230

Lic 860

SCHEDULE

1. This licence is granted in respect of the discharge of aquaculture wastewater from premises situated on Part of Lot 1 on R.P. 746359, Parish of Whyanbeel, County of Solander to waters described as the south arm of the Daintree River.

2. The quantity of wastes discharged during any day shall not exceed 1500 cubic metres.

3. The quality of wastes discharged shall meet the following standards:

(a) (i) the 5-day Biochemical Oxygen Demand shall not exceed 20 milligrams per litre;

(ii) the Non-Filtrable Residue shall not exceed 30 milligrams per litre;

(iii) the pH value shall be not less than 6.5 nor more than 8.5;

(iv) the Dissolved Oxygen shall be not less than 2 milligrams per litre;

(v) Nitrogen, phosphorus and chlorophyl 'a' concentrations shall be kept to the minimum practical.

(b) The wastes shall not contain any matter or organisms in concentrations which make or which, in the opinion of the chief executive are likely to make the waters less fit for other water uses when account is taken of the effective dilution and quality of the receiving waters.

(c) The wastes shall not have any properties which make or which, in the opinion of the chief executive, are likely to make the waters less fit for other water uses when account is taken of the effective dilution and quality of the receiving waters.

4. The Licensee shall be responsible for the making of determinations, by appropriate means, of the daily quantities of wastes actually discharged.

5. The Licensee shall be responsible for the making of determinations of the quality of wastes discharged; such determinations shall be performed:

(a) for at least the following quality characteristics:

(i) 5 day Biochemical Oxygen Demand;
(ii) pH value;
(iii) Non-Filtrable Residue;
(iv) Dissolved Oxygen;
(v) Organic Nitrogen;
(vi) Ammonia Nitrogen;
(vii) Nitrate and Nitrite Nitrogen;
(viii) Total phosphorus;
(ix) Chlorophyl 'a';

(b) as often as necessary to check that the conditions of this Licence are being complied with, but not less frequently than monthly;

(c) by appropriate means, including the taking and analysis of representative samples and the making of tests;

(d) in accordance with methods prescribed in the Regulations;

(e) by, or under the supervision of, a person holding suitable qualifications in analytical chemistry or a closely related discipline.

6. The Licensee shall:

(a) keep records of the results of all determinations of the quantity and quality of wastes discharged;

(b) ensure that such records are conveniently located for examination by an Inspector;

(c) provide copies of such records to the Director or an Inspector on request.

7. The Licensee shall:

(a) provide, and maintain in good condition, convenient access to the locations where wastes may be discharged;

(b) ensure that such access is available at all reasonable times;

(c) provide, and maintain in good condition, suitable facilities for sampling the wastes discharged.

Appendix 4A

2015 Current Aquaculture Licence and Marine Plants Permit

Queensland Government

Department of Infrastructure, Local Government and Planning

Our reference: SPD-0515-017379

5 June 2015

Daintree Saltwater Barramundi Fish Farms
Lot 3 Vixies Road
Wonga Beach QLD 4873

Att: Mark Hober

Dear Sir / Madam

Notice of decision—changed decision notice (assessment manager - responsible entity)
Development permit for a material change of use for aquaculture on land situated at Vixies Road, Wonga Beach and more particularly described as Lot 3 on SP150448 in the Douglas Shire region
(Given under section 376 of the *Sustainable Planning Act 2009*)

The Department of Infrastructure, Local Government and Planning received representations under section 369 of the *Sustainable Planning Act 2009* (SPA) on 1 May 2015 for the original decision described below.

Applicant details

Applicant name:	Daintree Saltwater Barramundi Fish Farms

Site details

Real property description:	Lot 3 on SP150448
Local government area:	Douglas Shire Council

Application details

Proposed development:	Development permit for a material change of use for aquaculture

Far North Queensland Regional Office
Ground Floor, Cairns Port Authority
PO Box 2358
Cairns QLD 4870

Original decision

Date of original permits / licences (history):	18 September 1988 – Permit for Aquaculture Purposes 7 September 1994 – Permit for Aquaculture Purposes 18 September 1996 – Aquaculture Licence 31 May 2004 – Aquaculture Licence 10 February 2012 – Development Permit for a material change of use to conduct aquaculture
Original decision details:	Approved subject to conditions

A changed decision notice for this request is attached.

Copies of the following documents are also attached:

- relevant appeal provisions in the *Sustainable Planning Act 2009*
- any plans and specifications approved in relation to the decision notice.

If you require any further information, please contact Joanne Manson, Senior Planning Officer, SARA Far North QLD on 4037 3228 who will be pleased to assist.

Yours sincerely

Robin Clark
Manager (Planning)

enc: Changed decision notice
Attachment 1—Changed Concurrence agency conditions
Attachment 2 – Further advice
SPA appeal provisions
Approved plans and specifications

Our reference: SPD-0515-017379

Changed decision notice

(Given under section 376 of the *Sustainable Planning Act 2009*)

Applicant details

Applicant name:	Daintree Saltwater Barramundi Fish Farms
Applicant contact details:	Lot 3 Vixies Road Wonga Beach QLD 4873

Application details

Level of assessment:	Code assessment
Original application properly made date:	Not known
Date of request for change:	1 May 2015

Site details

Street address:	Vixies Road, Wonga Beach QLD 4873
Real property description:	Lot 3 on SP150448
Name of owner:	Pavel Prokopec

Nature of the changes

The nature of the changes agreed to are:

1. amendment to condition 2 to reference new plans that show the existing production ponds and settlement ponds numbered 1, 2 and 3 within the approved aquaculture area
2. inclusion of two additional species (tropical rock lobster and mud crabs).

Original decision

Date of original permits / licences (history):	18 September 1988 – Permit for Aquaculture Purposes 7 September 1994 – Permit for Aquaculture Purposes 18 September 1996 – Aquaculture Licence 31 May 2004 – Aquaculture Licence 10 February 2012 – Development permit for a material change of use to conduct aquaculture
Original decision details:	Approved subject to conditions

Changed decision

Date of changed decision:	5 June 2015
Changed decision details:	Approved subject to conditions

Conditions

This approval is subject to:

- the changed concurrence agency conditions in Attachment 1

The department has, for particular conditions of this approval, nominated an entity to be the assessing authority for that condition under section 255D(3) of the *Sustainable Planning Act 2009*.

Aspects of development and development approval granted

Development permit for a material change of use to conduct aquaculture

Further development permits or compliance permits

Please be advised that the following development permits or compliance permits are required to be obtained before the development can be carried out:

1. Not applicable

Self-assessable codes

Please be advised that the following codes may need to be complied with for self-assessable development related to the approved development:

1. Not applicable

Compliance assessment

Compliance assessment is required under chapter 6, part 10 of the *Sustainable Planning Act 2009* for the following documents or works in relation to the development:

1. Not applicable

Properly made submissions

Not applicable—No part of the application required impact assessment.

Conflicts with relevant instruments

This decision does not conflict with a relevant instrument.

Rights of appeal

The rights of applicants to appeal to the Planning and Environment Court against decisions about a development application are set out in chapter 7, part 1, division 8 of the *Sustainable Planning Act 2009*. For particular applications, there may also be a right to appeal to the Building and Development Dispute Resolution Committee (see chapter 7, part 2 of the *Sustainable Planning Act 2009*).

Copies of the relevant appeal provisions are attached.

Relevant period for the approval

This development approval will lapse if development is not started within the relevant periods stated in section 341 of SPA.

Native title considerations

Notification for native title was not required.

Approved plans and specifications

Copies of the following approved plans and specifications are attached:

Drawing or document	Prepared by	Date	Reference no.	Version
Daintree Saltwater Barramundi Fish Farms Pty Ltd – site plan sheet 1 of 2 – Lot 3 SP150448 Wonga Beach **(as amended in red)**	RPS Australia Pty Ltd	27/1/2015	9338-8	N/A
Daintree Saltwater Barramundi Fish Farms Pty Ltd – site plan sheet 2 of 2 – Lot 3 SP150448 Wonga Beach	RPS Australia Pty Ltd	27/1/2015	9338-8	N/A

Our reference: SPD-0515-017379

Attachment 1—Changed concurrence agency conditions

No.	Conditions of development approval	Condition timing
Development permit for a material change of use for aquaculture		
Schedule 6, Table 3, Item 10 – Aquaculture- Pursuant to section 255D of the *Sustainable Planning Act 2009*, the chief executive administering the *Sustainable Planning Act 2009* nominates the Director-General of **Department of Agriculture and Fisheries** to be the assessing authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following condition(s):		
1.	The operator is authorised to conduct aquaculture on and harvest the following approved species: Common Name — Scientific Name Australian bass — *Macquaria novemaculeata* Banded rainbowfish — *Melanotaenia trifasciata* Barcoo grunter — *Scortum barcoo* Barramundi — *Lates calcarifer* Barramundi cod — *Cromileptes altivelis* Barred-cheek coral trout — *Plectropomus maculatus* Blue-spot coral trout — *Plectropomus laevis* Cobia — *Rachycentron canadum* Common coral trout — *Plectropomus leopardus* Eel tail catfish — *Tandanus tandanus* Estuary cod — *Epinephelus coioides* Flowery cod — *Epinephelus fuscoguttatus* Freshwater shrimp — *Macrobrachium rosenbergii* Golden perch (Cooper Creek strain) — *Macquaria ambigua n.sp* Golden perch (Dawson River strain) — *Macquaria ambigua oriens* Golden perch (Murray-Darling strain) — *Macquaria ambigua ambigua* Golden Snapper — *Lutjanus johnii* Gulf Saratoga — *Scleropages jardinii* Mahi Mahi — *Coryphaena hippurus* Mangrove jack — *Lutjanus argentimaculatus* Milkfish — *Chanos chanos* **Mud crab** — ***Scylla serrata*** Mulloway — *Argyrosomus japonicus* Murray cod — *Maccullochella peeli peeli*	At all times

No.	Conditions of development approval	Condition timing
	Passionfruit trout *Plectropomus areolatus* Queensland groper *Epinephelus lanceolatus* Redclaw crayfish *Cherax quadricarinatus* Sand whiting *Sillago ciliata* Silver perch *Bidyanus bidyanus* Sleepy cod *Oxyeleotris lineolatus* Snapper *Pagrus auratus* Southern saratoga *Scleropages leichardti* Spangled perch *Leiopotherapon unicolor* **Tropical rock lobster** ***Panulirus ornatua*** Yabby *Cherax destructor*	
2.	~~This development approval authorises activities within an approved Aquaculture Area of 3.34 hectares defined within Lot 3 on SP150448 and described in Drawing No. SC1010-S1 Rev A dated November 20052 submitted with the transfer application.~~ **This development approval authorises activities within an approved Aquaculture Area of 22.67 hectares defined within Lot 3 on SP150448 (this includes approximate area of 3.42 hectares of production ponds and 19.25 hectares of settlement ponds identified as number 1, 2 and 3) as shown in the following plans:** • **Daintree Saltwater Barramundi Fish Farms Pty Ltd, Site Plan sheet 1 of 2, Lot 3 SP150448 Wonga Beach, prepared by RPS Australia East Pty Ltd, Drawing number 9338-8, dated 27/1/2015 (as amended in red); in particular** o **settlement pond 4 identified within the area hatched red is not included in the approved aquaculture area** **Daintree Saltwater Barramundi Fish Farms Pty Ltd, Site Plan sheet 2 of 2, Lot 3 SP150448 Wonga Beach, prepared by RPS Australia East Pty Ltd, Drawing number 9338-8, dated 27/1/2015**	At all times
3.	~~Aquaculture authorised under this approval is limited by the following:~~ ~~Proposal details:~~ ~~Conduct aquaculture on an approved Aquaculture Area of 3.34 hectares (production area) on a total land area of 49.68 hectares~~ ~~Location:~~ ~~Lot 3 on SP150448, Parish of Whyanbeel, County of Solander, Shire of Douglas~~ ~~Address:~~ ~~Vixies Road, Wonga Beach, QLD~~	~~At all times~~
4.	~~DEEDI~~ **The Department of Agriculture and Fisheries** must be	At all times

No.	Conditions of development approval	Condition timing
	informed of any changes to the personal contact details for this Development Approval within 28 working days.	
5.	An Aquaculture Production Return must be submitted to the chief executive of ~~DEEDI~~ **the Department of Agriculture and Fisheries** by close of business on 31 July each year during the term of this Development Approval. This includes lodging a 'nil return' when no activity has occurred.	At all times
6.	Under this approval aquaculture fisheries resources must not be released in Queensland waters other than those waters approved under this Development Approval.	At all times
7.	Unless otherwise authorised, fisheries resources that are to be aquacultured and subject to this Development Approval must not be sold, traded, or given away for the purposes of using for bait. This includes the use of whole fish and any part of the fish.	At all times
8.	Any Development Approval and/or Resource Allocation Authority Area, and any associated areas which are used for activities related to the approved aquaculture operation (including processing), and all records relating to the aquaculture activity, must be made available for inspection by an inspector under the *Fisheries Act 1994* during reasonable hours.	At all times
9.	The species approved under this Authority must not be brought in Queensland for rearing without a health certificate or Pathology Report, issued by the exporting State or Territory's Fisheries or Veterinary authority certifying the animal's health, which must include a statement that the specimens originate from: a) a hatchery, farm, aquaculture premises or region which is recognised as free from infection by the diseases on the Queensland Declared Disease List based on the requirements listed in the OIE Manual of Diagnostic Tests for Aquatic Animals, current edition (Fourth Edition 2003 or later) for recognition as free from infection; or b) a hatchery, farm, aquaculture premises or region in which an appropriate targeted surveillance scheme over two years has been undertaken under the supervision of State or Territory Fisheries agencies or fisheries approved Veterinary authorities and where the requirements for recognition as free from infection by diseases of concern for that species on the OIE Manual of Diagnostic Tests for Aquatic Animals, current edition (Fourth Edition 2003 or later) have been met; or c) a single batch of gametes, larvae, fry, post-larvae, spat or early juvenile or adult of a species of finfish, crustaceans or molluscs, isolated from open waters, which has been tested using suitable techniques (refer ~~DEEDI~~ **Department of Agriculture and Fisheries** Health Translocation Protocols appropriate for approved species) to provide evidence that the batch is free from infection by diseases of concern on the	At all times

No.	Conditions of development approval	Condition timing
	Queensland Declared Disease List for that species A species of aquatic animal that is not finfish, crustacean or mollusc must not be brought into Queensland for rearing without a specific risk assessment and under a specific translocation protocol for that species.	
10.	The species to be farmed under this approval must not be brought into Queensland for rearing unless an "Application to all the Translocation of Live Aquatic Animals into and within Queensland form" (FDU1398) and Pathology Report (as detailed above) must be given within three (3) working days prior to all shipments into Queensland. It is a requirement that the pathology report/health certificate is dated no more than 14 days before shipment date. After arrival, any unusual clinical signs or mortalities in the stock must be reported immediately to the District Officer of the nearest Queensland Boating and Fisheries Patrol. If directed by a ~~DEEDI~~ **Department of Agriculture and Fisheries** officer, specimens must be forwarded to a veterinary laboratory as directed by the officer.	At all times
11.	The possession and use of "regulated fishing apparatus" under the Fisheries Regulation 2008, Chapter 4, Part 1, Division 4, Subdivision 1 (freshwater) and Subdivision 2, sections 188 and 189 (marine) area authorised at the approved Aquaculture Area.	At all times
12.	The control over the release of water from all ponds, tanks and drainage systems within the approved Aquaculture Area must be maintained at all times.	At all times
13.	~~A perimeter barrier/fence, which is impervious, must be maintained, for all size classes of the species that are approved under this Authority which are capable of overland escape.~~ **A barrier/fence, which is impervious, must be maintained, for all size classes of the species that are approved under this Authority which are capable of overland escape.**	At all times
14.	All reasonable and practicable measures to ensure that all waters (ponds, tanks, aquaria etc.) and associated plumbing, pumps etc. on the approved Aquaculture Area must be implemented and secured in such a way as to prevent the escape of any specimens (eggs, juveniles or adults) into Queensland waters.	At all times
15.	Where waters are introduced for the aquaculture of the approved species, the developer must implement all reasonable measures to ensure all waters are sufficiently screened to prevent the movement of any juvenile or adult wild fauna (excepting zooplankton) into the approved Aquaculture Area.	At all times
16.	This Development Approval authorises the purchase of broodstock and/or culture stock from the holder of a commercial fishing boat licence, a Commercial Fisher, or holder of any other authority that	At all times

No.	Conditions of development approval	Condition timing
	allows the sale of the approved species.	
17.	**The movement of animals of any species cultivated under this approval must comply with the relevant species specific health protocol.**	At all times
18.	The movement of all barramundi must comply with ~~DEEDI~~ **the Department of Agriculture and Fisheries** 'Health Protocol for the Importation and Movement of Live Barramundi".	At all times
19.	**The movement of all live marine crustaceans must comply with the Department of Agriculture and Fisheries 'Health Protocol for the movement of live marine crustaceans including crabs, lobsters and bugs'.**	At all times
20.	No water or organisms originating from the aquaculture of exotic species is permitted to reach Queensland waters (as defined in the *Fisheries Act 1994)*.	At all times
21.	All containers used to aquaculture of exotic species are to be screened to exclude vertebrate predators (eg. Birds).	At all times
22.	Containers used to aquaculture exotic species must be constructed on land this is situated above the 1:100 (Q100) flood level.	At all times
23.	Filters or screens must be installed to ensure that all waters leaving containers used for aquaculture of exotic species are treated to prevent escape of eggs, juveniles or adults.	At all times
24.	This development permit extends to authorising the removal and disposal of marine plants on the two constructed drains on the eastern and western boundaries of the property and the approved Aquaculture Area where: a) the removal of marine plants, which have self propagated, is required for the maintenance of the two constructed drains on the eastern and western boundaries of the property; and b) ~~with respect to those species of marine plants, and with respect to that part of the aquaculture site, for which a Marine Plan Permit has been previously issued for initial site works (as per expired DPI Plan No. 01NOCA7965MP0238)~~ **the removal of marine plants is consistent with the Marine Plant Permit previously issued for initial site works (as per expired DPI Plan No 01NOCA7965MP0238);** and **c)** ~~where~~ the removal of marine plants, which have self propagated, is required for the maintenance of aquaculture structures such as channels, drains and ponds on the approved Aquaculture Area, **excluding settlement ponds 1, 2 and 3 as shown on Daintree Saltwater Barramundi Fish Farms Pty Ltd, Site Plan sheet 1 of 2 Lot 3 SP150448 Wonga Beach, RPS Australia East Pty Ltd, 9338-8, 27/1/2015 (as amended in red).**	At all times

No.	Conditions of development approval	Condition timing
	~~The developer is not authorised to conduct further clearing or maintenance of marine plants outside the approved Aquaculture Area, or to start new site works within the approved area.~~ **The developer is not authorised to remove, damage or destroy any marine plants within settlement ponds 1, 2 and 3 or outside the approved aquaculture area to start new site works.**	

Attachment 2— Further advice

General advice	
1.	Any future development application for the proposed expansion is likely to trigger state assessment for the following matters of interest under the *Sustainable Planning Regulation 2009*: • aquaculture • development within the coastal management district • clearing vegetation • environmentally relevant activity • impacts on a state-controlled road; and • removal, destruction or damage of marine plants. It is recommended Douglas Shire Council is also consulted to discuss its requirements under the planning scheme.
2.	It is also recommended prior to lodging any development application that a pre-lodgement meeting is held the State Assessment and Referral Agency division of the department. This meeting can also include Douglas Shire Council if required. Please contact the State Assessment and Referral Agency on 4037 3209 to arrange a meeting.

Sustainable Planning Act 2009—Representation and appeal provisions

The following relevant appeal provisions are provided in accordance with s336(a) of the *Sustainable Planning Act 2009.*

Chapter 6 Integrated development assessment system (IDAS)

Part 8 Dealing with decision notices and approvals

Division 1 Changing decision notices and approvals during applicant's appeal period

360 Application of div 1

This division applies only during the applicant's appeal period.

361 Applicant may make representations about decision

(1) The applicant may make written representations to the assessment manager about—
   (a) a matter stated in the decision notice, other than a refusal or a matter about which a concurrence agency told the assessment manager under section 287(1) or (5); or
   (b) the standard conditions applying to a deemed approval.

(2) However, the applicant can not make representations under subsection (1)(a) about a condition attached to an approval under the direction of the Minister.

362 Assessment manager to consider representations

The assessment manager must consider any representations made to the assessment manager under section 361.

363 Decision about representations

(1) If the assessment manager agrees with any of the representations about a decision notice or a deemed approval, the assessment manager must give a new decision notice (the ***negotiated decision notice***) to—
   (a) the applicant; and
   (b) each principal submitter; and
   (c) each referral agency; and
   (d) if the assessment manager is not the local government and the development is in a local government area—the local government.

(2) Before the assessment manager agrees to a change under this section, the assessment manager must consider the matters the assessment manager was required to consider in assessing the application, to the extent the matters are relevant.

(3) Only 1 negotiated decision notice may be given.

(4) The negotiated decision notice—
   (a) must be given within 5 business days after the day the assessment manager agrees with the representations; and

(b) must comply with section 335; and
(c) must state the nature of the changes; and
(d) replaces—
(i) the decision notice previously given; or
(ii) if a decision notice was not previously given and the negotiated decision notice relates to a deemed approval—the standard conditions applying to the deemed approval.

(5) If the assessment manager does not agree with any of the representations, the assessment manager must, within 5 business days after the day the assessment manager decides not to agree with any of the representations, give written notice to the applicant stating the decision about the representations.

364 Giving new notice about charges for infrastructure

(1) This section applies if the development approved by the negotiated decision notice is different from the development approved in the decision notice or deemed approval in a way that affects the amount of an infrastructure charge, regulated infrastructure charge or adopted infrastructure charge.
(2) The local government may give the applicant a new infrastructure charges notice under section 633, regulated infrastructure charges notice under section 643 or adopted infrastructure charges notice under section 648F to replace the original notice.

366 Applicant may suspend applicant's appeal period

(1) If the applicant needs more time to make the representations, the applicant may, by written notice given to the assessment manager, suspend the applicant's appeal period.
(2) The applicant may act under subsection (1) only once.
(3) If the representations are not made within 20 business days after the day written notice was given to the assessment manager, the balance of the applicant's appeal period restarts.
(4) If the representations are made within 20 business days after the day written notice was given to the assessment manager—
(a) if the applicant gives the assessment manager a notice withdrawing the notice under subsection (1)—the balance of the applicant's appeal period restarts the day after the assessment manager receives the notice of withdrawal; or
(b) if the assessment manager gives the applicant a notice under section 363(5)—the balance of the applicant's appeal period restarts the day after the applicant receives the notice; or
(c) if the assessment manager gives the applicant a negotiated decision notice—the applicant's appeal.

Chapter 7 Appeals, offences and enforcement

Part 1 Planning and Environment Court

Division 8 Appeals to court relating to development applications and approvals

461 Appeals by applicants

(1) An applicant for a development application may appeal to the court against any of the following—
  (a) the refusal, or the refusal in part, of the development application;
  (b) any condition of a development approval, another matter stated in a development approval and the identification or inclusion of a code under section 242;
  (c) the decision to give a preliminary approval when a development permit was applied for;
  (d) the length of a period mentioned in section 341;
  (e) a deemed refusal of the development application.

(2) An appeal under subsection (1)(a), (b), (c) or (d) must be started within 20 business days (the *applicant's appeal period*) after—
  (a) if a decision notice or negotiated decision notice is given—the day the decision notice or negotiated decision notice is given to the applicant; or
  (b) otherwise—the day a decision notice was required to be given to the applicant.

(3) An appeal under subsection (1)(e) may be started at any time after the last day a decision on the matter should have been made.

462 Appeals by submitters—general

(1) A submitter for a development application may appeal to the court only against—
  (a) the part of the approval relating to the assessment manager's decision about any part of the application requiring impact assessment under section 314; or
  (b) the part of the approval relating to the assessment manager's decision under section 327.

(2) To the extent an appeal may be made under subsection (1), the appeal may be against 1 or more of the following—
  (a) the giving of a development approval;
  (b) any provision of the approval including—
    (i) a condition of, or lack of condition for, the approval; or
    (ii) the length of a period mentioned in section 341 for the approval.

(3) However, a submitter may not appeal if the submitter—
  (a) withdraws the submission before the application is decided; or
  (b) has given the assessment manager a notice under section 339(1)(b)(ii).

(4) The appeal must be started within 20 business days (the *submitter's appeal period*) after the decision notice or negotiated decision notice is given to the submitter.

463 Additional and extended appeal rights for submitters for particular development applications

(1) This section applies to a development application to which chapter 9, part 7 applies.

(2) A submitter of a properly made submission for the application may appeal to the court about a referral agency's response made by a concurrence agency for the application.
(3) However, the submitter may only appeal against a referral agency's response to the extent it relates to—
  (a) development for an aquacultural ERA; or
  (b) development that is—
    (i) a material change of use of premises for aquaculture; or
    (ii) operational work that is the removal, damage or destruction of a marine plant.
(3) Despite section 462(1), the submitter may appeal against the following matters for the application even if the matters relate to code assessment—
  (a) a decision about a matter mentioned in section 462(2) if it is a decision of the chief executive;
  (b) a referral agency's response mentioned in subsection (2).

464 Appeals by advice agency submitters

(1) Subsection (2) applies if an advice agency, in its response for an application, told the assessment manager to treat the response as a properly made submission.
(2) The advice agency may, within the limits of its jurisdiction, appeal to the court about—
  (a) any part of the approval relating to the assessment manager's decision about any part of the application requiring impact assessment under section 314; or
  (b) any part of the approval relating to the assessment manager's decision under section 327.
(3) The appeal must be started within 20 business days after the day the decision notice or negotiated decision notice is given to the advice agency as a submitter.
(4) However, if the advice agency has given the assessment manager a notice under section 339(1)(b)(ii), the advice agency may not appeal the decision.

465 Appeals about decisions relating to extensions for approvals

(1) For a development approval given for a development application, a person to whom a notice is given under section 389, other than a notice for a decision under section 386(2), may appeal to the court against the decision in the notice.
(2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.
(3) Also, a person who has made a request under section 383 may appeal to the court against a deemed refusal of the request.
(4) An appeal under subsection (3) may be started at any time after the last day the decision on the matter should have been made.

466 Appeals about decisions relating to permissible changes

(1) For a development approval given for a development application, the following persons may appeal to the court against a decision on a request to make a permissible change to the approval—
  (a) if the responsible entity for making the change is the assessment manager for the application—
    (i) the person who made the request; or
    (ii) an entity that gave a notice under section 373 or a pre-request response notice about the request;
  (b) if the responsible entity for making the change is a concurrence agency for the application—the person who made the request.
(2) The appeal must be started within 20 business days after the day the person is given notice of the decision on the request under section 376.
(3) Also, a person who has made a request under section 369 may appeal to the court against a deemed refusal of the request.
(4) An appeal under subsection (3) may be started at any time after the last day the decision on the matter should have been made.

467 Appeals about changing or cancelling conditions imposed by assessment manager or concurrence agency

(1) A person to whom a notice under section 378(9)(b) giving a decision to change or cancel a condition of a development approval has been given may appeal to the court against the decision in the notice.
(2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.

Division 11 Making and appeal to Court

481 How appeals to the court are started

(1) An appeal is started by lodging written notice of appeal with the registrar of the court.
(2) The notice of appeal must state the grounds of the appeal.
(3) The person starting the appeal must also comply with the rules of the court applying to the appeal.
(4) However, the court may hear and decide an appeal even if the person has not complied with subsection (3).

482 Notice of appeal to other parties—development applications and approvals

(1) An appellant under division 8 must give written notice of the appeal to—
  (a) if the appellant is an applicant—
    (i) the chief executive; and
    (ii) the assessment manager; and
    (iii) any concurrence agency; and
    (iv) any principal submitter whose submission has not been withdrawn; and
    (v) any advice agency treated as a submitter whose submission has not been withdrawn; or

(b) if the appellant is a submitter or an advice agency whose response to the development application is treated as a submission for an appeal—
  (i) the chief executive; and
  (ii) the assessment manager; and
  (iii) any referral agency; and
  (iv) the applicant; or
(c) if the appellant is a person to whom a notice mentioned in section 465(1) has been given—
  (i) the chief executive; and
  (ii) the assessment manager for the development application to which the notice relates; and
  (iii) any entity that was a concurrence agency for the development application to which the notice relates; and
  (iv) the person who made the request under section 383 to which the notice relates, if the person is not the appellant; or
(d) if the appellant is a person mentioned in section 466(1)—
  (i) the chief executive; and
  (ii) the responsible entity for making the change to which the appeal relates; and
  (iii) the person who made the request to which the appeal relates under section 369, if the person is not the appellant; and
  (iv) if the responsible entity is the assessment manager—any entity that was a concurrence agency for the development application to which the notice of the decision on the request relates; or
(e) if the appellant is a person to whom a notice mentioned in section 467 has been given—the entity that gave the notice.

(2) The notice must be given within—
(a) if the appellant is a submitter or advice agency whose response to the development application is treated as a submission for an appeal—2 business days after the appeal is started; or
(b) otherwise—10 business days after the appeal is started.

(3) The notice must state—
(a) the grounds of the appeal; and
(b) if the person given the notice is not the respondent or a co-respondent under section 485—that the person may, within 10 business days after the notice is given, elect to become a co-respondent to the appeal by filing in the court a notice of election in the approved form.

485 Respondent and co-respondents for appeals under div 8

(1) Subsections (2) to (8) apply for appeals under sections 461 to 464.
(2) The assessment manager is the respondent for the appeal.
(3) If the appeal is started by a submitter, the applicant is a co-respondent for the appeal.
(4) Any submitter may elect to become a co-respondent for the appeal.
(5) If the appeal is about a concurrence agency's response, the concurrence agency is a co-respondent for the appeal.

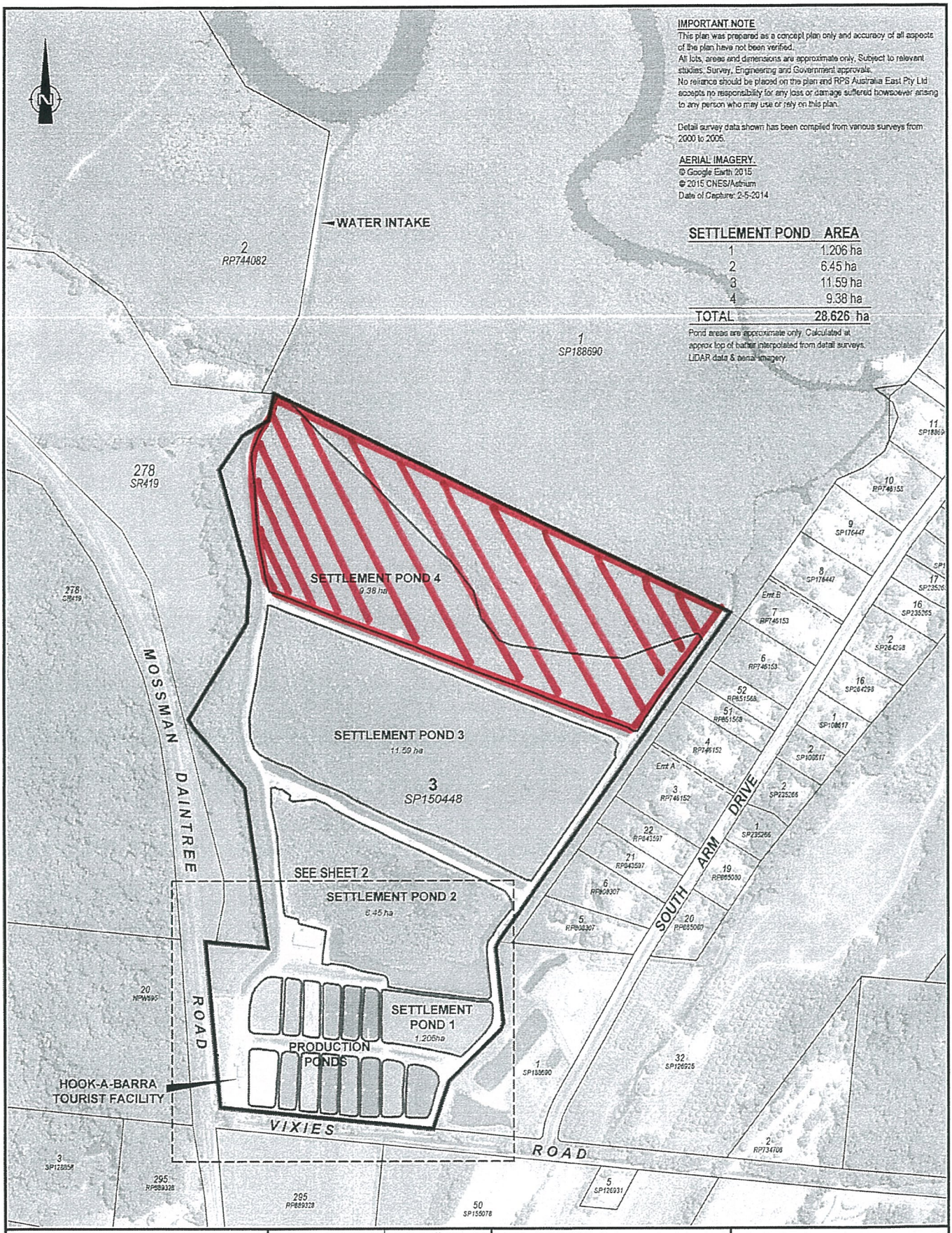
(6) If the appeal is only about a concurrence agency's response, the assessment manager may apply to the court to withdraw from the appeal.
(7) The respondent and any co-respondents for an appeal are entitled to be heard in the appeal as a party to the appeal.
(8) A person to whom a notice of appeal is required to be given under section 482 and who is not the respondent or a co-respondent for the appeal may elect to be a co-respondent.
(9) For an appeal under section 465—
  (a) the assessment manager is the respondent; and
  (b) if the appeal is started by a concurrence agency that gave the assessment manager a notice under section 385—the person asking for the extension the subject of the appeal is a co-respondent; and
  (c) any other person given notice of the appeal may elect to become a co-respondent.
(10) For an appeal under section 466—
  (a) the responsible entity for making the change to which the appeal relates is the respondent; and
  (b) if the responsible entity is the assessment manager—
    (i) if the appeal is started by a person who gave a notice under section 373 or a pre-request response notice—the person who made the request for the change is a co-respondent; and
    (ii) any other person given notice of the appeal may elect to become a co-respondent.
(11) For an appeal under section 467, the respondent is the entity given notice of the appeal.

488 How an entity may elect to be a co-respondent

An entity that is entitled to elect to be a co-respondent to an appeal may do so, within 10 business days after notice of the appeal is given to the entity, by following the rules of court for the election.

490 Lodging appeal stops particular actions

(1) If an appeal, other than an appeal under section 465, 466 or 467, is started under division 8, the development must not be started until the appeal is decided or withdrawn.
(2) If an appeal is about a condition imposed on a compliance permit, the development must not be started until the appeal is decided or withdrawn.
(3) Despite subsections (1) and (2), if the court is satisfied the outcome of the appeal would not be affected if the development or part of the development is started before the appeal is decided, the court may allow the development or part of the development to start before the appeal is decided.



0 50 100 150 200 250
metres

SCALE 1:5000 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

AMENDMENTS	
PROJECT MANAGER	O. Caddick-King
SURVEYED	2000-2005
COMPILED	AMK
CAD REF	9338-B DWG
SHEET OF SHEETS	1 OF 2
SHEET SIZE	A3

DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

SITE PLAN
SHEET 1 OF 2
LOT 3 SP150448
WONGA BEACH

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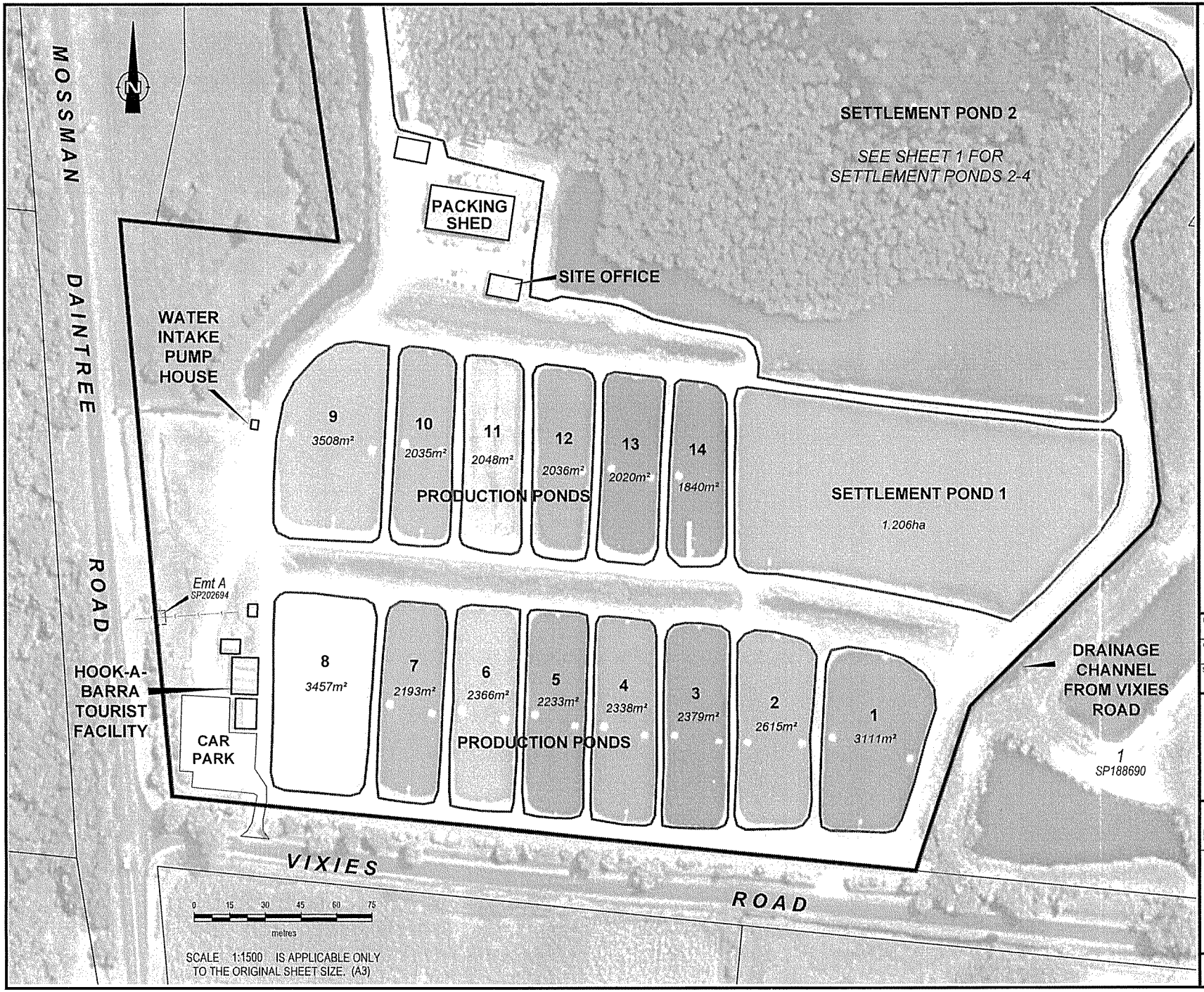
SCALE	DATE	DRAWING NO	ISSUE
1:5000	27/1/2015	9338-8	



IMPORTANT NOTE

This plan was prepared as a concept plan only and accuracy of all aspects of the plan have not been verified. All lots, areas and dimensions are approximate only, Subject to relevant studies, Survey, Engineering and Government approvals.
No reliance should be placed on the plan and RPS Australia East Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person who may use or rely on this plan.

Detail survey data shown has been compiled from various surveys from 2000 to 2005.

AERIAL IMAGERY.

© Google Earth 2015
© 2015 CNES/Astrium
Date of Capture: 2-5-2014

PRODUCTION POND	AREA
1	3111m²
2	2615m²
3	2379m²
4	2338m²
5	2233m²
6	2366m²
7	2193m²
8	3457m²
9	3508m²
10	2035m²
11	2048m²
12	2036m²
13	2020m²
14	1840m²
TOTAL	34179m²

Pond areas calculated at top of batter.

PROJECT MANAGER: O. Caddick-King	SURVEYED: 2000-2005
COMPILED: AMK	CAD REF: 9338-8.DWG
SHEET SIZE: A3	SHEET 1 OF SHEETS 1

RPS
RPS Australia East Pty Ltd
ACN 140 292 762
135 Abbott St
PO Box 1949
CAIRNS QLD 4870
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DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

SITE PLAN

SHEET 2 OF 2
LOT 3 SP150448
WONGA BEACH

SCALE	DATE	DRAWING NO.	ISSUE
1:1500	27/1/2015	9338-9	

Appendix 4B

1994 Fisheries Aquaculture Licence

QFMA

QUEENSLAND FISH MANAGEMENT AUTHORITY

In any further correspondence refer to No.

ENQUIRIES
Telephone: (07) 225 1839 Secretary
Telephone: (07) 225 1852 Licensing
Facsimile: (07) 221 8793

OFFICES
10th Floor,
157 Ann Street,
Brisbane.

Please address all correspondence to:
The Secretary,
Queensland Fish Management Authority
P.O. Box 344,
Fortitude Valley Qld. 4006

Our Ref:Mr. I. Rudd (07) 2251880

22 August, 1994

Dear Mr Scomazzon

I refer to permit for Aquaculture Purposes Number Q171 issued pursuant to Section 35A(2) of the Fishing Industry Organization and Marketing Act 1982.

On a search of Authority records it has come to my attention that your permit is due for renewal on 17 September 1994. The annual fee for such a permit is $134.00 per year and this amount should be forwarded along with the enclosed completed form 37 to this Authority as soon as possible.

If you have ceased aquaculture operations it would be appreciated if you would notify the Authority so its records can be updated accordingly.

I thank you for your co-operation in this matter.

Yours sincerely,

I Rudd

for (P.L. Appleton)
SECRETARY

Mr V G Scomazzon
PO Box 70
MOSSMAN Q 4873

SCHEDULE A

1. *Purchase live post larval Penaeus monodon prawns and Red claw crayfish (Cherax quadricarinatus) from -*

   (a) any aquaculture hatchery in Queensland approved by the Queensland Fish Management Authority

   (b) any other hatcheries throughout Australia, subject to the Secretary, Queensland Fish Management Authority first being advised of the quantity and source of such supply.

   and transport the specimens from the hatchery to the premises described in Schedule B 1.

2. *Purchase live Barramundi (Lates calcarifer) fry or fingerlings solely from any aquaculture hatchery in Queensland approved by the Queensland Fish Management Authority and transport (in terms of Clause 5) such fry or fingerlings from the hatchery to the premises described in Schedule B 1.*

3. *Conduct aquaculture of the above species in dams, ponds, tanks, other aquaria and approved structures as described in Schedule B 1 and be in possession of such species.*

4. *Harvest and sell (subject to the terms and conditions of this Permit) the species described above and reared under the terms and conditions of this permit for stocking private waters and for human consumption.*

SCHEDULE B

1. *Dams, ponds, tanks, aquaria and approved structures on Lot 1, RP746359, Lots 1 & 2, RP749715, Parish of Whyanbeel, County of Solander.*

SCHEDULE C

1. *Where specimens have been imported into Queensland for rearing- (the importation of Barramundi is <u>not</u> permitted)*

   (a) the sale of such specimens shall be limited to those for which disease clearance has been obtained from the vendor.

   (b) The Secretary, Queensland Fish Management Authority, P.O. Box 344, Fortitude Valley, Q. 4006 must be given 10 days notice in writing of all shipments into Queensland. This notice should include, source of specimens, age of the specimens, number of specimens in the shipment, and proposed date of shipment.

(c) On arrival, 200 specimens shall be consigned alive to Animal Research Institute (D.P.I.) at Yeerongpilly or Oonoonba Veterinary Laboratory, Queensland Deparment of Primary Industries, Townsville for disease testing. The remaining specimens shall be contained in a closed circulating tank until clearance of the shipment is obtained. If the consignment of specimens are found to have unacceptable high levels of disease, the whole consignment will be destroyed by officers of the Department of Primary Industries or Queensland Fish Management Authority.

(d) Prior to the movement interstate of any fingerlings from the farm authorised by this permit, a sample of the fish to be shipped shall be provided at the permittee's expense to the Oonoonba Veterinary Laboratory, townsville {contact Ian Anderson (077) 222610} for disease/parasite screening and subsequent issue of a Fish Health Certificate which should accompany the shipment of fish.

2. This permit does not authorise the holder thereof to source, take or collect any species whatsoever from the wild.

3. Specimens reared under this permit shall not be released into any waters, without prior approval, of the Queensland Fish Management Authority.

4. The permit holder is required to ensure that all waters (ponds, tanks, aquaria, etc.) and associated plumbing, pumps, etc. on the said property employed for culture are to be adequately screened to prevent escape of specimens (including fry, fingerlings, post larvae or eggs) into Queensland waters. Where other waters are used or introduced howsoever in the culture of the species specified in Schedule A, all such waters shall be sufficiently screened to prevent ingress of wild juveniles, larvae or eggs of any species whatsoever in to the dams ponds tanks and other aquaria.

5. Transportation of any reared specimens (including fry, fingerlings and post larvae) shall be in containers which are clearly marked with "Aquaculture Specimens under Queensland Fish Management Authority Permit, Species and Name of Consignee".

6. The permit holder is required to comply with any requirements that the relevant local authority (Shire or City Council) or other State Government Department (e.g. Department of Environment and Heritage) have imposed or may impose on the described activities authorised, and at the locations specified under this permit.

7. With respect to specimens reared under the terms of this permit the holder thereof shall not treat such specimens for a commercial purpose other than refrigeration or freezing unless -

(a) a Processor Class 'A' Licence has been granted and issued under Section 31 of the Act to the permit holder; and

(b) such activities are carried out on premises in respect of which a Certificate of Registration has been issued under the Fishing Industry Organization and Marketing Act 1982.

8. With respect to the sale of specimens reared under the terms and conditions of this permit for human consumption, the holder thereof shall-

(i) only sell such specimens to the holder of a Processor Class 'A' Licence or a Commercial Buyer Class 'A' Licence, or

(ii) obtain in his/her own right a Processor Class 'A' Licence or Commercial Buyer Class 'A' licence

(iii) ensure that where Barramundi reared to a size less than the prescribed size for that species are sold under (i) and (ii) above or otherwise removed from the premises described in Schedule B 1 by the permit holder or any other person or party, each Barramundi shall be identified with a legible tag which must contain the following information: "Product of Aquaculture" under Queensland Fish Management Authority permit together with the aquaculturists name.

9. The permit holder shall issue to each purchaser of any specimens reared on the establishment described in Schedule B1, documentation containing advice that -

(i) the purchase dockets should be retained by the purchaser and be available for inspection by the Authority (or its appointed Inspectors),and

(ii) the tag on each Barramundi shall remain intact up to the point of final preparation for consumption.

10. Where cultured Barramundi are sold under the terms and conditions of this Permit the holder thereof shall ensure that the purchaser is aware of the legal requirements relating to the possession of undersize Barramundi.

11. The permit holder shall supply to the Authority by the last day of each quarter (or more frequently if required) for which the permit is valid -

(i) the quantity of harvested specimens on hand (by number of cartons and weight),

(ii) the location of these specimens,

(iii) a list of purchasers of the specimens including name, address, point of delivery, quantity and description of the product and date of purchase and dispatch,

(iv) details of

a) the tags obtained,
b) those tags utilised and to whom the tagged Barramundi were supplied, and
c) the tags on hand.

(v) all sales of reared specimens.

12. This permit does not replace the provisions of the Fisheries Act 1976, the Fishing Industry Organization and Marketing Act 1982 or the Fishing Industry Organization and Marketing Regulations 1991, except as it relates to the possession of Barramundi below the legal minimum size.

13. This permit or a copy, is to be available for inspection at any time by an officer authorised under this Act.

Appendix 4C

1989 Aquaculture Permit

F79410-$115.00

QUEENSLAND

Fishing Industry Organization and Marketing
Act 1982 — 1987

Section 35A(2)

PERMIT FOR AQUACULTURE PURPOSES

NO. 171

This is to certify that the holder

MR V.G. SCOMAZZON

of P.O. BOX 70

MOSSMAN QLD 4873

is permitted to carry out the aquaculture activities specified in Schedule A hereto with respect to the locations specified in Schedule B hereto subject to such terms conditions and restrictions as are specified in Schedule C hereto.

Unless sooner cancelled, revoked, suspended or surrendered, this permit shall remain in force FOR A 5 YEAR PERIOD (17 SEPTEMBER 1994) AND IS CONTINGENT UPON THE PERMIT HOLDER PAYING AN ANNUAL FEE AS DETERMINED BY THE AUTHORITY AND COMPLIANCE WITH ALL OTHER TERMS AND CONDITIONS OF THIS PERMIT.

Issued at BRISBANE.

Date Issued: 18th September, 1989

(AUTHORISED OFFICER)

SCHEDULE A

AS ATTACHED OVERLEAF

SCHEDULE B

AS ATTACHED OVERLEAF

SCHEDULE C

AS ATTACHED OVERLEAF

SCHEDULE A

1. Purchase live post larval Penaeus monodon prawns and red claw crayfish (*Cherax quadricarinatus*) from -

   (a) any aquaculture hatchery in Queensland approved by the Queensland Fish Management Authority

   (b) any other hatcheries throughout Australia, subject to the Secretary, Queensland Fish Management Authority first being advised of the quantity and source of such supply.

   and transport the specimens from the hatchery to the premises described in Schedule B 1.

2. Purchase live Barramundi (*Lates calcarifer*) fry or fingerlings solely from any aquaculture hatchery in Queensland approved by the Queensland Fish Management Authority and transport (in terms of Clause 5) such fry or fingerlings from the hatchery to the premises described in Schedule B 1.

3. Conduct aquaculture of the above species in dams, ponds, tanks, other aquaria and approved structures as described in Schedule B 1 and be in possession of such species.

4. Harvest and sell (subject to the terms and conditions of this Permit) the species described above and reared under the terms and conditions of this permit, for stocking private waters and for human consumption.

SCHEDULE B

1. Dams, ponds, tanks, aquaria and approved structures on Lot 1, RP46359 and Lots 1 & 2, RP749715, Parish of Whyanbeel, County of Solander.

SCHEDULE C

1. Where specimens have been imported into Queensland for rearing - (the importation of barramundi is <u>not</u> permitted)

   (a) the sale of such specimens shall be limited to those for which disease clearance has been obtained from the vendor.

   (b) The Secretary, Queensland Fish Management Authority, PO Box 344, Fortitude Valley, Q. 4006 must be given 10 days notice in writing of all shipments into Queensland. This notice should include, source of specimens, age of the specimens, number of specimens in the shipment, and proposed date of shipment.

27/4/93.

(c) On arrival, 200 specimens shall be consigned alive to Animal Research Institute (DPI) at Yeerongpilly or Oonoonba Veterinary Laboratory, Queensland Department of Primary Industries, Townsville for disease testing. The remaining specimens shall be contained in a closed circulating tank until clearance of the shipment os obtained. If the consignment of specimens are found to have unacceptable high levels of disease, the whole consignment will be destroyed by officers of the Department of Primary Industries or Queensland Fish Management Authority.

2. This permit does not authorise the holder thereof to source, take or collect any species whatsoever from the wild.

3. Specimens reared under this permit shall not be released into any waters, without prior approval, of the Queensland Fish Management Authority.

4. The permit holder is required to ensure that all waters (ponds, tanks, aquaria, etc.) and associated plumbing, pumps, etc, on the said property employed for culture are to be adequately screened to prevent escape of specimens (including fry, fingerlings, post larvae or eggs) into introduced howsoever in the culture of the species specified in Schedule A, all such waters shall be sufficiently screened to prevent ingress of wild juveniles, larvae or eggs of any species whatsoever into the dams, ponds, tanks and other aquaria.

5. Transportation of any reared specimens (including fry, fingerlings and post larvae) shall be in containers which are clearly marked with "Aquaculture Specimens, species, Current Permit Number and Name of Consignee".

6. The permit holder is required to comply with any requirements that the relevant local authority (Shire or City Council) or other State Government Department (e.g. Department of Environment and Heritage) have imposed or may impose on the described activities authorised, and at the locations specified under this permit.

7. With respect to specimens reared under the terms of this permit the holder thereof shall not treat such specimens for a commercial purpose other than refrigeration or freezing unless -

(a) a Processor Class 'A' Licence has been granted and issued under Section 31 of the Act to the permit holder; and

(b) such activities are carried out on premises in respect of which a Certificate of Registration has been issued under the Fishing Industry Organization and Marketing Act 1982.

1990

8. With respect to the sale of specimens reared under the terms and conditions of this permit for human consumption, the holder thereof shall -

(i) only sell such specimens to the holder of a Processor Class 'A' Licence or a Commercial Buyer Class 'A' Licence, or

(ii) obtain in his/her own right a Processor Class 'A' Licence or Commercial Buyer Class 'A' Licence.

(iii) ensure that where Barramundi reared to a size less than the prescribed size for that species are sold under (i) and (ii) above or otherwise removed from the premises described in Schedule B 1 by the permit holder or any other person or party, each Barramundi shall be identified with a legible tag which must contain the following information: "Product of Aquaculture" together with the aquaculturists name and permit number.

9. The permit holder shall issue to each purchaser of any specimens reared on the establishment described in Schedule B 1, documentation containing advice that -

(i) the purchase dockets should be retained by the purchaser and be available for inspection by the Authority (or its appointed Inspectors), and

(ii) the tag on each Barramundi shall remain intact up to the point of final preparation for consumption.

10. Where cultured Barramundi are sold under the terms and conditions of this Permit the holder thereof shall ensure that the purchaser is aware of the legal requirements relating to the possession of undersize Barramundi.

11. The permit holder shall supply to the Authority by the last day of each quarter (or more frequently if required) for which the permit is valid -

(i) the quantity of harvested specimens on hand (by number of cartons and weight),

(ii) the location of these specimens,

(iii) a list of purchasers of the specimens including name, address, point of delivery, quantity and description of the product and date of purchase and dispatch,

(iv) details of

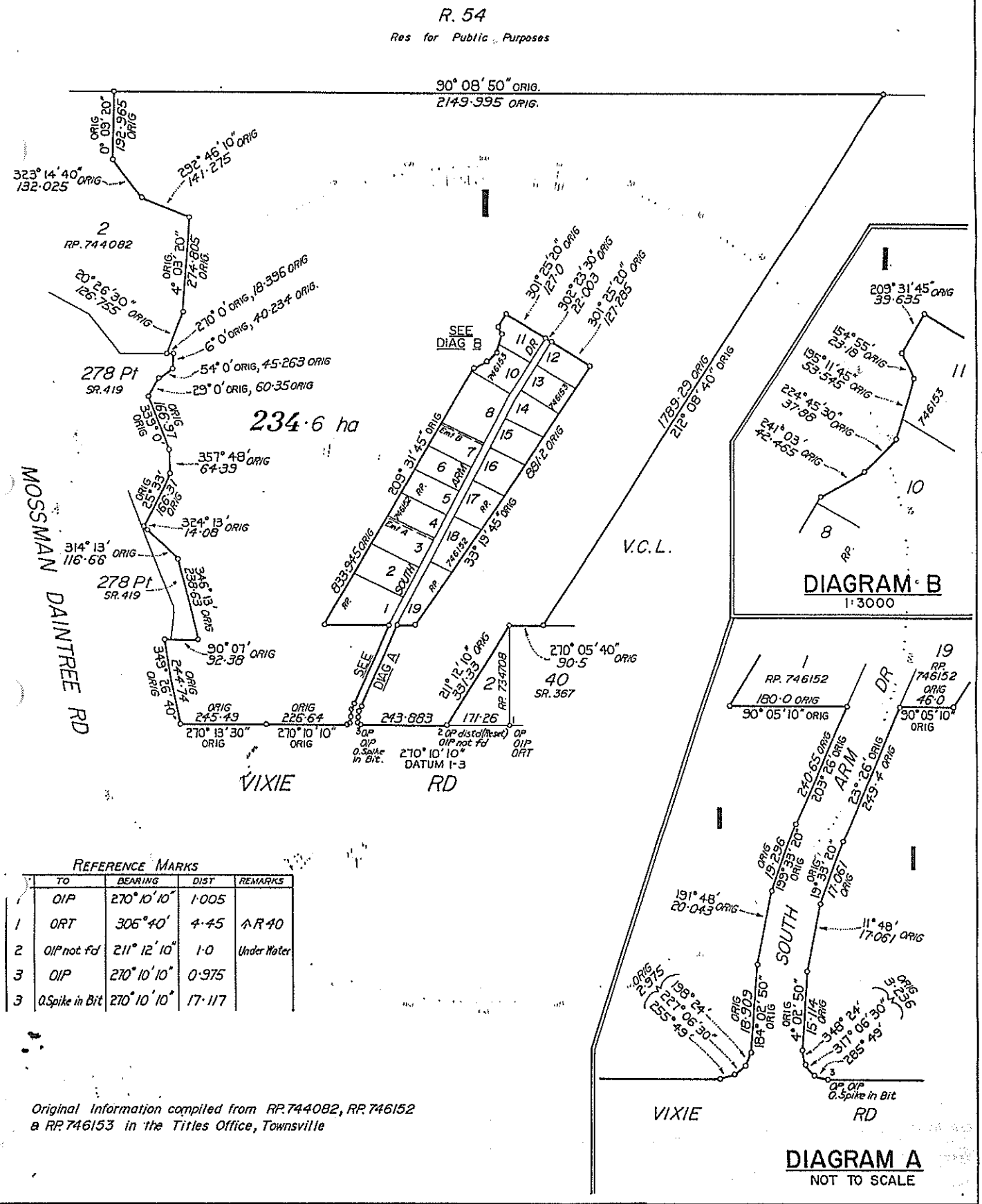
(a) the tags obtained,
(b) those tags utilised and to whom the tagged Barramundi were supplied, and
(c) the tags on hand.

(v) all sales of reared specimens.

12. This permit does not replace the provisions of the Fisheries Act 1976, the Fishing Industry Organization and Marketing Act 1982 or the Fishing Industry Organization and Marketing Regulations 1991, except as it relates to the possession of Barramundi below the legal minimum size.

13. This permit or a copy, is to be available for inspection at any time by an officer authorised under this Act.

GW WARNING - FOLDING OR MUTILATING WILL LEAD TO REJECTION - PLAN MAY BE ROLLED



REFERENCE MARKS

	TO	BEARING	DIST	REMARKS
1	OIP	270° 10' 10"	1.005	
1	ORT	306° 40'	4.45	↑R 40
2	OIP not fd	211° 12' 10"	1.0	Under Water
3	OIP	270° 10' 10"	0.975	
3	0.Spike in Bit	270° 10' 10"	17.117	

Original Information compiled from RP. 744082, RP. 746152 & RP. 746153 in the Titles Office, Townsville

NO FIELD NOTES LODGED

ORIGINAL GRANT

Vol. N1085 Fol. 168

PLAN OF Lot 1

REDUCED

Cancelling The Balance of Lot 1 on RP. 744082

ORIG. PORTION 348

TOWN

PARISH WHYANBEEL

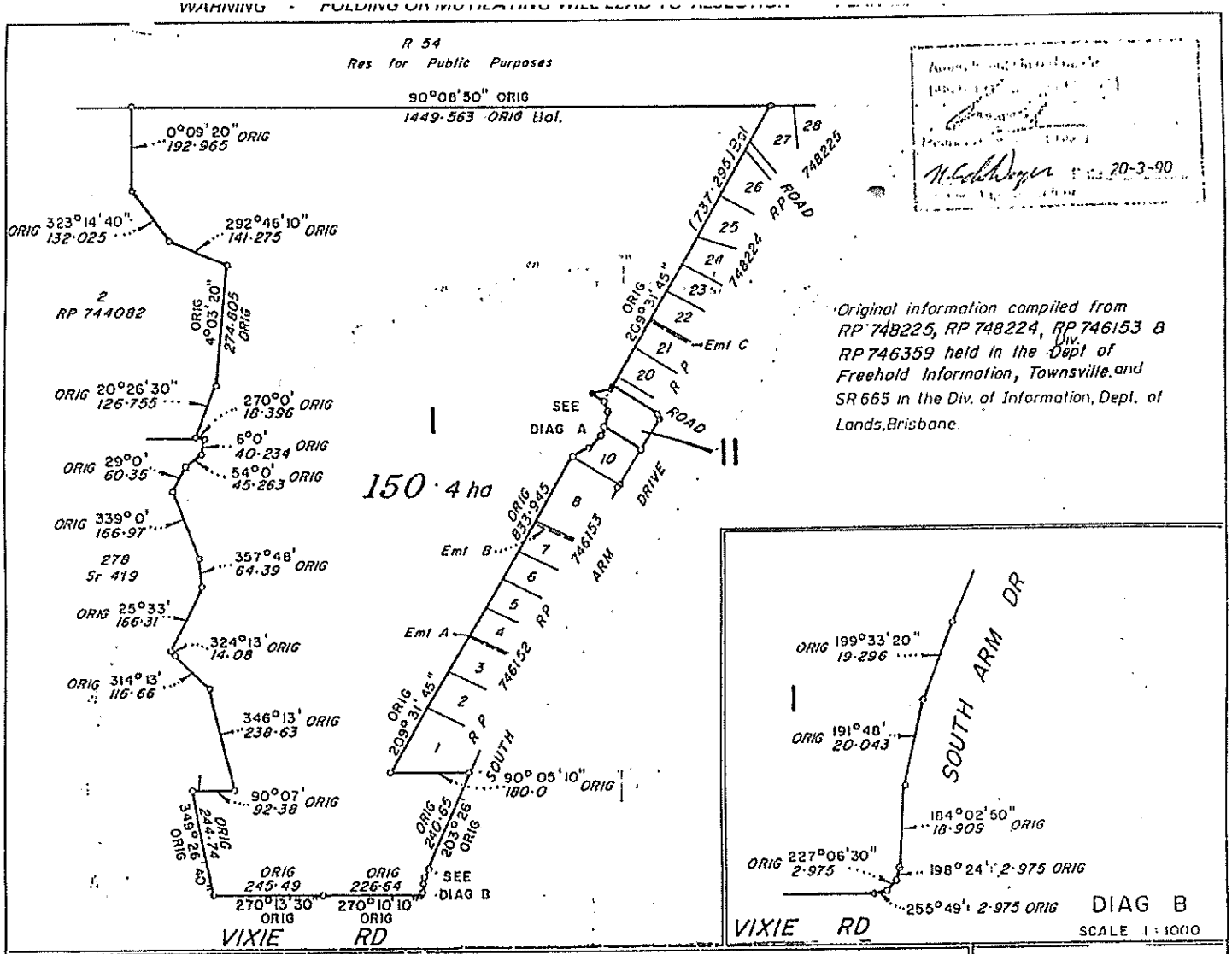
COUNTY Solander

MAP REF.	PROCLAIMED SURVEY AREA	SURVEYED BY PETER STOPFORD 29/7/1987	MERIDIAN OF SR. 665	SCALE 1:10 000	REGISTERED PLAN 746359
PM					

CROWN COPYRIGHT RESERVED, REGISTRAR OF TITLES, QUEENSLAND

746359 PLAN MUST BE DRAWN WITHIN BLUE LINES 746359 PLAN MUST BE DRAWN WITHIN BLUE LINES 746359

WARNING - FOLDING OR MUTILATING WILL LEAD TO REJECTION

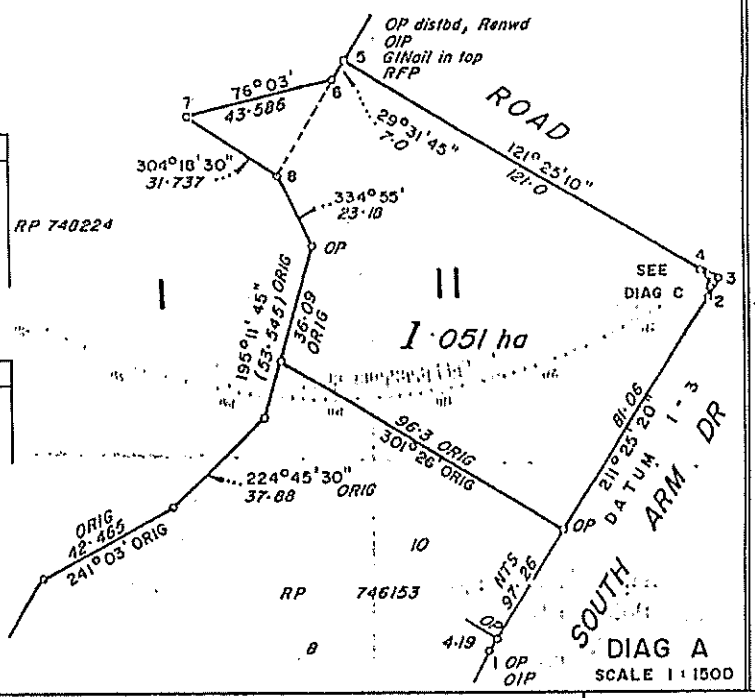


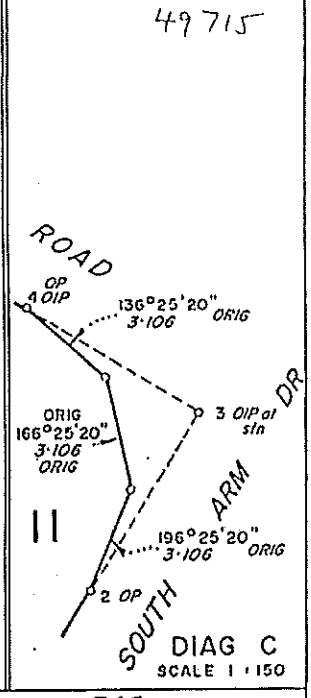
REFERENCE MARKS

STN	TO	BEARING	DIST	
1	OIP	31°25'20"	1·16	
4	OIP	121°25'20"	0·96	
5	OIP	121°25'20"	1·05	RP 748224
	GINail in top RFP	26°19'	6·427	

TRAVERSES

LINE	BEARING	DIST
2 - 3	31°25'20"	6·0
3 - 4	301°25'20"	6·0
6 - 8	209°31'45"	32·635





No. FIELD NOTES LODGED	PLAN OF Lots 1 & 11	ORIG. PORTION 348
ORIGINAL GRANT	cancelling Lot II on RP 746153 and	TOWN
Vol.N1085 fol.168	part of Lot 1 on RP 746359	PARISH WHYANBEEL
		COUNTY Solander

MAP REF.	PROCLAIMED SURVEY AREA	SURVEYED BY J.M. SCRIVEN 12 / 9 / 89	MERIDIAN RP 746153	SCALE 1:10000	PLAN 719715

CROWN COPYRIGHT RESERVED, REGISTRAR OF TITLES, QUEENSLAND

719715

PLAN MUST BE DRAWN WITHIN BLUE LINES

719715

Appendix 4D

2004 Aquaculture Permit

Queensland Government
Department of Primary Industries

QUEENSLAND
FISHERIES ACT 1994
Section 50
FISHERIES REGULATIONS 1995

LICENCE NUMBER
96BRBC1628

AQUACULTURE LICENCE

This is to certify that Wonga Beach Aqaculture Resort Pty Ltd

of 634 Pacific Highway, Belmont North NSW 2280

is authorised to conduct aquaculture on the following approved species:

Common Name	Scientific Name
Banded rainbowfish	*(Melanotaenia trifasciata)*
Barramundi	*(Lates calcarifer)*
Mangrove jack	*(Lutjanus argentimaculatus)*
Milkfish	*(Chanos chanos)*
Redclaw crayfish	*(Cherax quadricarinatus)*
Sleepy cod	*(Oxyeleotris lineolatus)*
Spangled perch	*(Leiopotherapon unicolor)*

at the approved aquaculture area described as:

1) Description: Vixies Road, Wonga Beach

Lot on Plan: Within Lot 3 on Plan SP150448, Douglas Shire

for the period Wednesday, 18 September 1996 until Thursday, 31 May 2012.

Issued at Cairns this 31st day of May 2004.

.....
Delegate of the
Chief Executive

CONDITIONS

1 The holder must comply with:

a) the requirements of all relevant legislation and obtain approvals from the relevant administering organisations; and

b) any Codes of Practice or management arrangements relevant to the approved species (eg. Translocation Policy).

2 This licence authorises:

a) persons identified by the holder to assist in aquaculture activities at the approved Aquaculture Area; and

b) the possession and use of fishing apparatus (excluding an electrofisher) at the approved Aquaculture Area.

3 The holder is not authorised to take any species from the wild.

4 This licence authorises the holder to purchase the approved species from any Aquaculture Area in Queensland which has been authorised under the Fisheries Act 1994, or any other aquaculture area in Australia authorised by the relevant State Department, and transport the purchased species to the Aquaculture Area approved on this licence.

5 The holder must not bring the approved species into Queensland for rearing without:

a) A Freedom-from-Disease Certificate issued by the exporting State or Territory Fisheries or veterinary authorities.

b) That Certificate must include a statement that the specimens originate from:

i) a hatchery, farm, aquaculture premises or region where diseases on the Declared Disease List have never been diagnosed; or

ii) a hatchery, farm, aquaculture premises or region in which an approved two year disease eradication and monitoring program for a disease(s) on the Declared Disease List has been undertaken under the supervision of State or Territory Fisheries or Veterinary authorities.

.....

Delegate of the Chief Executive

6 Where approved species are brought into Queensland the holder must ensure:

a) an approved ectoparasite prophylactic treatment must be done within 48 hours of shipment, and be certified as being done by the vendor; and

b) the Queensland Department of Primary Industries aquaculture contact officer nearest to the approved Aquaculture Area must be given three (3) days notice in writing by the holder of all shipments into Queensland. This notice must include, source, practices used to minimise disease transfer, age and number of specimens, an original copy of the Freedom-from-Disease certification, the proposed date of shipment and the estimated date of import; and

c) on delivery the certificate of ectoparasite prophylactic treatment must be sent to the aquaculture contact officer; and

d) after arrival, any unusual clinical signs or mortalities in the specimens must be reported immediately to the nearest aquaculture contact officer. If directed by the contact officer, the holder must forward specimens to a veterinary laboratory as indicated by the contact officer.

7 The total approved Aquaculture Area is 3.34 hectares (production area) on a total area of land of 49.68 hectares as described in Drawing No. SCO1010-S1 Rev A dated November 2002 submitted with the transfer application.

8 The holder must ensure that all ponds used for culture of redclaw crayfish are secured by a solid perimeter fence to prevent the overland escape of aquaculture product.

9 The holder must ensure that all waters (dams, ponds, tanks, aquaria etc.) and associated plumbing, pumps etc. on the approved Aquaculture Area are secured in such a way as to prevent the escape of any specimens (eggs, juveniles or adults) into Queensland waters.

10 Where waters are introduced in the culture of the approved species, the holder must ensure all waters are sufficiently screened to prevent the placement or movement of any juvenile or adult wild fauna (excepting zooplankton) into the approved Aquaculture Area.

11 The holder must not release aquaculture fisheries resources into Queensland waters, other than those waters approved under this licence, unless an authority has been issued by the Queensland Fisheries Management Authority for that purpose.

.....

Delegate of the Chief Executive

12 The holder, when selling live aquaculture fisheries resources must:

a) give the buyer a docket which contains the following particulars:

- the holder's name, usual address and authority number,
- the buyer's name, usual address and authority number (if any),
- the date of the sale,
- the species of fish sold and the estimated quantity (by weight or number) of each species,
- the estimated total quantity (by weight or number) of all fish sold; and

b) keep a legible copy of all dockets issued for 18 months from date of issue.

13 The holder is NOT authorised to sell aquaculture fisheries resources (alive or dead) as bait.

14 Transportation within Queensland of any cultured product (inciuding fingerlings or post larvae) shall be in containers or tankers which:

a) are clearly marked as aquaculture product; and

b) display the holder's name and address.

15 The holder must pay the Annual Fee by the due date each year as advised in the Aquaculture Licence Annual Fee Notice.

16 The holder must submit an Aquaculture Statistical Return to Fisheries DPI by close of business on 30 September each year during the tenure of this Licence.

SCHEDULE OF FEES

Date Paid	Amount	Receipt No.	Fee Type
05 09 1996	$68.85	8711	Aquaculture Licence Class 3 - Fisheries Resources, Non-Tidal
05/09/1996	$50.00	8711	Assessment Fee - Aquaculture Licence Class 3
27 05 1997	$95.00	34649	Class 3 Aquaculture Licence - Annual Fee 1996/97
02/06/1998	$96.00	50888	Class 3 Aquaculture Licence Annual Fee 1998/99
02/06/1999	$96.00	14/21748	Class 3 Aquaculture Licence - Annual Fee - 1999/2000
31/05/2000	$96.00	14.64403	Class 3 Aquaculture Licence - Annual Fee - 2000/2001
01/06/2001	$96.00	14.122618	Class 3 Aquacultre Licence - Annual Fee 2001/02
03/06/2002	$96.00	14/182076	Class 3 Aquaculture Licence - Annual Fee - 2002/2003
13/11/2002	$23.70	771504	Amendment Fee

Delegate of the Chief Executive

Date Paid	Amount	Receipt No.	Fee Type
13/11/2002	$52.00	771504	Transfer fee
13/11/2002	$51.50	771504	Assessment fee
13/11/2002	$27.62	771504	CITEC Plan Search
13/11/2002	$340.00	771504	Survey Fee
04/06/2003	$96.00	1400243404	Class 3 Aquaculture Licence - Annual Fee - 2003/2004

SCHEDULE OF AMENDMENTS

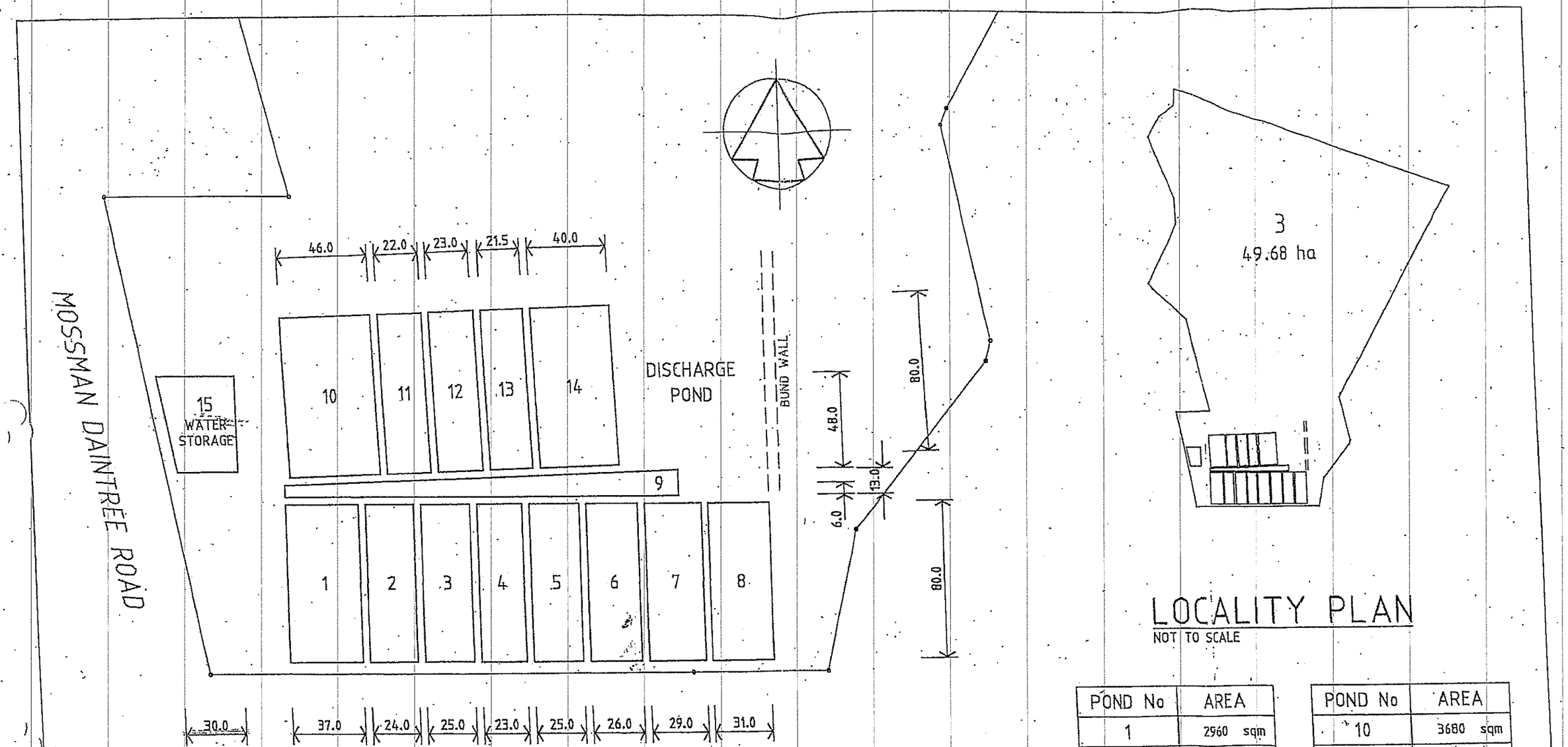
Date	Amendment
9/06/2000	Address amended - no fee.
18/05/2004	amendment for property description due to land subdivision, amend production area and adding approved aquaculture species.

SCHEDULE OF TRANSFERS

Date	Transferred From
25/05/2004	Mr Vittorio Guiseppe Scomazzon

.....

Delegate of the
Chief Executive



POND LAYOUT

NOT TO SCALE

Lot 3 on SP 150448
Parish of WHYANBEEL, County of SOLANDER

LOCALITY PLAN

NOT TO SCALE

POND No	AREA
1	2960 sqm
2	1920 sqm
3	2000 sqm
4	1840 sqm
5	2000 sqm
6	2080 sqm
7	2320 sqm
8	2480 sqm
9	1990 sqm

POND No	AREA
10	3680 sqm
11	1760 sqm
12	1840 sqm
13	1720 sqm
14	3200 sqm
15	1680.10 sqm
TOTAL	33380.10 sqm 8.2481 ac 3.3380 ha

A	11.02	ORIGINAL ISSUE FOR COUNCIL APPLICATION

DRAWN	SEB
DESIGNED	SEB
APPROVED	
DATE	NOV 2002

VIC SCOMAZZON

PROPOSED AQUA-CULTURE POND EXTENSION
LOT 3 MOSSMAN DAINTREE ROAD, WONGA BEACH

SITE PLAN

SCALE -

DRAWING NUMBER
SCO1010 - S1
SHEET 1 of 1

A

Appendix 4E

2001 Marine Plants Permit

Queensland Government

23 March 2001

V.G. Scomazzon
Lot 1 South Arm Drive
Wonga Qld 4873

Department of
Primary Industries

Dear Mr. Scomazzon,

ISSUE OF SECTION 51 (FISHERIES ACT 1994) FOR THE REMOVAL, DAMAGE OR DESTRUCTION OF MARINE PLANTS

I refer to your application of 2nd February 2001 to allow trimming of mangroves for drainage maintenance on the above property. Further to an on site inspection and discussions with yourselves and this Department, I advise that assessment of your application has now been finalised.

Enclosed is Marine Plant Permit 01NOCA0238 and Plan Number 01NOCA7965MP0238 to allow works as requested. Your attention is drawn to the Schedule of Conditions on the Permit and the need to comply with all Conditions.

The District Officer of the Queensland Boating and Fishing Patrol must be contacted prior to the commencement of marine plant removal. This is a condition of Permit that allows the QB&FP to monitor compliance with Permit conditions and deal with public enquiries. The QB&FP office is at Port Douglas (Phone : 07 40 995 160, facsimile : 07 40 335 172).

According to Condition 2 of the Permit a Survey Fee of $500 is now due and payable to:

Habitat Manager (North)
PO Box 5396
CAIRNS Q 4870

It is the responsibility of the Permittee to be aware of the contents of the Fisheries Act 1994 and the Fisheries Regulations 1995 with respect to the issue of Marine Plant Permits. If you wish to obtain a copy of the legislation it is available at Goprint, 371 Vulture Street, Woolloongabba, Qld 4102 (☎ 07 3246 3399) or can be accessed via the Internet at *www.qld.gov.au*.

(Encl)

CC:

Jim Gillespie, General Manager, Fisheries Resource Protection, QFS, DPI Fisheries, GPO Box 46, Brisbane 4001.
Eddie Gilbert, Rural Services Coordinator, Department of Primary Industries, PO Box 1085, Townsville 4810.
Steve Pollard, District Officer, QB&FP PO Box 412, Port Douglas QLD 4871

Enquiries to Your Ref: Our Ref: (:)
Department of Primary Industries, 38-40 Tingira Street, PO Box 5396, Portsmith Q 4870
Telephone Facsimile: (07) 40 350 401 E-Mail:
nfc0103lmj16

ABN 78 342 684 030

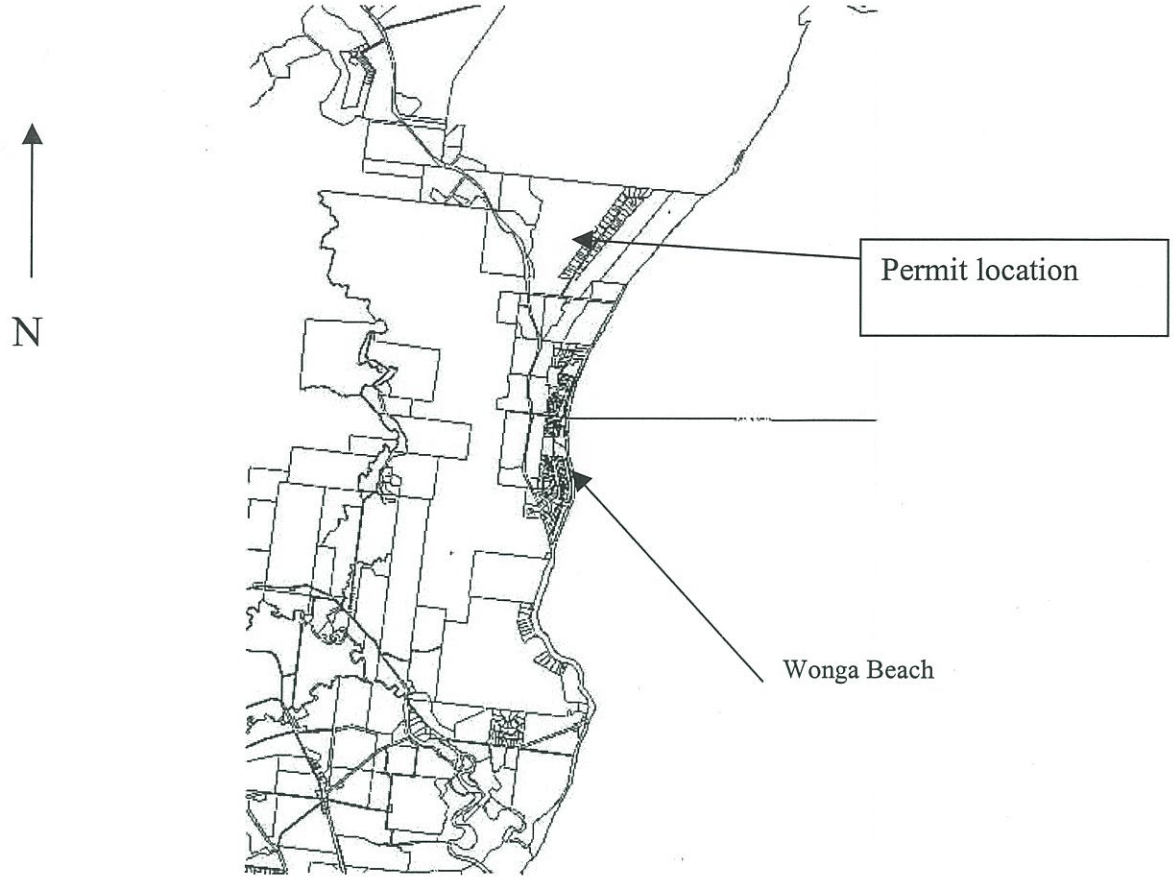
There is a provision under the Fisheries Act for appeal, under certain circumstances, should you feel dissatisfied with the decision. For further information contact the Secretary of the Fisheries Tribunal on (07) 3239 6709. A notice of appeal must be lodged within twenty-eight (28) days after receiving advice of the decision.

If you wish to discuss any aspect of this Permit please contact Ms Louise Johns at the Northern Fisheries Centre, Cairns (☎ 07 4035 0148).

Yours faithfully

Anne Clarke
HABITAT MANAGER (NORTH)
QUEENSLAND FISHERIES SERVICE

nfc0103lmj16



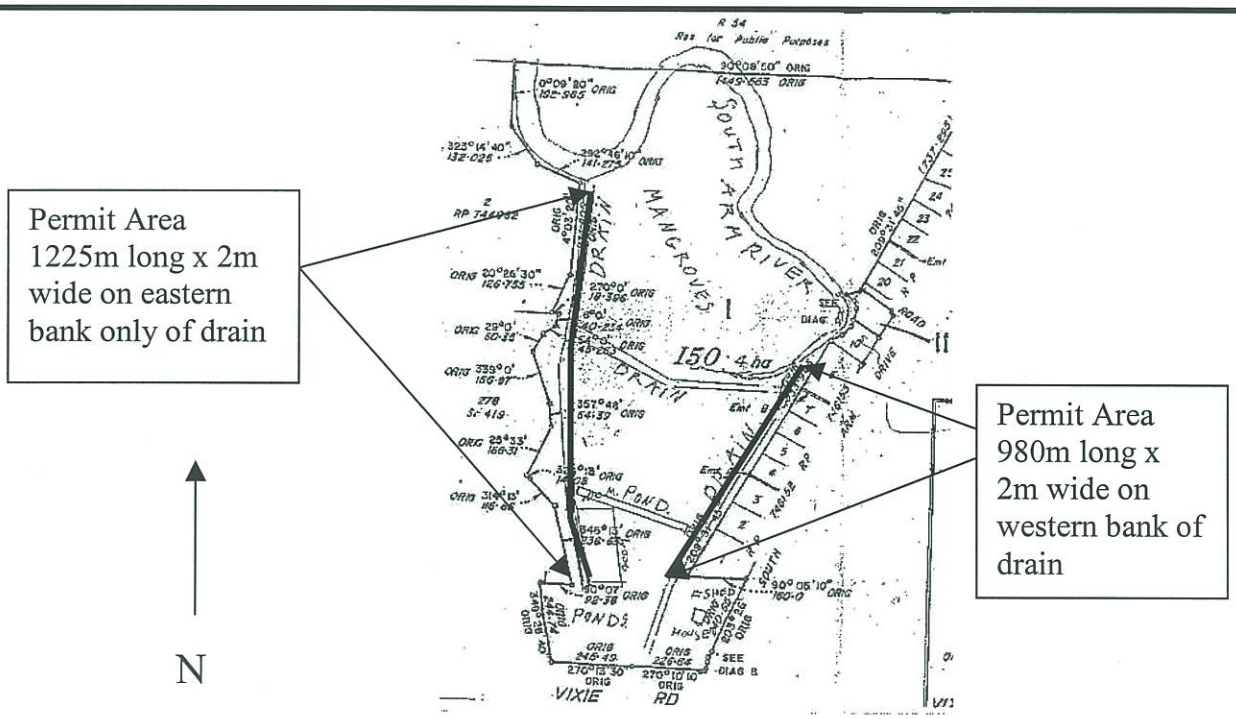


Figure 1. Permit location
Figure 2. Permit area. Trimming only of regrowth marine plants.

DPI PLAN NO.

01NOCA7965MP0238

Queensland Government
Department of Primary Industries

QUEENSLAND
FISHERIES ACT 1994
Section 51
FISHERIES REGULATIONS 1995

PERMIT NUMBER
01NOCA0238

MARINE PLANT PERMIT

This is to certify that VITTORIO G SCOMAZZON

of LOT 1 SOUTH ARM DRIVE WONGA QLD 4873

is authorised to: trim marine plants

at the approved area described as:

LOT 1 SOUTH ARM DRIVE, WONGA, as described in DPI Plan No 01NOCA7965MP0238

for the purpose of: aquaculture farm drain maintenance

for the period 26 March 2001 **until** 25 March 2002.

Issued at CAIRNS **this** 23 **day of** March 2001.

.....

Delegate of the
Chief Executive

CONDITIONS

1 The nature and extent of disturbance is limited to:
Trimming of marine plants along eastern bank of western drain (1225m long x 2m wide)and western bank of eastern drain (980m long x 2m wide). Trimming to base of trees with roots to be left in the ground. No disturbance of herbaceous marine plants. Area described in DPI Plan No. 01NOCA7965MP0238.

2 A survey fee of $500 (for monitoring and report preparation) must be paid to the Habitat Manager (North), Department of Primary Industries, PO Box 5396, Cairns Qld 4870, prior to the commencement of works, but in no case later than 27 April 2001.

3 The Port Douglas office of the Queensland Boating and Fisheries Patrol (Ph. No.40 995 160, and the Habitat Manager (North), Department of Primary Industries (Ph. No.07 40 350 100), must be notified, in writing, of the date of commencement of works, fifteen (15) days prior to the commencement of works.

4 A written report which details the completed works must be provided within fifteen (15) days of completion of works to the District Officer, Queensland Boating and Fisheries Patrol, PO Box 412, Port Douglas Qld 4871, and the Habitat Manager (North), Department of Primary Industries, PO Box 5396, Cairns Qld 4870.

5 This Permit authorises persons identified by the holder to assist in the authorised activities on the approved area.

6 The holder must comply with:
a) the requirements of all relevant legislation and obtain approvals from the relevant administering organisations, including approvals to access and use the land for the authorised activity, and
b) any Codes of Practice or management arrangements relevant to the authorised activity.

7 At least three (3) signs must be displayed around the works site, in positions where they are clearly visible to the public, for fifteen (15) days prior to the commencement of the authorised activities and during all authorised works. Each sign must advise and describe the authorised activity, and state "Works authorised under QDPI Permit No. 01NOCA0238".

8 This Permit is issued for necessary disturbances within the approved area only, and the works involved must be performed in such a manner as to not cause direct or indirect disturbance or damage to adjacent tidal land or plants or unnecessary disturbance within the approved area.

9 The holder must adequately mark (peg) the boundaries of the approved area to allow for ease of identification, unless the area can be readily located by an existing boundary (eg. surveyed property boundary).

10 The holder is to ensure that all spoil from the approved area is not disposed of on tidal lands or within waterways and is managed to prevent acid soil development, if relevant.

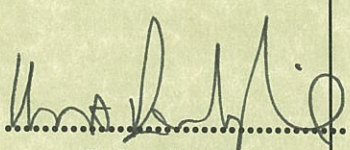
Delegate of the
Chief Executive

CONDITIONS (continued)

11 All marine plants authorised for removal, exclusive of those to be used for a restoration project acceptable to the Department of Primary Industries, and other debris, is to be removed from the intertidal zone and disposed of in a neat and tidy manner.

SCHEDULE OF FEES

Date	Fee	Receipt No	Fee Type
02/02/2001	$147.00	711548	Permit Fee- Marine Plants
20/03/2001	$500.00	711595	Assessment Fee - Marine Plant Permit 2001 - GST exempt



Delegate of the Chief Executive

Appendix 4F

2001 Marine Plants Permit correspondence

Queensland Government

Department of
Primary Industries

20 March 2001

Mr V G Scomazzon
Lot 1 South Arm Drive
WONGA Q 4873

Dear Mr Scomazzon

Re: MARINE PLANT PERMIT 01NOCA0238

Enclosed is your receipt (711595) for the above permit which is now being processed. Please note that the assessment fee is non refundable and does not constitute permit approval.

Yours sincerely

Anne Clarke
MANAGER - HABITAT (NORTH)
QUEENSLAND FISHERIES SERVICE

Att/Encl

Enquiries to: Anne Clarke | **Your Ref:** | **Our Ref:** 530(406) : **AC:BG**
Northern Fisheries Centre, PO Box 5396, 38-40 Tingira Street, **CAIRNS, QLD, 4870, Australia**
Telephone: (07) 4035 0144 | **Facsimile:** (07) 4035 4664 | **Email:** ClarkeA@dpi.qld.gov.au
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ABN 78 342 684 030

27 February 2001

V.G. Scomazzon
Lot 1
South Arm Drive
Wonga Qld 4873

DPI
QUEENSLAND
DEPARTMENT OF PRIMARY INDUSTRIES
FISHERIES GROUP

Dear Mr. Scomazzon,

MARINE PLANT PERMIT APPLICATION - DRAIN MAINTENANCE

I refer to your Marine Plant Permit application dated 2nd February 2001 relating to drain maintenance on your aquaculture farm at Wonga Beach.

It appears from a site inspection held on the 13th February 2001 with Fisheries Officer Louise Johns that some points require clarification prior to finalisation of permit assessment.

The trimming, by hand, of regrowth mangroves and melaleuca along one side of both drains to maintain suitable access to the drains is supported by Queensland Fisheries Service (QFS). Removal of spoil within the eastern drain as discussed on site requires further discussion as to the treatment and disposal of Potential Acid Sulphate Soil (PASS).

As discussed on site QFS does not support disposal of spoil on tidal land. The spoil would need to be removed, treated and disposed of in a non-tidal location. The location labelled on your application, as "existing reclaimed land", would not be suitable for disposal, as it appears to have some tidal influence due to the presence of mangroves. The Department of Natural Resources (DNR) are the lead agency in testing and treatment of PASS soil. An Acid Sulphate Soil Management Plan dealing with the proposed spoil would need to be provided to QFS prior to permit issue.

There appears to be a large amount of exposed PASS soil alongside the two drains. The yellow coloured material (jarosite) indicates low pH soil, which may have a negative impact on adjacent waterways. Testing and treatment of this spoil could be treated as mitigation for loss of marine plants for your maintenance permit. It is QFS policy to include some mitigation for loss of marine plants through the assessment of Marine Plant Permits.

CC: **Jim Gillespie, General Manager, Fisheries & Aquaculture Development Division, QFS, GPO Box 3129, Brisbane 4001 Attention Dr John Beumer**
Eddie Gilbert, Rural Services Coordinator, Department of Primary Industries, PO Box 1085, Townsville 4810.

Enquiries to: Louise Johns | **Your Ref:** | **Our Ref:** 530 (406) : **LJ:LJ**
Northern Fisheries Centre, PO Box 5396, 38-40 Tingira Street, **CAIRNS, QLD, 4870, Australia**
Telephone: (07) 4035 0148 | **Facsimile:** (07) 4035 4664 | **Email:** JohnsL@dpi.qld.gov.au
o:\r_nth\l_nfc\fish\habitat\docs\general\reg.admin\nfc0102lmj10.doc

QUEENSLAND GOVERNMENT

Contact Louise Johns on ☎07 40 350 148 for further information.

Yours sincerely

Anne Clarke
MANAGER, HABITAT MANAGEMENT (NORTH)
QUEENSLAND FISHERIES SERVICE

nfc/nfc0102lmj10

DPI
QUEENSLAND
DEPARTMENT OF
PRIMARY INDUSTRIES

FISHERIES
GROUP

14 March 2001

V.G. Scomazzon
Lot 1
South Arm Drive
Wonga Qld 4873

Dear Mr. Scommazon,

MARINE PLANT PERMIT APPLICATION - DRAIN MAINTENANCE

I refer to your application dated 2nd February 2001 for the above works and subsequent and telephone conversation on the 5th March 2001 with Fisheries Officer, Louise Johns.

I am confirming that from your advice on the 5th March 2001 you wish to alter your application for cutting only of marine plants along both east and western drains. No spoil removal will occur under this application.

To finalise this application an assessment fee of $500 is required at your earliest convenience.

If you require further information contact Louise Johns on ☎40 350 148.

Yours sincerely

Anne Clarke
MANAGER, HABITAT MANAGEMENT
QUEENSLAND FISHERIES SERVICE

Enquiries to: Louise Johns | **Your Ref:** | **Our Ref:** : LJ:LJ
Northern Fisheries Centre, PO Box 5396, 38-40 Tingira Street, **CAIRNS, QLD, 4870, Australia**
Telephone: (07) 4035 0148 | **Facsimile:** (07) 4035 4664 | **Email:** JohnsL@dpi.qld.gov.au
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QUEENSLAND
GOVERNMENT

Appendix 4G

1994 Marine Plants Permit

11 February 1994

DPI
QUEENSLAND
DEPARTMENT OF PRIMARY INDUSTRIES
LAND USE AND FISHERIES

Mr V G Scommazzon
PO Box 70
MOSSMAN QLD 4873

Dear Sir

ISSUE OF SECTION 71 PERMIT FOR THE DISTURBANCE OF MANGROVES/MARINE PLANTS - DAINTREE RIVER

I refer to your applications of 18 December 1992 and 7 June 1993 to allow the removal of mangroves associated with the construction of aquaculture ponds and the maintenance of existing drains. I advise that subsequent to on-site inspections and meetings the assessment of your application has now been finalised.

On the basis of an inspection undertaken by our regional environment manager on the 19 November 1993, together with consideration of the impacts on the fisheries resource, I advise that approval is **not** given for the issue of a Permit for all works as requested.

However, I have enclosed Permit 94.08 and Plan 016.653(1994) to allow the removal of regrowth mangroves and marine plants within two existing drains. During the on-site inspection it was noted that these two drains would need to be kept clear of marine plants to enable you to continue with your licenced aquaculture activities. Your attention is drawn to the Schedule of Conditions on the Permit and the need to comply with **all** Conditions.

Previous discussions between yourself and Dr Rob Coles of the Northern Fisheries Centre have indicated that you would consider the surrender of 15 hectares back to the Crown to offset the loss of fisheries productivity from existing and proposed works.

I wish to advise that regardless of past history and advice regarding your property, marine plants may only be legally disturbed in any way if a Permit under Section 71 of the Fisheries Act has been obtained prior to any works.

CC: **Mr C Andrews**, District Officer, Qld Boating & Fisheries Patrol, PO Box 412, PORT DOUGLAS QLD 4871
Mr C Creighton, Regional Manager (LUF), North Region, PO Box 1085, TOWNSVILLE QLD 4810
Dr R Coles, Environment Manager, North Region, PO Box 5396, CAIRNS QLD 4870
Ms L Nagan, Solicitor, PO Box 265, PORT DOUGLAS QLD 4871
Mr J N Harden, Coastal Management Branch (Approvals), Department of Environment and Heritage, PO Box 155, BRISBANE ALBERT STREET QLD 4002

Enquiries to: Ms Dawn Couchman Your Ref: Our Ref: 93/FBR (DC:)
Primary Industries Building, 80 Ann Street, GPO Box 46, Brisbane Q 4001
Telephone (07) 23 93386 Facsimile (07) 22 98146

FISHERIES DIVISION

An application for any further works must include the information requested in points (a) to (m) of our correspondence, Ref: 14F.078 of 26 August 1993, and details of an area of mangroves that could be returned to the Crown to offset the loss of productivity to fisheries for consideration by the Department of Primary Industries.

Please contact Dr Rob Coles (ph 070 529 830), Regional Environment Manager, Northern Fisheries Centre, Cairns for further advice in this regard.

Yours sincerely

P L Appleton
CHIEF INSPECTOR OF FISHERIES

Enc.

Queensland Fisheries Act 1976-1989 (Section 71)
Permit No. 94.08
Application Fee: $129.00
Receipt No.: 50549 (15-6-93)
Monitoring Fee: $300.00

DPI QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES
LAND USE AND FISHERIES

PERMIT TO CUT, ETC. MANGROVE/MARINE PLANTS*

Mr Vittorio Guiseppe Scommazzon
of Cedar Street, PO Box 70, MOSSMAN QLD 4873
Residential Address / Postal Address
and persons under his direction

is hereby permitted to * remove

mangroves/marine plants* within the area described as - Lot 1 on RP 749715, Parish of Whyanbeel, County of Solander, corner of Daintree Road and Vixies Road, Wonga.
and shown on the plan attached hereto and catalogued: 016.653(1994)

Nature and extent of cutting etc.: Removal of regrowth mangroves only from within a maximum disturbance area of 1 hectare.

Purpose Proposed: Maintenance of two existing drains.

Schedule of Conditions:

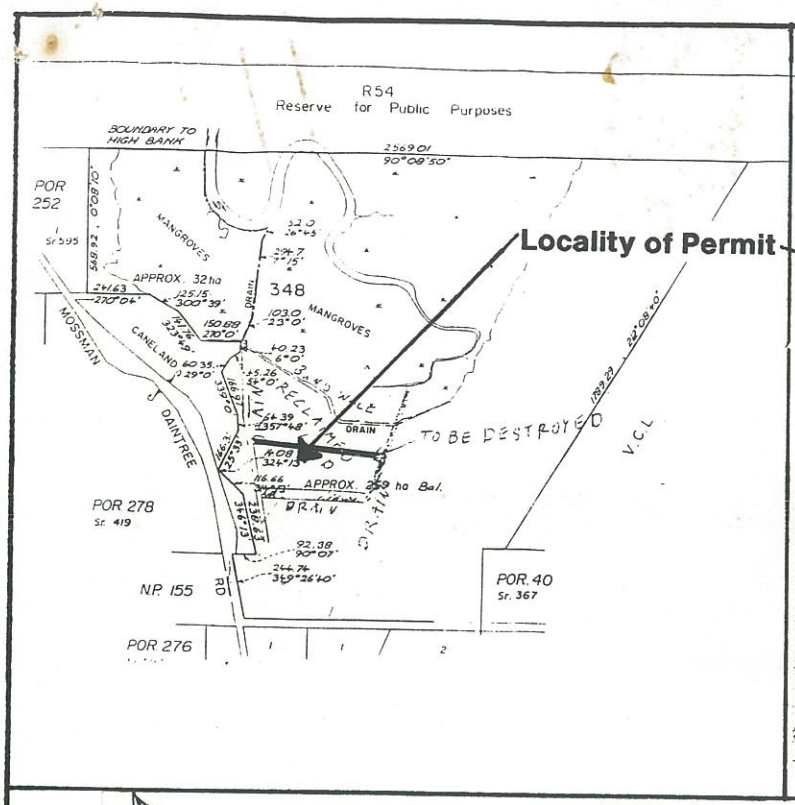
1 A fee of $300 is to be paid to the DPI, Fisheries Services, Brisbane **within 30 days** of the date of issue of this Permit and prior to commencement of works for monitoring and report preparation to ensure full compliance with the terms, conditions and restrictions of this Permit.
2 The Port Douglas office of the Boating & Fisheries Patrol and Fisheries Services, Brisbane, are to be notified, in writing, **15 days prior** to the commencement of works, of the date of commencement of works.
3 This Permit or a copy is to be available at the site of works for immediate inspection by any officer authorised under the Fisheries Act 1976-1989.
4 At least one (1) sign is to be displayed around the site of works where visible to the public prior to commencement and during the permitted works, advising and describing the intended works and quoting the relevant permit numbers.
5 The Permittee is responsible for all works associated with the purpose proposed within or outside the permitted area.
6 The Permittee is responsible for all actions of all persons within the site of the purpose proposed.
7 This Permit is issued for necessary disturbances within the specified area only and the works involved must be performed in such a manner as to not cause indirect disturbance or damage to adjacent tidal land or plants or unnecessary disturbance within the specified area.
8 All mangrove and other debris is to be removed from the intertidal zone and disposed of in a neat and tidy manner.
9 This Permit does not give permission to pass through or enter upon lands or infer the issue of any other Permits or Approvals necessary to the purpose proposed.
10 All other Permits and Approvals relevant to the purpose proposed are to be obtained and held prior to the commencement of works, in particular all rights to use the land for the purpose proposed.
11 Written advice is to be provided **within 15 days** of the completion of works to the District Officer, Boating and Fisheries Patrol, PO Box 412, Port Douglas Q 4871, and the Manager Fisheries Services, Department of Primary Industries, GPO Box 46, Brisbane, Q, 4001.

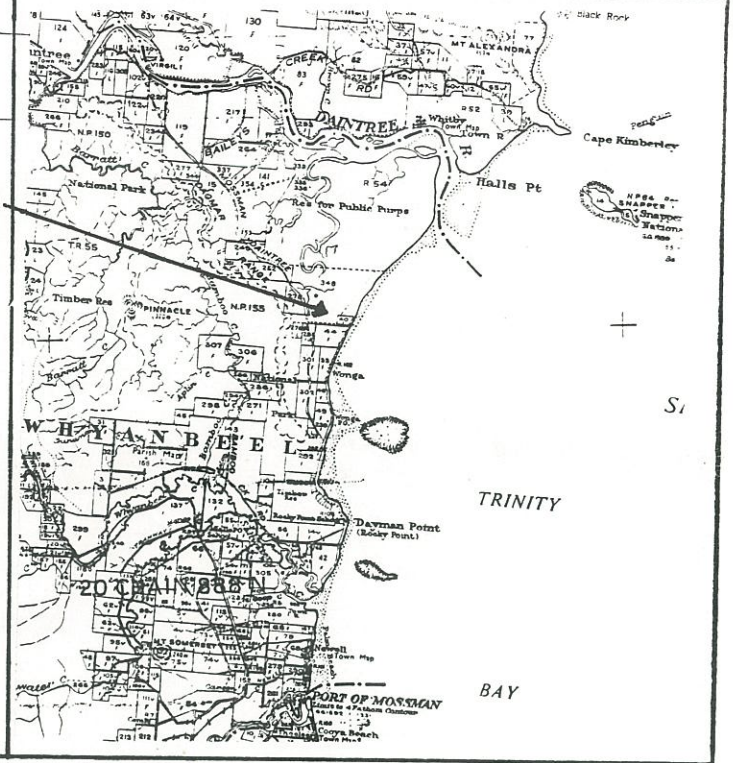
This Permit is not transferable or renewable and is current for a period of 12 months from the date of issue.

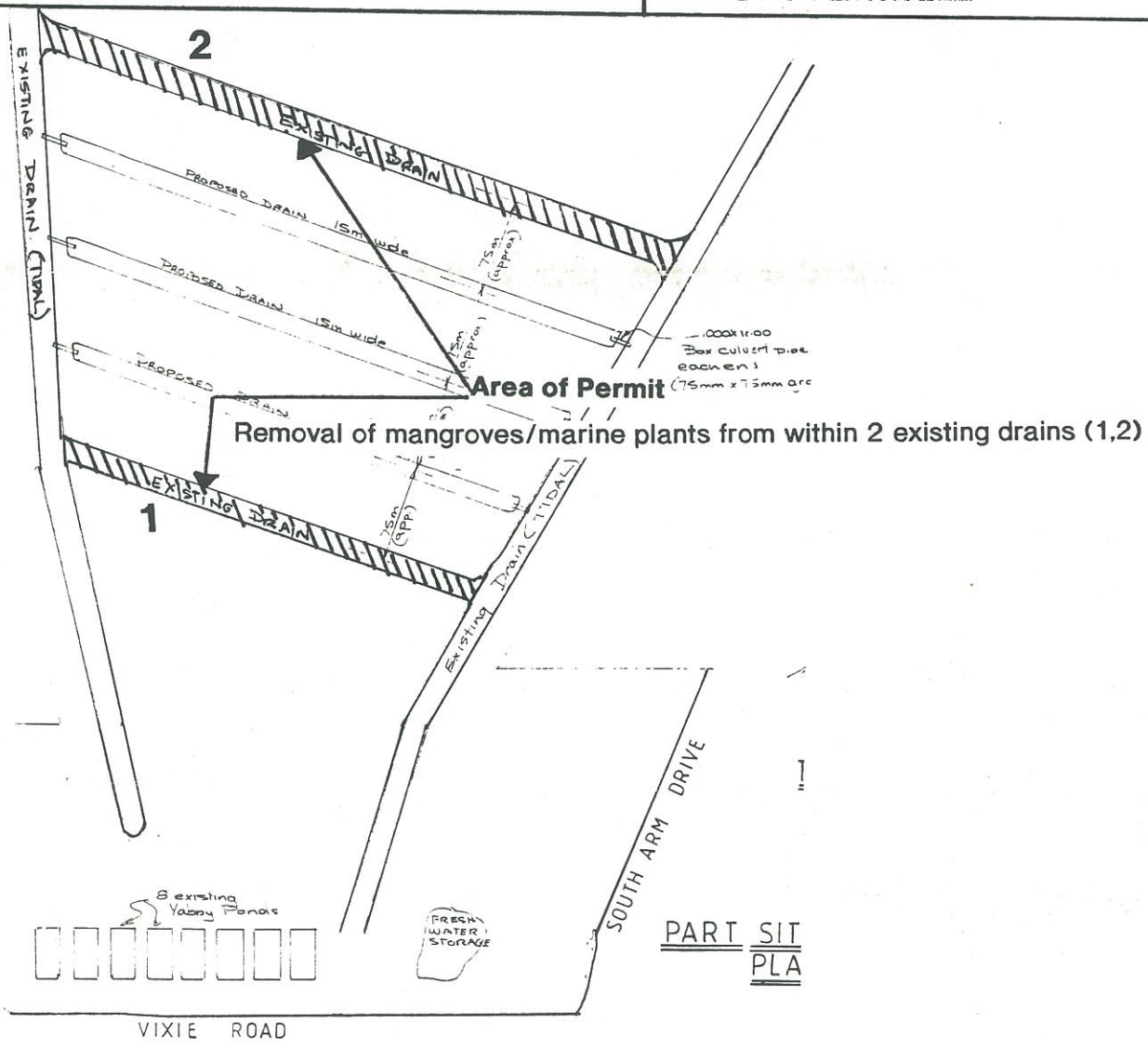
Pat L. Appleton

(P L Appleton)
CHIEF INSPECTOR OF FISHERIES

Dated at Brisbane, this 14th day of FEBRUARY 1994.







Removal of mangroves/marine plants from within 2 existing drains (1,2)

Photocopy reduction of submitted plan, locality map. 25-1-94

Grid Ref.	Plan No.
7965	016·653(1994)

Appendix 5

Previous Land Clearing Permits

Wonga Beach Aquaculture

Guide to various clearing approvals held by Vixie

Permit issued 8 May 1975

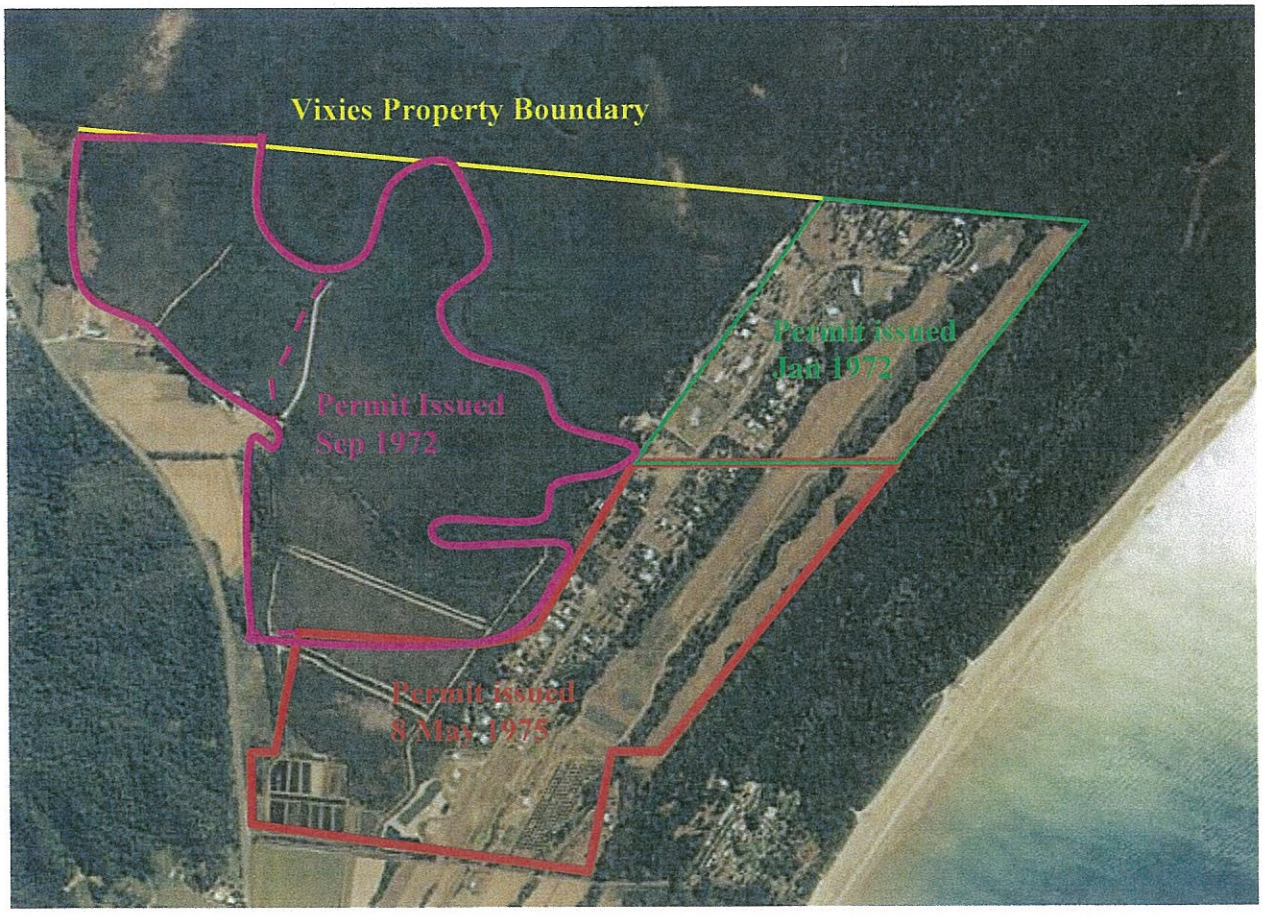
According to the landholder this area was totally cleared

Permit issued Jan 1972

According to the landholder this area was totally cleared

Crashed Area. Permit Issued Sep 1972

According to the landholder this area was 'crashed'. It is presumed that this means the vegetation was knocked over, but not removed.



LAND ACT 1962–19

PERMIT TO DESTROY TREES

(For other than constructional timber purposes)

WHEREAS V.G. the lessee of the land particularly described in Schedule I hereunder, made application on the fourth day of January, 1972, to the Land Commissioner for the Land Agent's District of Cairns for a Permit to destroy trees on the said land; Now, after due inquiry, I, the Commissioner for the said District, in accordance with the stipulations and conditions set out in Schedules I and II hereof and in pursuance of and subject to the provisions of the *Land Act* 1962–19 ," do hereby grant the said V.G. this Permit to destroy trees.

Subject to all the conditions and provisions in the said Act contained, this Permit shall have effect for the period from date hereof up to and including the seventh day of January, 1974, provided that this Permit shall cease to have any force or effect forthwith upon the execution by the permittee of a transfer of the lease or license with respect to which this Permit applied, and no further trees shall thereafter be destroyed in terms of this Permit. B/c The District Forester, Atherton. For your information.

SCHEDULE I

*Name of Pastoral Lease: Special Lease District: Cairns

*Reg. No. of Lease or Licence: Special lease Portion 91/2[illegible] Acting Land Commissioner, Cairns. 7.1.72.

Portion: 348 Parish: Nyanbool Area: abt. 70a nea.

Purpose for which Permit authorises destruction of trees: Improved pasture. B/c The Secretary, Land Administration Commission, Brisbane. For your information.

Description and extent of area embraced by Permit: 95a more (Vide sketch appended hereto) Acting Land Commissioner, Cairns. 7.1.72.

Specie(s) of Trees to be destroyed: Cattle, bloodwood, tiacoing & mangrove of no commercial value.

Method of destruction: mechanical

†Special Condition(s) of Permit:

Granted under my hand at Cairns this seventh day of January, 1972.

Land Commissioner.

* Strike out whichever is not applicable.

† Such conditions, if any, are additional to the conditions set out in Schedule II on back hereof.

(See back hereof)

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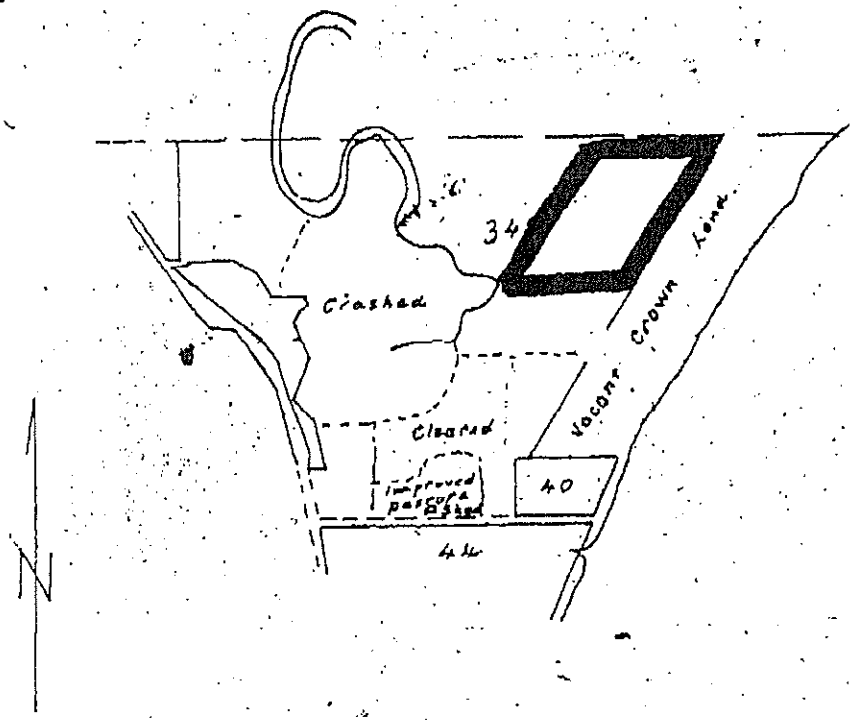


Scale: 40 chains = 1 inch

Area covered by Permit outlined in red

c The Secretary,
Land Administration Commission,
Brisbane.
Your information.

B/c. The District Recorder,
Atherton.
For your information.

Land Commissioner,
Cairns. 13.9.72.

PERMIT TO DESTROY TREES

Land Commissioner,
Cairns. 22.

(To obtain round split hewn or sawn timber for constructional purposes)

WHEREAS Vittorio Guiseppe Giovanazzo the *Lessee *Licensee of the land particularly described in Schedule I hereunder, made application on the twenty-fifth day of July, 19 72, to the Land Commissioner for the Land Agent's District Cairns for a permit to destroy trees on the said land, for the purpose of the use by him of the timber derivable therefrom in the improvement of the said land: Now, I, the Commissioner for the said District, in accordance with the stipulations and conditions set out in Schedules I and II hereof and in pursuance of and subject to the provisions of "*The Land Acts, 1962 to 1965*," do hereby grant the said Vittorio Guiseppe Giovanazzo this Permit to destroy trees.

Subject to all the conditions and provisions in the said Act contained, this Permit shall have effect for the period from the date hereof up to and including the thirteenth day of September, 19 74, provided that this Permit shall cease to have any force or effect forthwith upon the execution by the permittee of a transfer of the lease or license with respect to which this permit applies.

SCHEDULE I

*Name of Lease: Special Lease — District. Cairns

*Reg. No. of Lease: 35093

Portion: 548 — Parish: Whyanbeel — Area: Abt. 720 acres

Purpose for which Permit authorises destruction of trees: Fencing

Species of trees which may be destroyed: Suitable species of forest timber.

Quantity of constructional timber which may be obtained: 500 Fence Posts - round - 9" diameter

†Special conditions of Permit: No trees to be destroyed within forty-four (44) yards of the main watercourse shown on attached sketch.

Granted under my hand at Cairns this thirteenth day of September, 1972.

J. Stanton, Land Commissioner.

* Strike out whichever is not applicable.

† Such conditions, if any, are additional to the conditions set out in Schedule II on back hereof.

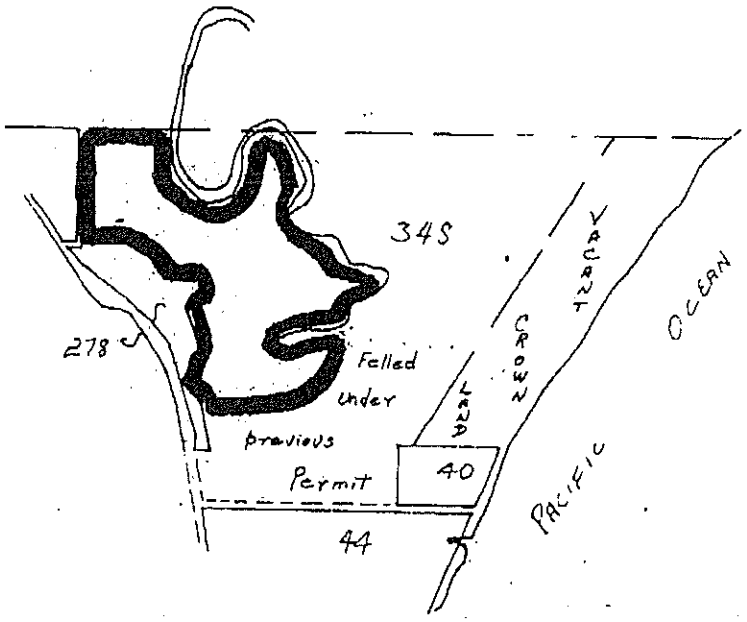
OVER

Govt. Printer, Brisbane.(M)

11 SEP 1972
CAIRNS

S.L. 35993

POR 348, WHYANBEEL



SCALE : 40 CHAIN TO AN INCH.

AREA RECOMMENDED UNDER PERMIT – EDGED RED

Brisbane.
For your information.

LAND ACT 1962–1974

PERMIT TO DESTROY TREES

Atng. Land Commissioner,
Cairns. 8.5.75.

(For other than constructional timber purposes)

WHEREAS Vittorio Giuseppe [illegible] the lessee of the land particularly described in Schedule I hereunder, made application on the third day of March 1975, to the Land Commissioner for the Land Agent's District of Cairns for a Permit to destroy trees on the said land; Now, after due inquiry, I, the Commissioner for the said District, in accordance with the stipulations and conditions set out in Schedules I and II hereof and in pursuance of and subject to the provisions of the *Land Act* 1962–1974, do hereby grant the said Vittorio Giuseppe [illegible] this Permit to destroy trees.

Subject to all the conditions and provisions in the said Act contained, this Permit shall have effect for the period from date hereof up to and including the eighth day of May, 1977, provided that this Permit shall cease to have any force or effect forthwith upon the execution by the permittee of a transfer of the lease or license with respect to which this Permit applied, and no further trees shall thereafter be destroyed in terms of this Permit.

SCHEDULE I

*Name of ~~Pastoral~~ Lease: Special case — District: Cairns

*Reg. No. of Lease ~~or License~~. 35993

Portion: 348 — Parish: Nyanbool — Area: about 67 ha.

Purpose for which Permit authorises destruction of trees: Establishment of improved pastures.

Description and extent of area embraced by Permit: (Vide sketch appended hereto) about 54 ha

Specie(s) of Trees to be destroyed: Cuttle, bloodwood and ti-tree with areas of marginal scrub.

Method of destruction: Mechanical

†Special Condition(s) of Permit: -

Granted under my hand at Cairns this eighth day of May, 1975.

/c The District Forester,
Atherton.
For your information.

Acting Land Commissioner.

This permit does not exempt any lessee from the obligation of obtaining a permit to burn as required by the Rural Fires Act.

Acting Land Commissioner.
Cairns. 8.5.75.

* Strike out whichever is not applicable.

† Such conditions, if any, are additional to the conditions set out in Schedule II on back hereof.

(See back hereof)

Govt. Printer, Brisbane.(20)

THE LAND ACTS, 1962 TO 1965

Application for a Permit to Destroy Trees

The Land Commissioner,

(Place) Cairns

I, [illegible] of Cairns the *Lessee/Licensee of a
(Surname first, Christian names in full, address and occupation)

Special Lease Prop. 71/2127 [illegible]
(State whether or not)

under the abovenamed Act, hereby make application for a Permit to destroy trees on Por. 348 Mayenbee[illegible] of the said Holding. Particulars with respect to the application are given hereunder:—

PARTICULARS OF HOLDING

District: County of Calander Parish of Mayenbee[illegible]

Name of Holding or Reg. No. of Selection or License: Por. 348

SCHEDULE I

(Completion of this Schedule is not required where the application is for the purpose of the use by the applicant of timber for fencing, yards, buildings or other constructional improvements on the said holding).

PARTICULARS OF AREA TO BE TREATED

Area of Holding:	Abt. 290 HA
Present Carrying Capacity of Holding:	100 Head
Estimated carrying capacity of Holding after proposed tree destruction has been effected:	150 Head
Area to be treated:	56 HA
Present carrying capacity of area to be treated:	Nil
Estimated carrying capacity of this area after treatment:	50
Approximate period for which the permit is required:	2 years
Description of timber to be destroyed:	Wattle, Bloodwood
Are there any commercial trees on area proposed to be treated?	No
Proposed use of treated area:	Grazing
Method to be adopted for tree destruction: (Ringbarking, Mechanical, Spraying, etc.)	Mechanical
Proposed provision for shade, shelter and windbreaks (where necessary):	Natural Shade

If part of Holding only to be treated, sketch must be supplied on back hereof.

SCHEDULE II

PARTICULARS OF TIMBER REQUIRED FOR CONSTRUCTION OF IMPROVEMENTS ON THE HOLDING

Proposed Improvements:

Quantity of timber required (state No. of fence posts or linear and diametric measurements of round constructional timbers or log volume of millable wood as the case may be):

Species of timber required:

Is the timber to be sawn at a licensed sawmill?

If so, at which sawmill is it to be processed?

Is the timber to be sawn at an exempted plant?

If so, is the plant owned by applicant?

If the plant is not owned by applicant, from whom is it leased?

Dated the [illegible] day of [illegible] 19[illegible]

(Signature of Applicant Lessee or Licensee) [illegible]

Witness [illegible]

(See back hereof)

[illegible] LAND Commissioner

Govt. Printer, Brisbane

5.3.75

Appendix 6A

DSWB Preliminary ASS Management Plan v1.1

EcoSustainAbility

Daintree Salt Water Barramundi

Daintree Saltwater Barramundi

Farm Expansion
Preliminary Acid Sulfate Soils Management Plan

Version 1.1

18 April 2018

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The moral rights of authorship are asserted by Guy Chester and EcoSustainAbility.

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1 Introduction

1.1 Preliminary Acid Sulphate Soils Management Plan

1.1.1 Preliminary Status

This document is a preliminary acid sulfate soils management plan (ASSMP) for the development of 13 additional aquaculture ponds at Daintree Saltwater Barramundi's Wonga Beach farm (Lot 3 SP292103).

Give the requirement for a plan to manage potential acid sulfate soils is required prior to further soil testing (which can only be undertaken during construction as ponds must be drained), this document is preliminary only. Once soil testing has been undertaken and the full extent of ASS/PASS known detailed and specific treatment strategies will be developed and this plan revised.

1.1.2 Risk Based Approach

The prime intent of this preliminary ASSMP is to provide a discussion of the likely ASS/PASS onsite and provide a risk averse mechanism to ensure construction can occur without short term or long term environmental harm.

1.2 Implementation

Daintree Saltwater Barramundi intends to engage professional services to undertake the ASS testing, development of the final ASSMP and for supervision/performance monitoring during construction.

Preliminary field testing was undertaken. Whilst treatment options are outlined in the Plan, further testing and development of a specific treatment system will be required.

1.3 Version

This is version 1.1.

1.4 Technical Guidelines

This preliminary ASSMP has been developed in accordance with the *Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines (2014)*.

1.5 Supporting Information

Please see two appendices:

- Appendix A –Geotechnical Investigation Report (Ground Engineering Services)
- Appendix B – Acid Sulfate Soils Management Plan for Bund Remediation (BTEQ)

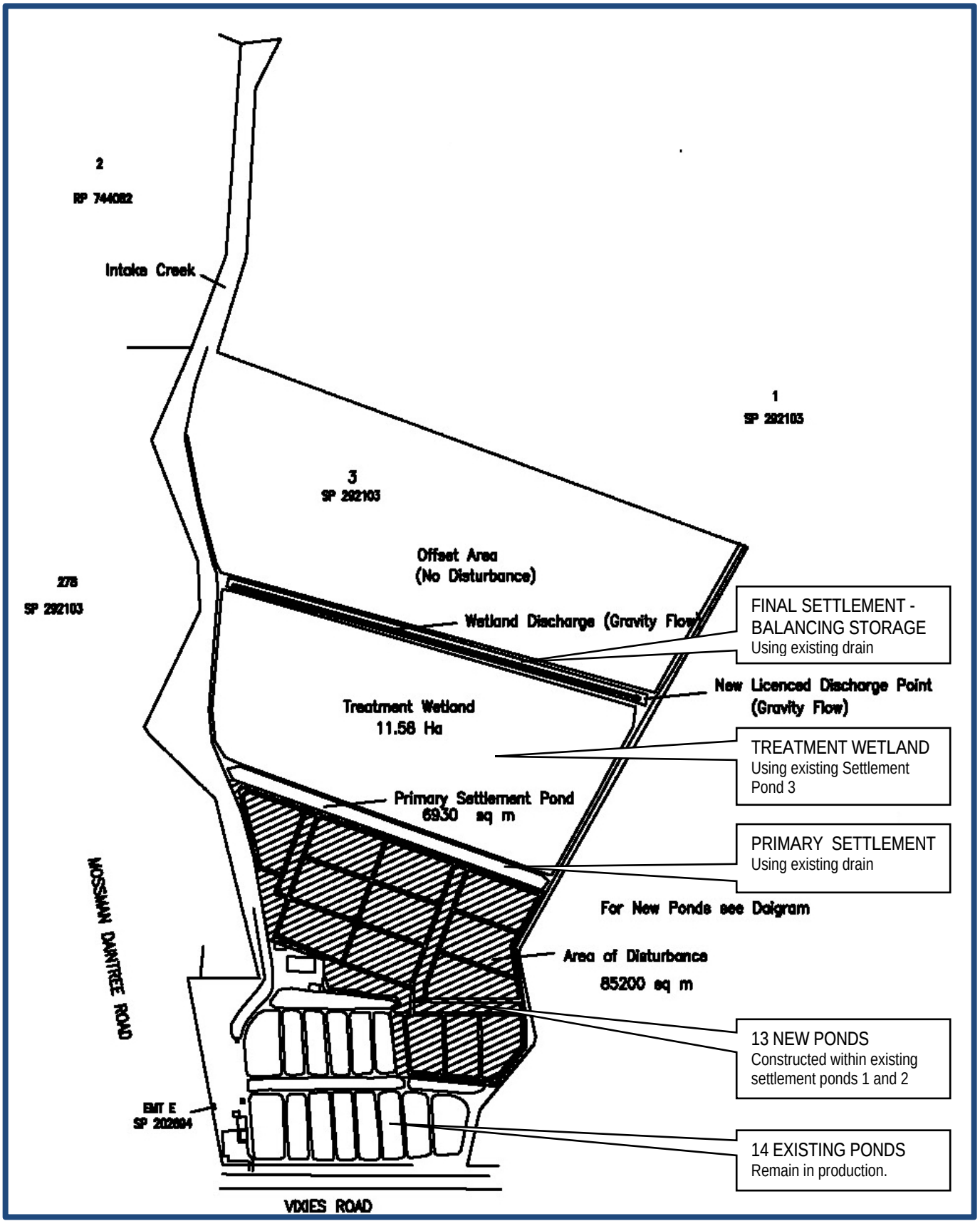
Appendix A sets out recent, 2017 acid sulfate soils testing results. Appendix B sets out a 2004 ASSMP for the site which was focussed on remediation and management of existing roads and bunds.

2 Site Characteristics

2.1 Site Plan and Proposed Development

Figures 1 and 2 provide an overview of the proposed design. For the purposes of this ASSMP the areas of disturbance proposed are by way of new ponds 15-27 and the new main drains from these ponds into the primary settlement pond. Earthworks for the existing ponds, including the conversion of some ponds to treatment will not involve disturbance below the current pond beds.

Figure 1: Overall Layout



SOURCE: Pozzi, see also Plan XX

Figure 2: Overall Layout and Schematic Arrangement Over Aerial Image

3 Soil Testing

3.1 2017 Field Tests

Field tests were taken when geotech sampling was undertaken. These samples were taken at sites most likely to be ASS/PASS, being the floor of the settlement ponds and drains. Sampling and subsequent laboratory testing were undertaken to assess site won materials for the presence of acid forming materials. Results of the testing are summarised in Table 1 and presented in full in Appendix A. See Figure 3 for sample site locations.

Table 1: 2017 Soil Tests

	SPOCAS Net Acidity Calculations	
Location	**s-Net Acidity (%w/w S)**	**a-Net Acidity (moles H+/T)**
ASS#1 - Drain (at Discharge Point)	0.10	62
ASS#2 – Pond 2,Floor -0.1m	1.60	1000
ASS#3 – Pond 2, Floor -0.5m	0.94	580
ASS#4 – Pond 2, Floor -0.5m	0.42	260
ASS#5 – Pond 1, Floor -0.1m	0.97	610
ASS#6 – Pond 1, Floor -0.5m	0.61	380

3.2 Consideration of Testing Results

Based on the above results the following is concluded:

- The drain where the discharge weir will be excavated and installed has a Net Acidity (%w/w S) of 0.10 and a-Net Acidity (moles H+/T). This will require the disturbance of less than ten tonnes of material is a low treatment regime (based on Table 4-2 QLD ASS Technical Guidelines).
- The main drains linking to the primary settlement pond (between ponds 16/16/17 and 18, 18/19/20 and 21/22/23 and 24/25/26 and 27) will require excavation of about 1000 tonnes of material below the current floor of settlement ponds 1 and 2. NOTE The net cut in the design is 420m^3 but there will be additional material removed to account for the drain lining. Sites ASS#3, ASS #4 and ASS#6 are representative of the material, at a depth of 0.5m below the pond floor. The range of s-Net Acidity (%w/w S) is 0.42 to 0.94 and a-Net Acidity (moles H+/T), 260 to 580, this is therefore just into the extra high treatment and will require 47 Tonnes of CaCO3 (based on Table 4-2 of QLD ASS Technical Guidelines).
- The settlement pond floors do have ASS properties, with the surface layer (e.g. sites ASS#2 and ASS#5 having higher existing and potential sulfidic acidity than the lower soil profile (represented by ASS#3, ASS #4 and ASS#5). The conclusion is that these soils should not be disturbed and the plan is to drain the current water, remove vegetation, rip to a depth 200mm and lime, then cover with select fill as quickly as possible during construction.

  The ripping will be to a relatively shallow depth of 200mm to avoid disturbance and oxidation of in-situ soils, it is the top layer that will oxidise as the soil dries out enough for machinery to work it and also has the higher net acidity levels. These soils will have a minimum of 500mm of material capping (lime guard layer, 250mm or more select fill, then 250mm of clay liner) and then the ponds will be filled above. Final liming rates will need to be determined once sampling is undertaken and the ponds are drained and vegetation removed. Field testing will be needed during construction to ensure this is adequate.

Only as a contingency, ripping, liming and mixing approach may be required. The area of the settlement ponds 1 and 2, where the new ponds will be built is 6.6ha, with ripping to a depth of 200mm this is a total of 16,500m^3, this will need approximately 1478 tonnes of $CaCO_3$ (see calculation notes below):

Calculated liming rate for the of draining, removing vegetation, drying out, and liming the ripped 200m layer is as follows:

- Assuming an net acidity of 900 molH+/t CaCo3/t divide by 19.98 = 45.04 kg $CaCO_3$/t
- To convert from pure $CaCO_3$ (NV 100%) to aglime (NV 98%) =45.96 kg aglime/t
- To convert from oven dry soil to field condition soil multiply by the bulk density 45.96 aglime/t x 1.3*t/m^3 = 59.75kg aglime/ m^3
- To add the safety factor 59.75 kg aglime/ m^{3}x1.5 = 89.62kg aglime/ m^3

* Note the bulk density of in-situ soils will need to be determined in soil tests once ponds are drained.

Given that it is not practicable to sample the materials in the interior of ponds 1 and 2 until they are drained, and recognising that if they all have ASS properties, oxidisation could start immediately and generate an acidic leachate, a conservative approach has been developed of urgently ripping and liming the soils, then covering as soon as practicable. On-site engineering advice (and amendment of this ASSMP) will be required once the ponds are drained and field testing can be carried out.

3.3 Proposed Detailed Soil Testing

3.3.1 Field Testing

As the ponds dry out field tests can be undertaken. Once access to the pond is available detailed soils testing can be undertaken.

3.3.2 Sampling Intensity

Given the area of disturbance is about 6.6ha for the new ponds and drains a minimum of 2 holes per ha will be the sampling intensity, as such at least 16 holes will be used.

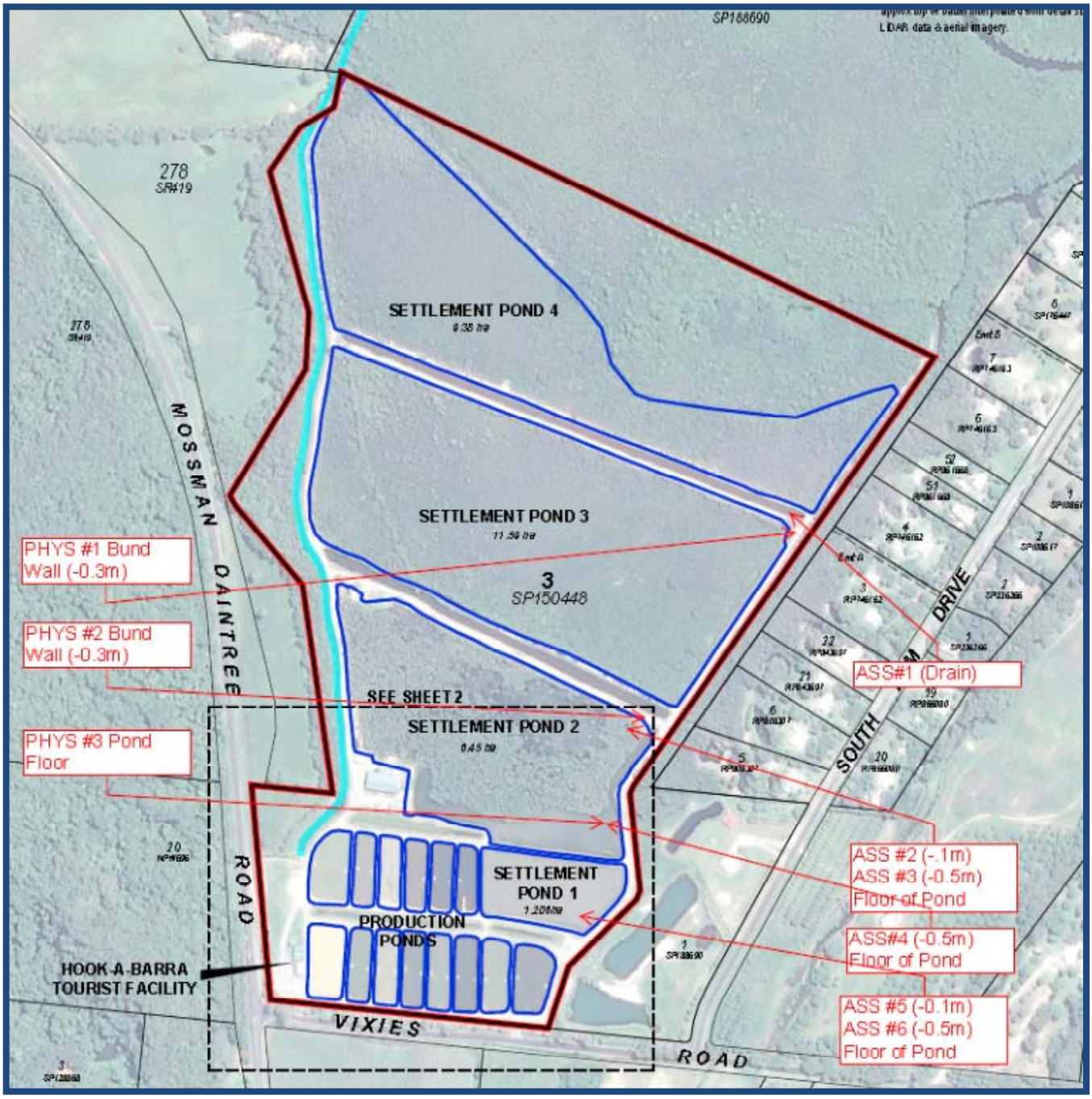
3.3.3 Sampling

Each borehole/pit will have its GPS location recorded, field descriptions of the soil horizon recorded, with samples taken 0.5m in depth. The depth of any water table encountered will be recorded.

3.3.4 Analysis

Analysis will be chromium or SPOCAS suite.

Figure 3: Location of 2017 ASS Testing Sites



4 Management Approach

4.1 Risk Management

The design of the proposal has been based upon reducing risk of environmental harm from ASS/PASS on site. The approach is based on:

- The new aquaculture ponds will be constructed entirely within the bunded settlement ponds 1 and 2. The integrity of these outer bunds will at all time remain. Disturbance of ASS/PASS material on the bed/floor of these existing settlement ponds will be minimised and the approach will be to dry out/rip in lime and promptly cover with at least 250mm of select fill and 25mm of clay liner (placed materials well compacted with sheep foot roller as per QLD Aquaculture Construction Containment Structures Guidelines).
- Actual excavation of ASS/PASS material has been minimised to just the discharge weir point and the drains. This material will be moved to a bunded treatment area, for insitu neutralisation.
- Existing, bunded, impervious, clay lined ponds will be used to collect and neutralise any leachate from within disturbed areas during construction.

Risks are minimised as the area of disturbance of ASS/PASS is within the existing bunds, which will remain intact and serve to contain any acidic surface water, leachate or surging saturated soils.

The long term risks are further reduced as the water table will not be affected and the new ponds will be mostly filled thus adding a level of certainty to reduced risk of ongoing oxidation of ASS/PASS materials below the ponds.

4.1.1 Avoiding Oxidation

For the construction of new aquaculture production ponds in current settlement ponds 1 and 2, the approach is to minimise potential for oxidation of ASS/PASS soils on the ponds floors. The approach is to pump out surface water and as soon as possible commence removal of vegetation, ripping in lime and covering, this can be undertaken when the soils are still quite saturated with cover progressing across the existing settlement pond by working from one side along a working "face". Given this, the proposed approach is, after draining the pond, as soon as saturation level of the soils allows machinery access, rip and lime then cover, thus avoiding oxidation to the greatest practicable extent.

4.2 Principles

The management principles of the QLD ASS Technical Manual are set out below, along with relevant discussion.

4.2.1 Avoid Disturbance

1. *The disturbance of ASS should be avoided wherever possible.*

The approach is to minimise disturbance of ASS as far as possible. The approach to is to drain settlement ponds 1 and 2 and then cover (after ripping and liming at a rate depending upon engineering advice during construction). The only excavation will be for the drains.

4.2.2 Management

2. *Where disturbance of ASS is unavoidable, preferred management strategies are:*

- *minimisation of disturbance*
- *neutralisation*

- *hydraulic separation of sulfides either on its own or in conjunction with dredging; and*
- *strategic reburial (reinterment).*

Any ASS that must be disturbed (for drain excavation) will be neutralised and placed in the bunded area, just to the east of the workshop.

For the majority of the area the approach is to minimise disturbance by drying out the material and covering.

4.2.3 Best Practices

3. Works should aim to achieve best practice environmental management, when it has been shown that the potential impacts of works involving ASS are manageable, to make sure that the potential short- and long-term environmental impacts are minimised.

It is proposed to use existing impervious, clay lined ponds for leachate collection and neutralisation, then testing prior to discharge. The main areas where ASS/PASS will be exposed or excavated are within existing bunded areas (settlement ponds). This containment of any acidic leachate is as far as practical best practice.

4.2.4 Environmental Duty

4. The material being disturbed (including the in situ ASS and surface water and groundwater systems), and any potentially contaminated waters associated with ASS disturbance, must be considered in developing a management plan for ASS and/or in complying with the general environmental duty.

The general environmental duty is acknowledged. The final, detailed ASS Plan once testing has been conducted will ensure a full risk assessment at all stages of handling of ASS to ensure a diligent approach to the protection of the receiving environment from any acidity or metal contaminants

4.2.5 No Dilution.

5. Receiving marine, estuarine, brackish or fresh waters are not to be used as a primary means of diluting and/or neutralising ASS or associated contaminated waters.

This is not proposed.

4.2.6 Management

6. Management of disturbed ASS is to occur if the ASS action criteria listed in Table 4.1 of these guidelines are reached or exceeded.

The final ASS Management Plan will ensure management of all ASS which meets or exceeds the action criteria.

4.2.7 Treatment

7. Placement of untreated ASS above the permanent watertable, with or without containment, is not an acceptable long-term management strategy. For example, soils that are to be stockpiled, disposed of to landfill, used as fill, placed as temporary or permanent cover on land or in waterways, sold or exported off the treatment site or used in earth bunds, that exceed the ASS action criteria listed in Table 4.1 should be treated/managed.

All soils that are ASS and meet or exceed Table 4.1 action criteria will be actively managed (most likely through covering with a guard layer and the covering with fill, or if required through neutralisation, as discussed below).

8. The following issues should be considered when formulating ASS environmental management strategies:

- *the sensitivity and environmental values of the receiving environment. This includes the conservation, protected or other relevant status of the receiving environment (e.g. Declared Fish Habitat Area, Marine Park, Coastal Management District and protected wildlife)*

The application for approval includes a full assessment of the site considerations.

- *whether groundwaters and/or surface waters are likely to be directly or indirectly affected*

Disturbance of ground waters is unlikely to occur. The use of the proposed ponds for the leachate means that containment of leachate can be achieved, thus protecting ground water.

- *the heterogeneity, geochemical and textural properties of soils on site*

This will be better assessed once further soil testing has occurred and the detailed ASS Management Plan prepared.

- *the management and planning strategies of local and/or state government, including statutory planning instruments.*

The State Planning Policy and local government planning forms the basis of the approach.

4.3 Strategies Adopted

The following sections of the QLD ASS Technical Guidelines have formed the basis of the approach:

7. Minimisation of disturbance

Where a sound case for the disturbance of ASS has been made, then efforts must be made to minimise the extent of the disturbance. Completing a detailed ASS investigation is essential for minimisation of disturbance to be effective. This includes an assessment of the concentration and spatial distribution of potential and existing acidity, and assessment of groundwater characteristics.

The overall approach is to minimise disturbance of ASS/PASS soils by covering them, rather than disturbance and excavation.

7.2 Shallow disturbances

The earthworks on a site can be designed to ensure that only shallow disturbances are undertaken. This strategy relies on a detailed understanding of the spatial distribution of ASS, and is only viable in situations where sulfidic soils are located in the deeper horizons within a soil profile.

The approach for the construction of the new ponds is to avoid any excavation or disturbance, rather to rip and lime to top layer of potentially oxidised ASS/PASS soils then cover to avoid further oxidation.

7.4 Minimise groundwater fluctuations

Activities that cause groundwater fluctuations, and in particular those that permanently lower the watertable, should be avoided as these may expose in situ sulfidic soils to oxygen. Acidity can be brought to the surface when the groundwater rises again, through capillary rise, or as a result of fill emplacement, where reduced soil void space can result in squeezing out of pore water and groundwater.

The approach is to avoid any affect on ground water levels. Once the new production ponds are constructed they will have an impervious lining and be hydraulically isolated from groundwater.

7.5 Cover In Situ Soils with Clean Fill

If groundwater levels are not affected by earthworks, then undisturbed in situ potential ASS can be covered with clean fill.
Using clean non-ASS fill instead of treated ASS on site minimises risk. Untreated ASS should not be used as pre-load material.

The approach is to cover ASS/PASS soils in settlement ponds 1 and 2 with clean fill, rather than disturb.

7.6 Use filling to compress saturated sediments

Filling can be used to compress and dewater saturated ASS materials before construction, while keeping the soils in anoxic conditions. This is a relatively common practice for large infrastructure projects that intersect with coastal alluvium, but time and expense issues may make the practice less viable for smaller projects. An experienced geotechnical consultant needs to decide on the details of such works, but some general tips include:

- staging the filling activities to slowly and progressively increase the weight acting on the soil
- using shallow batters around the edges of the fill pad
- containing, treating and appropriately disposing of expressed pore waters.

The first two measures are expected to reduce the risk of lateral displacement.

The approach is to cover ASS/PASS soils in settlement ponds 1 and 2 with clean fill, this will act to compress and wet sediments in the settlement ponds.

4.4 Construction

This section sets out the overall construction approach.

4.4.1 Overall Construction Approach

The approach to construction will be to minimise disturbance outside the construction footprint and to embody best practice acid sulfate soils and erosion and sediment control. Figure 5 sets out the locations of key aspects of the strategy, with Figure 5 showing a typical cross section of the new pond construction. Key aspects will be:

- The existing bunds around currently settlement ponds 1 and 2 will be kept intact and built onto.
- Fill material will be select sandy loams and clay to ensure adequate properties structural properties. Fill with a high clay content will be used to create an impervious liner across the pond floors and up to the top of bunds.
- Staged layering of fill and compaction will be used to ensure structural properties.
- Fill brought on site will be checked for physical properties and contaminant (metals and ASS/PASS) status. PASS material will not be brought on site.
- Induction of all construction workers will be undertaken, particularly to ensure the need to remain entirely within the footprint of disturbance and not have any impacts on the adjoining wetland and remnant vegetation, the importance of the acid sulfate management procedures and the importance of erosion and sediment control on the outside bunds (to protect adjoining wetlands).

Basic construction staging will involve (preliminary, may be amended by detailed Construction Plan and EMP, ASSMP and erosion and sediment control plan):

- Empty current production pond 14 (best) or 1 and 2 as holding/treatment pond for any collected acid leachate.
- Pumping free standing water from pond 1 into settlement pond 2.
- After this initial pumping out of settlement pond 1, any water from groundwater seepage or stormwater to be pumped into the holding pond, tested weekly for pH and limed as required before discharge.
- Place silt fence along toe of eastern bund of settlement pond 1 (adjacent to eastern drain).
- Lime and rip the floor of pond 1 and then placing select fill the level of 155-1.65 m AHD (needs to be undertaken with a week of pond being pumped out).
- *NOTE: Presuming the floor soils are AASS the time of exposure of the bottom sediment of Pond 1 (by pumping out) until it is limed, ripped and capped with fill is critical to minimising acid leachate. This operation will be carefully planned and coordinated with lime and fill ready and available for transport to site.*
- Place fill in layers and compact to create external and internal bund walls established (for ponds 15, 16 and 17.
- Place at least 250 mm liner of mostly clay layered and compacted on pond floors and bunds to top of bunds.
- Stabilise outer bund along eastern site boundary.

- Note: Other than to place each pond's drain structures, do not excavate drain between existing pond 14 and new pond 15 at this stage.
- Stockpile lime on site and stockpile select fill (ponds 15 and 16 can be used for fill stockpile) such that there will be little delay in capping ASS material in settlement pond 2. Pump out settlement pond 2, clear and remove vegetation. This Needs to be a quick process in case to minimise oxidation of ASS, vegetation and timber can be mulched/chipped and/or stored temporarily in new pond 17.
- Vegetation mulched and chipped on site and stored in Pond 17 for later re-use for revegetation and bank stabilisation works.
- Lime and ripping the floor of pond 2 and then placing select fill the level and then clay lining to the design pond floor levels.
- *NOTE: Presuming the floor soils are AASS the time of exposure of the bottom sediment of Pond 2 (by pumping out) until it is limed, ripped and capped with fill is critical to minimising acid leachate. This operation will be carefully planned and coordinated with lime and fill ready and available for transport to site.*
- Place hard barrier (e.g. orange construction site mesh fence) at top of bund and a silt fence on the remaining bench (along the toe of the new bund) to the east and west of settlement pond 2.
- Create a bunded area east of workshop (for ASS stockpile).
- If there is any obvious ASS (yellow deposits on soil etc.), remove and stockpile in bunded ASS stockpile area with any necessary liming.
- After this initial pumping out of settlement pond 2, any water from groundwater seepage or stormwater to be pumped into the Primary Settlement Pond (the drain between current settlement pond 2 and 3), tested weekly for pH and limed as required before discharge.
- Place fill to create external and internal bunds for ponds 18-27.
- Place fill in layers and compact to create external and internal bund walls established (for ponds 15, 16 and 17.
- Place at least 250 mm liner of mostly clay layered and compacted on pond floors and bunds to top of bunds.
- Stabilise outer bund along eastern site boundary.
- Note: Other than to place each pond's drain structures, do not excavate drains between ponds 27/26-25 and 21-23/18-20 15 at this stage.
- Excavate all drains, placing ASS material (and any PASS) in the ASS stockpile area with lime treatment and ongoing monitoring for any leachate. Sample and record structural properties of material placed. After liming the base of the drain, place at least 200mm of coarse sand/gravel at the base of each drain (for erosion and to cap any remaining ASS.
- Place culverts and abutments in drains at road crossings etc. then backfill.
- NOTE: intake water pipe work and electrical/telemetry monitoring cabling to be placed underground as bunds are constructed.
- Place HDPE plastic protection on pond banks.
- Cap roadways with a 100mm layer of coarse gravel and roll.

- Place headstocks and erosion protection around culverts and pond drain outlets.
- Cap the bund at the northern side of the Treatment Wetland and place at least 6 weirs at 1.8m AHD lined with HDPE sheet and with riprap protection at their base. NOTE it is vital there is no disturbance to the wetland to the west and to the northern bund of this Final Settlement Pond/Balancing Storage in order to protect the remnant vegetation and essential habitat.
- Install Wastewater Pump and pipe with numerous outlets along southern bund of the Treatment Wetland.
- Install Recirculation Pump.
- Install discharge weir and outlet erosion protection works.

Figure 4: Construction ASSMP Approach

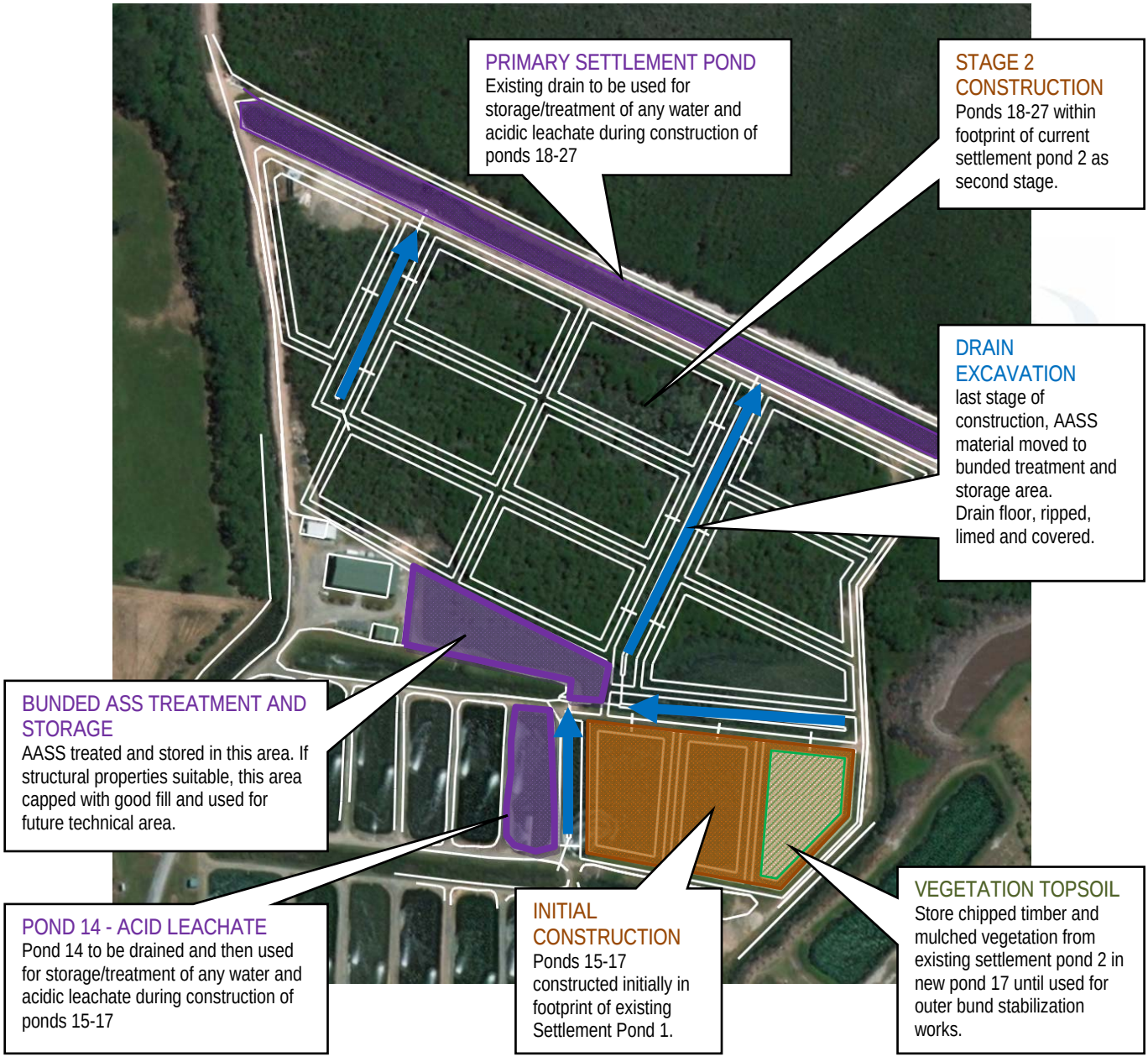
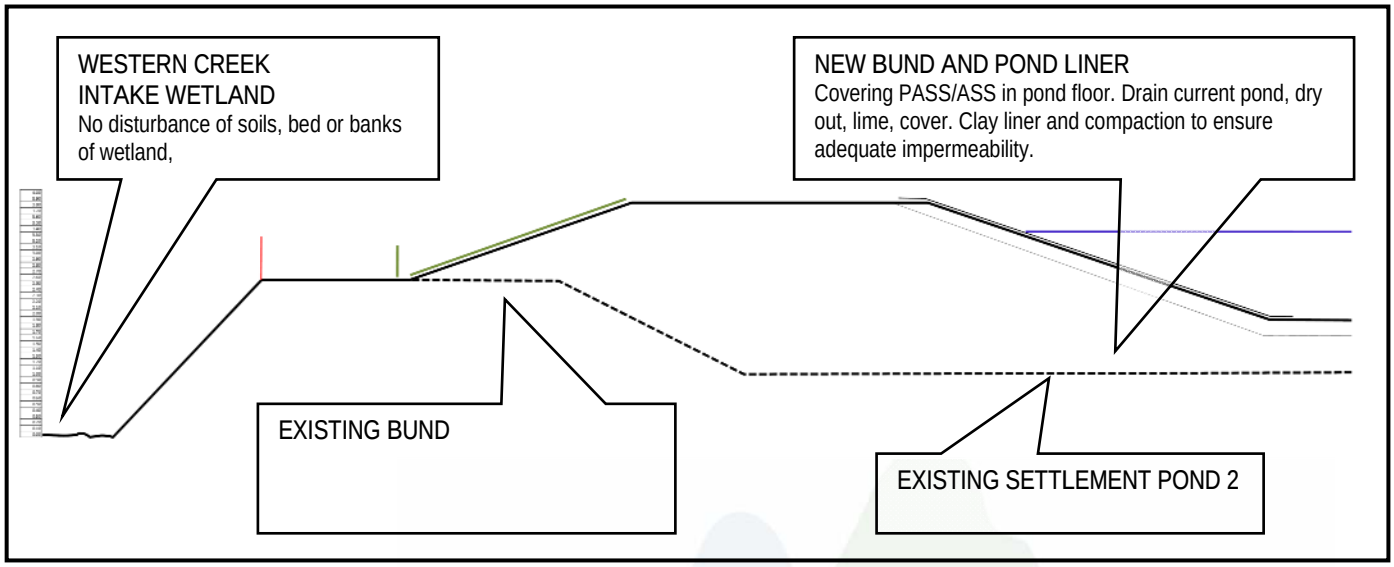


Figure 5: New Bunds and Ponds PASS/ASS Wetland Integrity at Western Bund of Ponds 24, 25 and 27



NOTE The "ASS Stockpile" (see Figure 5) bunded area (which will not become a pond) to the east of the current workshop can be filled with ASS material from the drain excavation and lime treated. This area can be subject to future use as additional technical area (e.g. workshop/nursery). Material will be capped in-situ initially for ASS management purposes and if material properties and compaction is acceptable can be the base fill this future technical area. It is likely that type of material will require additional compaction by surcharge (weight of fill on top) prior to any use.

In the event that there is more ASS material needing stockpiling the "alternative ASS Stockpile area" to the south of Pond 27 may be used. As a contingency any pond can be used to stockpile and treat ASS material until storage/placement can be arranged.

5 PASS Neutralisation

5.1 Neutralisation Strategy

5.1.1 If Required

Neutralisation will take two forms:

- In situ neutralisation of the settlement pond floors prior to covering with capping and the pond clay liners.
- Batch/layer neutralisation of ASS materials excavation to create the drains and the discharge weir.
- Should clays sourced on site be found to be PASS the current (lined) ponds which will form the primary settlement pond will be used as bunded are for controlled treatment neutralisation prior to the clays being moved to each pond and mixed and/or placed in situ to form the pond liners.

Using the existing pond as the "treatment pad" will allow a controlled environment where any leachate can be collected/treated before release. A small bund will be placed by way of the pond outlet and is required any acidic leachate will be lime treated, or if only minor acidity is present passed over lime chips prior to discharge.

5.2 Neutralisation Mechanism

Neutralisation will involve the thorough mixing of Aglime into the soil. The amount of neutralising agent added must be sufficient to neutralise all existing acidity that may be present and all potential acidity that could be generated from complete oxidation of the sulfides over time.

For the floor of settlement ponds 1 and 2 the treatment will either involve spreading lime over the exposed soil and then covering with fill, or if required, ripping, liming and then covering.

For treatment of excavated ASS/PASS, a batch process will be used in the treatment area, where excavated ASS are spread in thin layers, neutralising material is spread over the top, and machinery is used to mix the materials together.

5.3 Performance Criteria

Based on the QLD ASS Technical Manual, the following performance criteria are proposed for soil that has been treated using neutralisation:

- The neutralising capacity of the treated soil should exceed the existing plus potential acidity of the soil by at least a safety factor of 1.5
- Post-neutralisation, the soil pH (pH_{KCl}) is to be greater than 6.5[5]
- Excess neutralising agent should stay within the treated soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity

Treatment success will be verified with a full acid base account (chromium or SPOCAS suite including retained acidity).

Samples of the treated soil will be taken and analysed at an appropriately accredited (e.g. NATA/ISO 17025) laboratory.

Soil that has been treated by neutralisation techniques and has not met these criteria will be re-treated and re-tested until the above performance criteria are met.

5.4 Verification Testing

Verification testing of the treated ASS material in the bunded area east of the workshop will be undertaken at a minimum rate and will be at least one test per batch.

The testing regime will be determined once the existing plus potential acidity is determined. Based on the QLD ASS Technical Manual guidelines of suggested minimum volumetric rates (depending on existing plus potential acidity) will be used:

- <0.5% S-equivalent (<312 mol H^+/tonne) – 1 per 1000 m^3
- 0.5−2% S-equivalent (312−1247 mol H^+/tonne) – 1 per 500 m^3
- >2% S-equivalent (>1247 mol H^+/tonne) – 1 per 250 m^3.

Verification sampling will be undertaken to establish whether (a) sufficient neutralising material has been added to the batch of soil on the treatment pad (an aglime usage register will provide supporting information) and (b) whether it has been sufficiently mixed.

Composite samples will be taken according to a random or stratified-random protocol.

6 Monitoring

6.1 Construction Phase

6.1.1 pH of Waters

During construction in-situ monitoring of pH will be undertaken weekly (and after any rainfall event of more than 20mm in any 24 hours) at the following locations:

- Of any standing water within the bunds comprising settlement ponds 1 and 2 (any any bunded areas within this created during construction)
- Of the leachate collection/neutralization pond(s).
- In the final settlement pond/balancing storage.
- At three locations on the intake drain and wetland of high ecological significance to the west of new pond 27.
- At two locations in the eastern watercourse (near the proposed discharge point).

Appendix A

2017 Soil Testing

PGI
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DAINTREE SALTWATER BARRA FARM, WONGA BEACH

Geotechnical Investigation Report

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APPENDIX E: LIMITATIONS

Report	Daintree Saltwater Barra Farm, Wonga Beach
Contract No	PGC0118014
Date	Friday, 09 February 2018
Document Status	Version 1.3 Final
Prepared by	Andrew Horspool
Reviewed by	Stephen Flux
Signed	Jan Postma

1.0 INTRODUCTION

Geotechnical investigation was undertaken to provide materials parameters for the proposed development at the Wonga Beach Saltwater Barramundi Farm. The work was commissioned by Daintree Saltwater Barramundi Farms Pty. Ltd.

The Queensland Government Guidelines for constructing and maintaining aquaculture containment structures recommend the assessment of the several criteria to allow risk assessment of proposed development sites. This report presents PGI's assessment of the following criteria indicated in the guidelines;

- Regional Geology;
- Site Soil Classification;
- Material performance.

2.0 SCOPE OF WORK

In pursuance of the above the following scope of intrusive and laboratory analysis was undertaken;

- 3No. sampling locations in existing structures
- Laboratory testing to establish material types and likely construction performance; and
- Permeability
- Cr Suite Acid Sulfate Soil Testing

The results of the fieldwork and testing are discussed in the following sections. Records of the laboratory testing are presented in Appendices B, C and D respectively. Sampling locations are indicated in the Site Plan presented in Appendix A

3.0 SITE DESCRIPTION

The farm is located on a 49 hectare property, on the southern arm of the Daintree River in Far North Queensland.

4.0 REGIONAL GEOLOGY

Published geological information derived from the Queensland Digital Geological Map Sheet 7965, Mossman indicates that the site is underlain by non-tidal coastal flat and back-swamp deposits, predominantly sand and mud. Conditions encountered in exploratory holes largely confirmed the published geology.

5.0 GEOTECHNICAL CRITERIA

A programme of laboratory testing was undertaken to confirm geotechnical capacities of the materials encountered in the investigation and their likely capacity for re-use in construction. The results of the testing are summarised in Table 1 and presented in full in Appendix B.

Table 1 – Summary of Laboratory Testing

Select Fill Specification			Testing Results		
			C7651	C7652	C7653
Sieve Size/Property	Lower Limit	Upper Limit	Phys#1, Settlement Pond 3, Bund Wall	Phys#2, Settlement Pond 2, Bund Wall	Phys#3, Settlement Pond 2, Pond Floor
37.5 mm	100%	100%	100	100	100
19 mm	80%	100%	100	100	100
9.5 mm	75%	100%	100	100	100
2.36 mm	60%	100%	97	98	98
0.6 mm	50%	100%	86	92	92
0.425 mm	45%	90%	81	90	80
Plasticity Index	15%	40%	10	8	11
Liquid Limit	30%	70%	44	36	41
Material Classification			CL	CL	CL

5.1.1.1.1 REUSE OF SITE MATERIALS

Results of testing indicate that site won materials largely conform to commonly specified select embankment fill specifications. Plasticity indices for the tested material are lower than recommended.

5.1.1.1.2 PERMEABILITY

The permeability of pond liner layers is a critical issue in the assessment of risk for aquaculture facilities. Laboratory coefficient of permeability testing was undertaken on three samples to establish K values for site won materials. The results are summarised in Table 2 and presented in full in Appendix C. Reference is made to the sampling locations in Table 2, with their physical locations presented on the site plan in Appendix A.

Table 2 – Summary of Permeability Testing Results

Sample	Location	Pre Test Criteria		Average Coefficient of Permeability (m/sec)
		Moisture Content (%)	Dry Density (t/m^3)	
C7651	Phys#1 Settlement Pond 1 Bund Wall	36.7	1.10	1.5×10^{-9}
C7652	Phys#2 Settlement Pond 2, Bund Wall	26.4	1.38	1.3×10^{-9}
C7653	Phys#2 Settlement Pond 2, Pond Floor	32.3	1.26	2.8×10^{-10}

Indicative rates of percolation through a liner constructed from site won compacted select fill suggest flow rates, Q (m^3/sec) in the order of 10^{-9} m/sec are likely for site won material placed in compacted layer construction.

In accordance with Appendix 4 of the Guidelines for construction of containment structures the permeability of site won materials has been assessed from the perspective of loss of water over the maximum likely fill period. Calculated values indicate loss from containment structures <1ML/Ha over the fill period of the ponds. This level of loss is deemed acceptable in the Guidance notes for facilities assessed as **Low Risk.**

6.0 ACID SULFATE SOIL INVESTIGATION

Acid sulfate soils (ASS) is the name given to naturally occurring soils and sediments that contain iron sulfides, such as pyrite (FeS2). Iron sulfides are chemically stable oxygen-free environments. Exposure to oxygen causes reactivity and the generation of sulfuric acid.

When ASS are exposed to air, the iron sulfides oxidise and sulfuric acid is produced. These soils contain oxidised iron sulfides and are known as actual acid sulfate soils (AASS). AASS are very acidic (pH <4), and often contain a yellow mineral called jarosite, KFe3(SO4)2(OH)6. Textures can vary from sands to clays.

The term acid sulfate soils includes both actual acid sulfate soils and potential acid sulfate soils. AASS and PASS are often found in the same soil profile, with AASS generally overlying PASS.

6.1 ACID SULFATE SOIL TESTING

Sampling and subsequent laboratory testing were undertaken to assess site won materials for the presence of acid forming materials. Results of the testing are summarised in Table 5 and presented in full in Appendix D.

Table 3 – Summary of SPOCAS Net Acidity Calculations

Sample	Location	SPOCAS Net Acidity Calculations		Estimated Treatment Level
		s-Net Acidity (%w/w S)	a-Net Acidity (moles H+/T)	Tonnes ($CaCO_3$)
C7650	ASS#1 - Drain	0.10	62	4.7
C7654	ASS#2 – Pond 2, Floor	1.60	1000	47
C7655	ASS#3 – Pond 2, Floor	0.94	580	47
C7656	ASS#4 – Pond 2, Floor	0.42	260	28
C7657	ASS#5 – Pond 1, Floor	0.97	610	47
C7658	ASS#6 – Pond 1, Floor	0.61	380	37

It has been assumed for the purpose of this report that >1000 tonnes of material will be disturbed in the development of the proposed facility. Estimated treatment levels ranging from high to extra high, in accordance with Queensland Acid Sulfate Soil Technical Manual were assessed from the results of testing.

7.0 CONCLUDING REMARKS

Intrusive investigation, sampling and testing were undertaken in accordance with Queensland Government Guidelines for constructing and maintaining aquaculture containment structures to establish suitability of in situ soils for the construction of the proposed facility.

7.1 AQUACULTURE CONTAINMENT FACILITIES - RISK ASSESSMENT

Risk assessment was undertaken in accordance with the Department of Agriculture and Fisheries (DAF) Guidelines for constructing and maintaining aquaculture containment structures. Section 3.2 and 3.3 of the Guidelines demand the assessment of the risk from the perspective of impacts on other resources, natural or otherwise, by the operation of a poorly constructed aquaculture facility.

Assessment of the proposed development in line with the risk assessment matrix suggests that the facility can be considered **Low Risk.** This assessment is based on the following criteria assessed as part of the investigation;

- Generally flat topography;
- Interaction with regional geology is considered unlikely from the results of the investigation
- Largely favourable site won soils available for the construction of impermeable liners to containment ponds
- Local groundwater is considered unlikely to be used locally for other processes
- Local land use is predominantly agricultural and the proposed development site is and existing aquaculture facility.

Assessment of likely leakage suggests a flow rate of <1.0ML/Ha for a fill period of 180 days less than the acceptable level of <5.0ML/Ha.

Assessment of laboratory permeability testing for site won CL materials suggests permeabilities of the order 10^{-9} m/sec which suggests that for a low risk facility a minimum liner thickness of 200mm, constructed from CL material.

7.2 SAMPLING

Sampling and testing at the site was undertaken in general accordance with the guidelines for constructing and maintaining aquaculture containment structures, Appendix 2: Minimum soil testing requirements, with a broad assessment of the materials encountered corresponding to USC CL.

7.3 GEOLOGY

Regional geology is not considered to a risk to the proposed development. Rock was not encountered during the investigation and consequently it is considered unlikely that rock would be encountered in the construction of the proposed development.

7.4 USC SOIL CATEGORISATION

Materials encountered on the site were predominantly CL class.

7.5 CONSTRUCTION MATERIALS

It is considered likely that materials on the site could be used as site won general fill for the construction of embankments, where blended with clay material to develop appropriate plasticity.

7.6 ACID SULFATE SOIL

It has been assumed for the purposes of this repot that >1000 tonnes of material will be disturbed in the development. Action criteria for projects disturbing more than 1000 tonnes of soil are set at the lowest value and require the development of a detailed management plan.

8.0 REFERENCES

Australian Standard AS 1726 'Geotechnical site investigations' 1993, Standards Australia

Australian Standard AS 1289, Methods of Testing Soil for Engineering Purposes,

Australian Standard AS 3798 "Guidelines on Earthworks for Commercial and Residential Developments", 2007, Standards Australia

Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines Version 4.0, 2014, Queensland Government, Science Division.

APPENDIX A
SITE PLAN

IMPORTANT NOTE

This plan was prepared as a concept plan only and accuracy of all aspects of the plan have not been verified.
All lots, areas and dimensions are approximate only, Subject to relevant studies, Survey, Engineering and Government approvals.
No reliance should be placed on the plan and RPS Australia East Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person who may use or rely on this plan.

Detail survey data shown has been compiled from various surveys from 2000 to 2005.

AERIAL IMAGERY.

© Google Earth 2015
© 2015 CNES/Astrium
Date of Capture: 2-5-2014

SETTLEMENT POND	AREA
1	1.206 ha
2	6.45 ha
3	11.59 ha
4	9.38 ha
TOTAL	**28.626 ha**

Pond areas are approximate only. Calculated at approx top of batter interpolated from detail surveys, LiDAR data & aerial imagery.

WATER INTAKE

SETTLEMENT POND 4
9.38 ha

SETTLEMENT POND 3
11.59 ha

SETTLEMENT POND 2
6.45 ha

SETTLEMENT POND 1
1.206ha

PRODUCTION PONDS

SEE SHEET 2

PHYS #1 Bund Wall (-0.3m)

PHYS #2 Bund Wall (-0.3m)

PHYS #3 Pond Floor

ASS#1 (Drain)

ASS #2 (-.1m)
ASS #3 (-0.5m)
Floor of Pond

ASS#4 (-0.5m)
Floor of Pond

ASS #5 (-0.1m)
ASS #6 (-0.5m)
Floor of Pond

HOOK-A-BARRA TOURIST FACILITY

MOSSMAN DAINTREE ROAD

VIXIES ROAD

SOUTH DRIVE

2 RP744082
1 SP188690
3 SP150448
278 SR419
20 NPW695
3 SP128858
295 RP889328
50 SP155078
5 SP126931
11 SP188690
10 RP746153
9 SP176447
8 SP176447
17 SP235265
16 SP235265
7 RP746153
2 SP264298
6 RP746153
16 SP264298
52 RP851568
51 RP851568
1 SP108617
4 RP746152
2 SP108617
3 RP746152
2 SP235266
1 SP235266
22 RP843597
21 RP843597
19 RP865080
6 RP808307
5 RP808307
20 RP865080
Emt A
Emt B

0 50 100 150 200 250
metres

SCALE 1:5000 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

AMENDMENTS	
PROJECT MANAGER	O. Caddick-King
SURVEYED	2000-2005
COMPILED	AMK
CAD REF	9338-8.DWG
SHEET	1 OF SHEETS 2
SHEET SIZE	A3

DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

SITE PLAN
SHEET 1 OF 2
LOT 3 SP150448
WONGA BEACH

RPS Australia East Pty Ltd
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SCALE	DATE	DRAWING NO.	ISSUE
1:5000	27/1/2015	9338-8	

APPENDIX B
RESULTS OF LABORATORY TESTING

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SOIL AGGREGATE & CONCRETE TESTING

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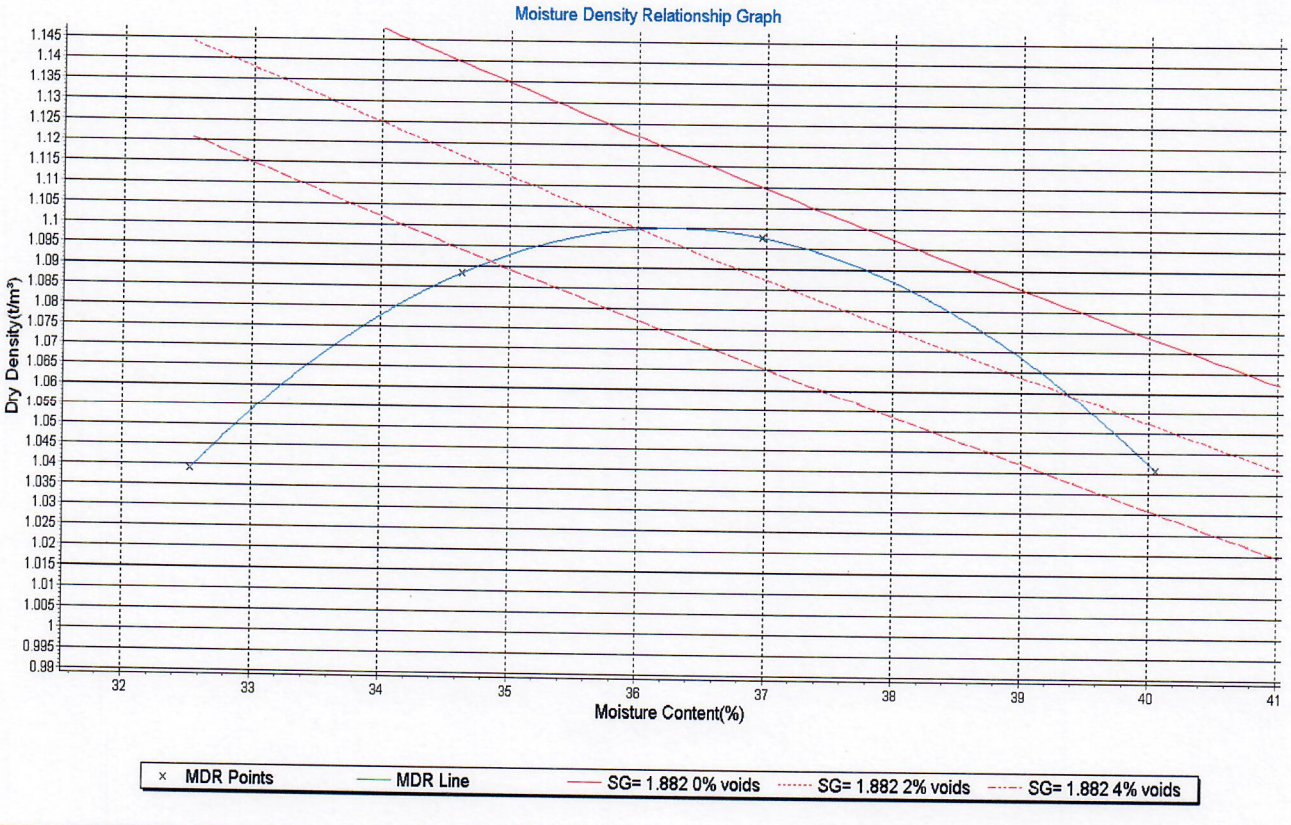
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Moisture Density Relationship Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 1/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**18/12/2017**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.5.1.1**
Location:	**Wonga Beach**	**Page 1 of 3**	

		SAMPLE LOCATION
Sample Number :	C/7651	Settlement Pond 3
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4	Bund Wall
Sampled By :	Shaun Hansen	PHYS#1
Date Sampled :	7/12/2017	-0.3m
Date Tested :	13/12/2017	Test Number :
Material Type :	Existing Material	Lot Number :
Material Source :	Existing Material	Moisture Method : AS1289.2.1.1
Remarks :		

Maximum Size (mm) :	19.0	**Maximum Dry Density (t/m³) :**	**1.1**
Oversize Dry (%) :	0.0	**Optimum Moisture Content (%) :**	**36.5**
Oversize Density (t/m³) :			



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Accredited for compliance with ISO/IEC 17025 - Testing

APPROVED SIGNATORY

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Shaun Hansen - Laboratory Manager
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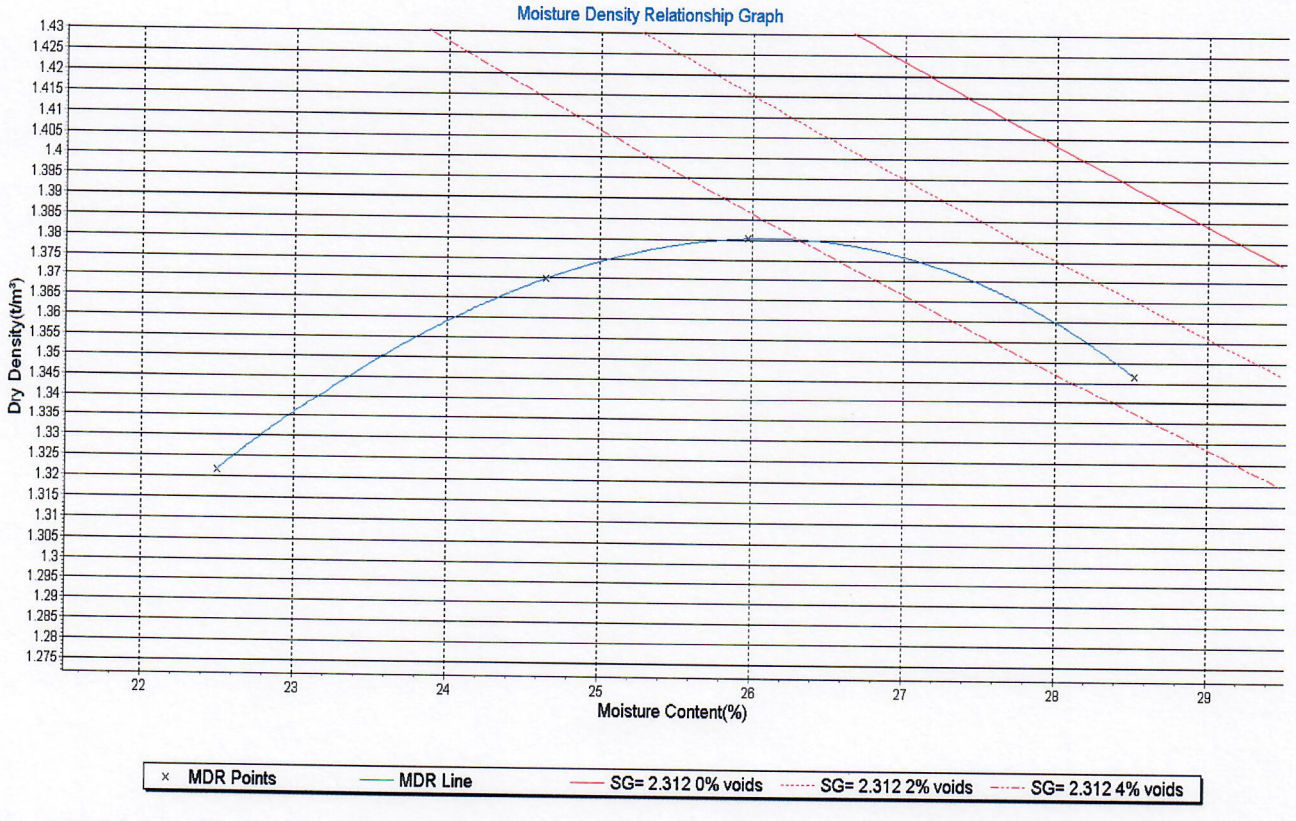
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**18/12/2017**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.5.1.1**
Location:	**Wonga Beach**	**Page 2 of 3**	

		SAMPLE LOCATION
Sample Number :	C/7652	Settlement Pond 2
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4	Bund Wall
Sampled By :	Shaun Hansen	PHYS#2
Date Sampled :	7/12/2017	-0.3m
Date Tested :	13/12/2017	Test Number :
Material Type :	Existing Material	Lot Number :
Material Source :	Existing Material	Moisture Method : AS1289.2.1.1
Remarks :		

Maximum Size (mm) :	19.0	**Maximum Dry Density (t/m³) :**	**1.38**
Oversize Dry (%) :		**Optimum Moisture Content (%) :**	**26**
Oversize Density (t/m³) :			



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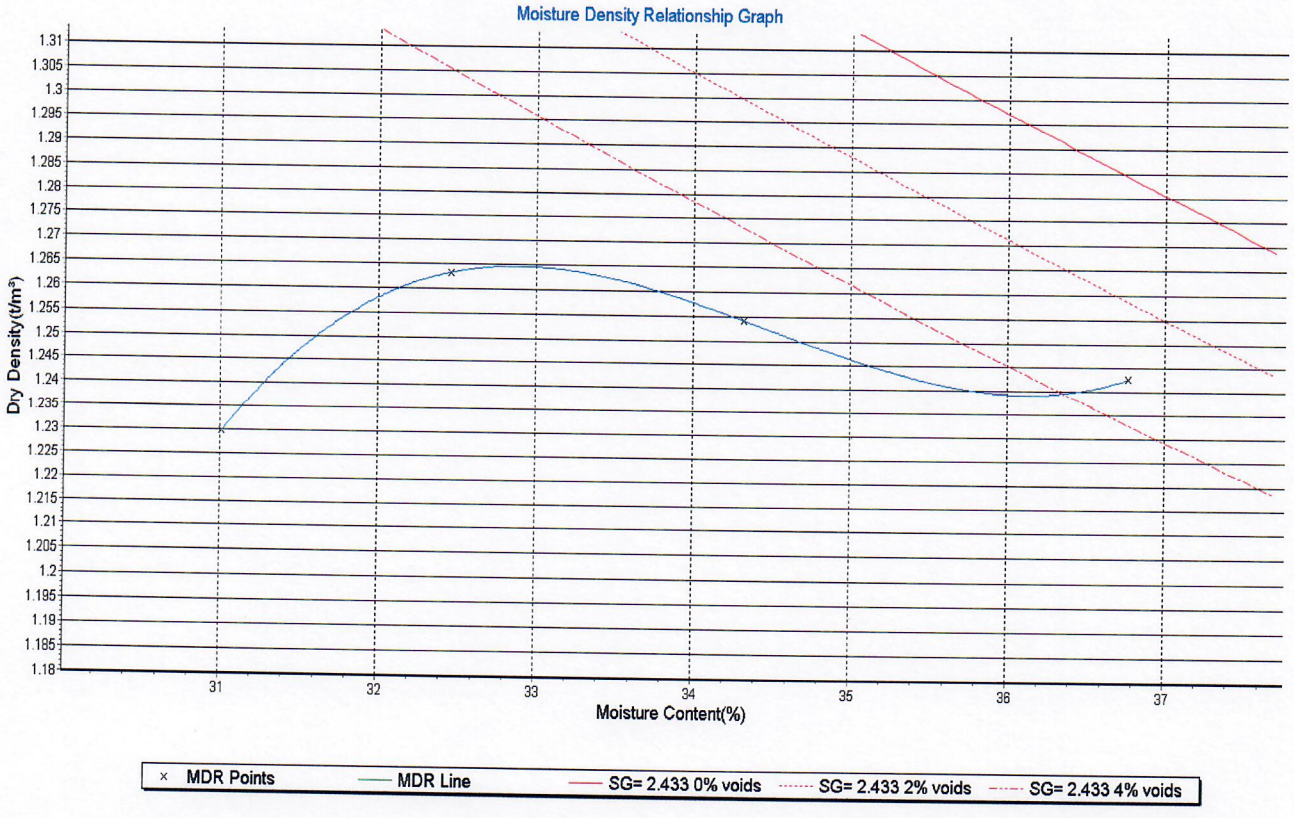
Moisture Density Relationship Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 1/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**18/12/2017**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.5.1.1**
Location:	**Wonga Beach**	**Page 3 of 3**	

Sample Number :	C/7653	SAMPLE LOCATION	
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4	Settlement Pond 2	
Sampled By :	Shaun Hansen	Floor Of Pond	
Date Sampled :	7/12/2017	PHYS#3	
Date Tested :	13/12/2017	Test Number :	
Material Type :	Existing Material	Lot Number :	
Material Source :	Existing Material	Moisture Method :	AS1289.2.1.1
Remarks :			

Maximum Size (mm) :	19.0	**Maximum Dry Density (t/m³) :**	**1.26**
Oversize Dry (%) :		**Optimum Moisture Content (%) :**	**33**
Oversize Density (t/m³) :			



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Document Code RF124-7

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Quality of Materials Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 2/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**10/01/2018**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.3.6.1**
Location:	**Wonga Beach**		**Page 1 of 3**

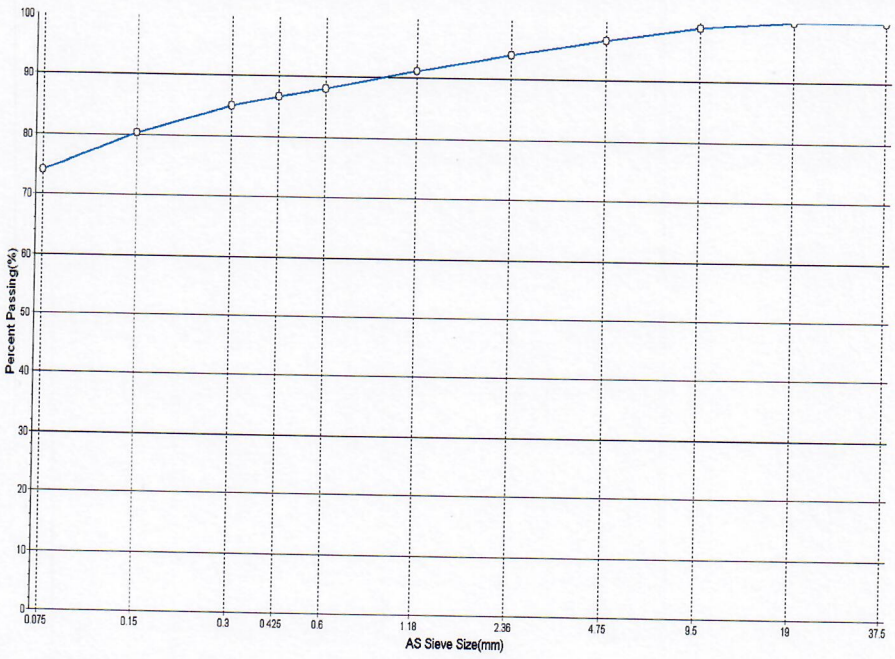
Sample Number :	C/7651
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4
Sampled By :	Shaun Hansen
Date Sampled :	7/12/2017
Date Tested :	13/12/2017
Material Type :	Existing Material
Material Source :	Existing Material
Remarks :	

SAMPLE LOCATION

Settlement Pond 3
Bund Wall
PHYS#1
-0.3m

Test Number :	
Lot Number :	
Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75.0		
63.0		
53.0		
37.5	**100**	
26.5		
19.0	**100**	
16.0		
13.2		
9.5	**99**	
6.7		
4.75	**97**	
2.36	**94**	
1.18	**91**	
0.600	**88**	
0.425	**87**	
0.300	**85**	
0.150	**80**	
0.075	**74**	



	Test Method	Results		
Liquid Limit (%) :	**AS1289.3.1.2, 3.2.1, 3.3.1 & 3.4.1**	**44**	Shrinkage Comments :	**No Defects**
Plastic Limit (%) :		**34**	Mould Length (mm) :	**150.2**
Plasticity Index (%) :		**10**	Sample History	**Oven Dried**
Linear Shrinkage (%) :		**5.5**	Sample Preperation:	**Oven Dried**
Soil Description :				

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ABN 34 149 057 182
Accreditation public testing facility #19463

Quality of Materials Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 2/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**10/01/2018**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.3.6.1**
Location:	**Wonga Beach**	**Page 2 of 3**	

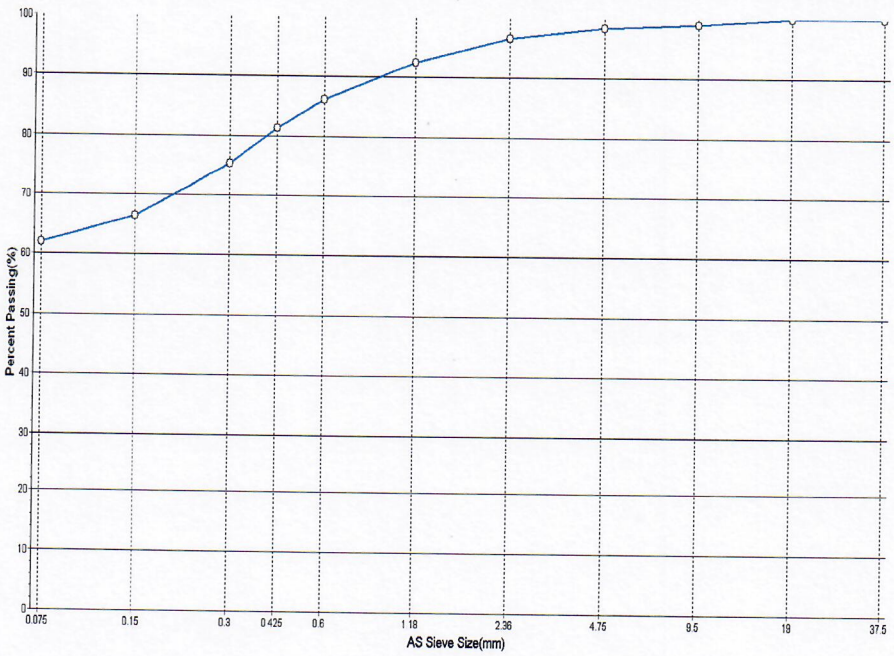
Sample Number :	C/7652
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4
Sampled By :	Shaun Hansen
Date Sampled :	7/12/2017
Date Tested :	13/12/2017
Material Type :	Existing Material
Material Source :	Existing Material
Remarks :	

SAMPLE LOCATION

Settlement Pond 2
Bund Wall
PHYS#2
-0.3m

Test Number :	
Lot Number :	
Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75.0		
63.0		
53.0		
37.5	**100**	
26.5		
19.0	**100**	
16.0		
13.2		
9.5	**99**	
6.7		
4.75	**98**	
2.36	**97**	
1.18	**92**	
0.600	**86**	
0.425	**81**	
0.300	**75**	
0.150	**66**	
0.075	**62**	



		Test Method	Results		
Liquid Limit (%) :		**AS1289.3.1.2, 3.2.1, 3.3.1 & 3.4.1**	**36**	Shrinkage Comments :	**Slight Curling Occured**
Plastic Limit (%) :			**28**	Mould Length (mm) :	**150.0**
Plasticity Index (%) :			**8**	Sample History	**Oven Dried**
Linear Shrinkage (%) :			**4.5**	Sample Preperation:	**Oven Dried**
Soil Description :					

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APPROVED SIGNATORY

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Document Code RF145-22

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Phone 07 4053 6840 **Fax** 07 4053 6746
Email cairns@soilengineeringservices.com
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Quality of Materials Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 2/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**10/01/2018**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.3.6.1**
Location:	**Wonga Beach**	**Page 3 of 3**	

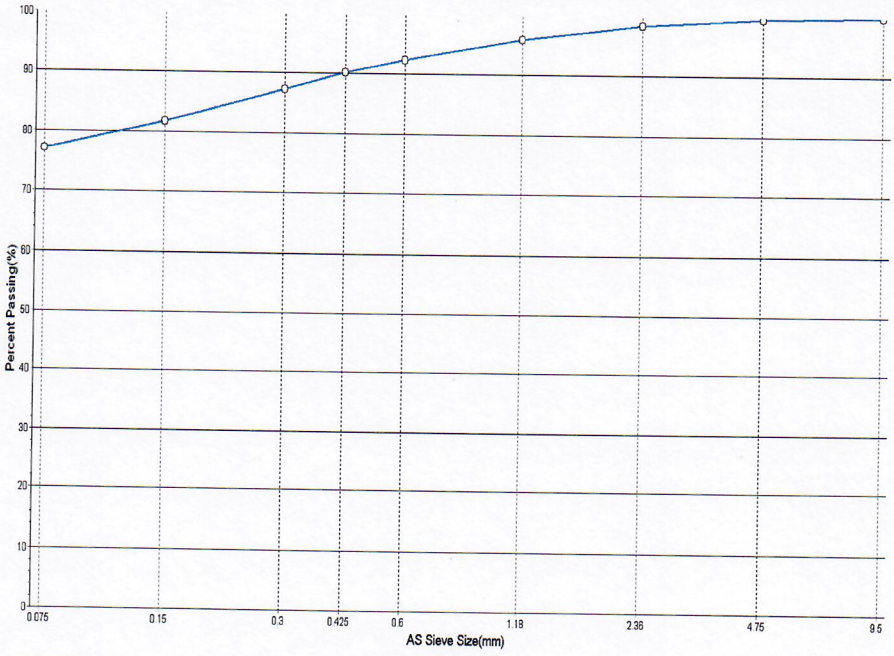
Sample Number :	C/7653
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4
Sampled By :	Shaun Hansen
Date Sampled :	7/12/2017
Date Tested :	18/12/2017
Material Type :	Existing Material
Material Source :	Existing Material
Remarks :	

SAMPLE LOCATION

Settlement Pond 2
Floor Of Pond
PHYS#3

Test Number :	
Lot Number :	
Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75.0		
63.0		
53.0		
37.5		
26.5		
19.0		
16.0		
13.2		
9.5	**100**	
6.7		
4.75	**100**	
2.36	**98**	
1.18	**96**	
0.600	**92**	
0.425	**90**	
0.300	**87**	
0.150	**82**	
0.075	**77**	



		Test Method	Results		
Liquid Limit (%) :		**AS1289.3.1.2, 3.2.1, 3.3.1 & 3.4.1**	**41**	Shrinkage Comments :	**Slight Curling Occured**
Plastic Limit (%) :			**30**	Mould Length (mm) :	**150.1**
Plasticity Index (%) :			**11**	Sample History	**Oven Dried**
Linear Shrinkage (%) :			**4.5**	Sample Preperation:	**Oven Dried**
Soil Description :					

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing

APPROVED SIGNATORY

Shaun Hansen - Laboratory Manager
NATA Accreditation Number
19463

Document Code RF145-22

APPENDIX C
RESULTS OF PERMEABILITY TESTING

Trilab
Soil Rock Calibration

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346A Bilsen Road,
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QLD 4034
Ph: +61 7 3265 5656

Perth
2 Kimmer Place,
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Ph: +61 8 9258 8323

PERMEABILITY BY FALLING HEAD TEST REPORT

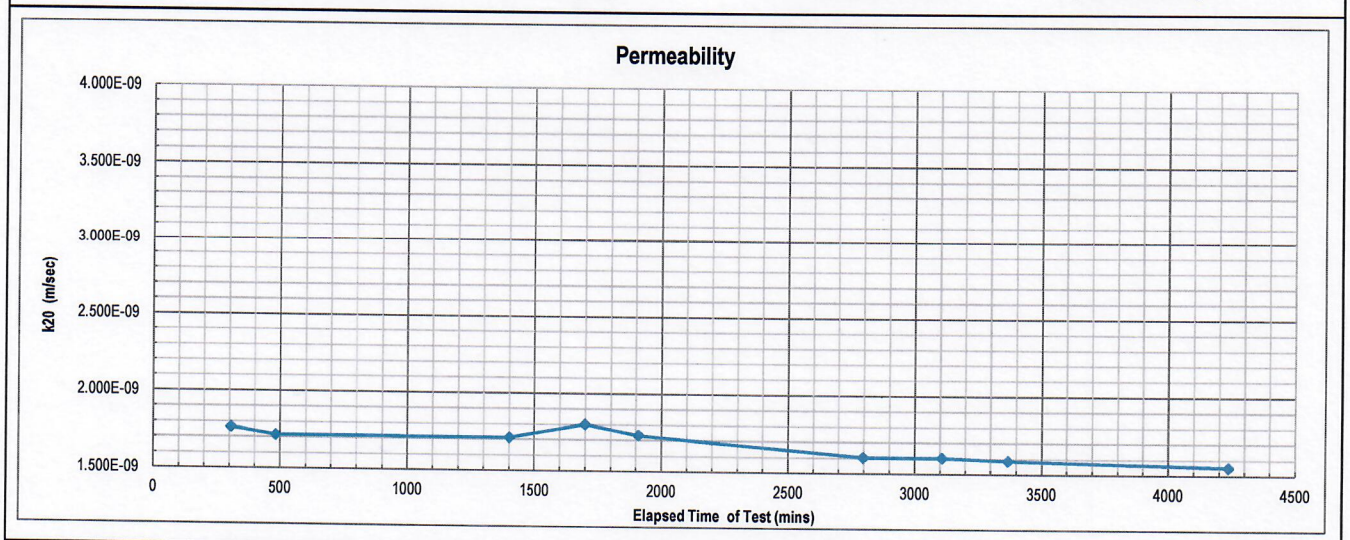
Test Method AS 1289 6.7.2, 5.1.1 , KH2 (Based on K H Head (1988) Manual of Laboratory Testing,10.7)

Client	Soil Engineering Services	**Report No.**	17120607-FHPT
		Workorder No.	0003628
Address	PO Box 7760 GARBUTT QLD 4814	**Test Date**	21/12/2017
		Report Date	9/01/2018
Project	CNS379 - Daintree Saltwater Barramundi Farm, Wonga Beach		
Client ID	C/7651 - PHYS#1 Settlement Pond 1 - Bund Wall - Location: -0.3m	**Depth (m)**	Not Supplied
Description	SILTY CLAY- brown	**Sample Type**	Remoulded Soil Specimen

RESULTS OF TESTING

Compaction Method	**AS1289.5.1.1 - Standard Compaction**		
Maximum Dry Density (t/m^3)	**1.10**	Hydraulic Gradient	**9.4**
Optimum Moisture Content (%)	**36.5**	Surcharge (kPa)	**3.0**
Placement Moisture Content (%)	**36.7**	Head Pressure Applied (kPa)	**10.79**
Moisture Ratio (%)	**100.6**	Water Type	**35900ppm Salt Water**
Placement Wet Density (t/m^3)	**1.50**	Percentage Material Retained/Sieve Size (mm)	**0 % /9.5 mm**
Density Ratio (%)	**99.6**		

PERMEABILITY $k_{(20)}$ = **1.5×10^{-09} (m/sec)**



Remarks: The above specimen was remoulded to a target of 100% of Standard Maximum Dry Density and at Optimum Moisture Content.

Sample/s supplied by client: The compaction data was supplied by the client.

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

Tested at Trilab Brisbane Laboratory.

Authorised Signatory
C. Channon

NATA ACCREDITED FOR TECHNICAL COMPETENCE
Laboratory No. 9926

The results of calibrations and tests performed apply only to the specific instrument or sample at the time of test unless otherwise clearly stated.
Reference should be made to Trilab's "Standard Terms and Conditions of Business" for further details.
Trilab Pty Ltd ABN 25 065 630 506

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING

Trilab
Soil Rock Calibration

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346A Bilsen Road,
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WA 6107
Ph: +61 8 9258 8323

PERMEABILITY BY FALLING HEAD TEST REPORT

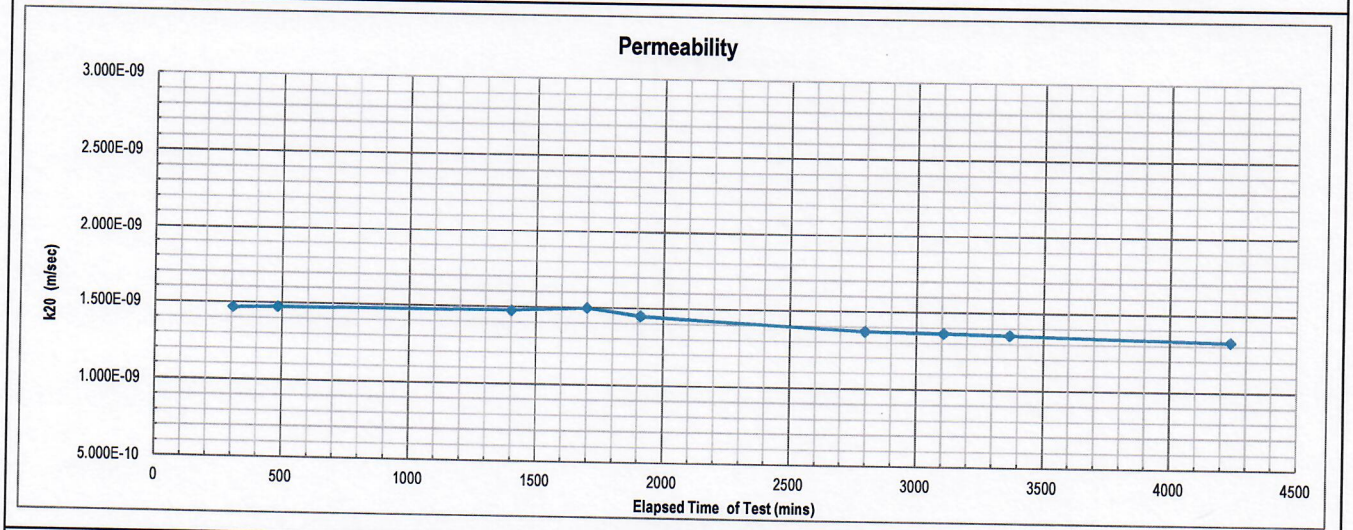
Test Method AS 1289 6.7.2, 5.1.1 , KH2 (Based on K H Head (1988) Manual of Laboratory Testing,10.7)

Client	Soil Engineering Services	**Report No.**	17120608-FHPT
		Workorder No.	0003628
Address	PO Box 7760 GARBUTT QLD 4814	**Test Date**	21/12/2017
		Report Date	5/01/2018
Project	CNS379 - Daintree Saltwater Barramundi Farm, Wonga Beach		
Client ID	C/7652 - PHYS#2 Settlement Pond 2 - Bund Wall - Location: -0.3m	**Depth (m)**	Not Supplied
Description	SILTY CLAY - brown	**Sample Type**	Remoulded Soil Specimen

RESULTS OF TESTING

Compaction Method	**AS1289.5.1.1 - Standard Compaction**		
Maximum Dry Density (t/m^3)	**1.38**	Hydraulic Gradient	**9.5**
Optimum Moisture Content (%)	**26.0**	Surcharge (kPa)	**3.0**
Placement Moisture Content (%)	**26.4**	Head Pressure Applied (kPa)	**10.79**
Moisture Ratio (%)	**101.5**	Water Type	**35900ppm Salt Water**
Placement Wet Density (t/m^3)	**1.74**	Percentage Material Retained/Sieve Size (mm)	**0 % /9.5 mm**
Density Ratio (%)	**99.9**		

PERMEABILITY $k_{(20)}$ = **1.3×10^{-09} (m/sec)**



Remarks: The above specimen was remoulded to a target of 100% of Standard Maximum Dry Density and at Optimum Moisture Content.

Sample/s supplied by client The compaction data was supplied by the client.

Accredited for compliance with ISO/IEC 17025 - Testing.
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Tested at Trilab Brisbane Laboratory.

Authorised Signatory

C. Channon

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Laboratory No. 9926

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PERMEABILITY BY FALLING HEAD TEST REPORT

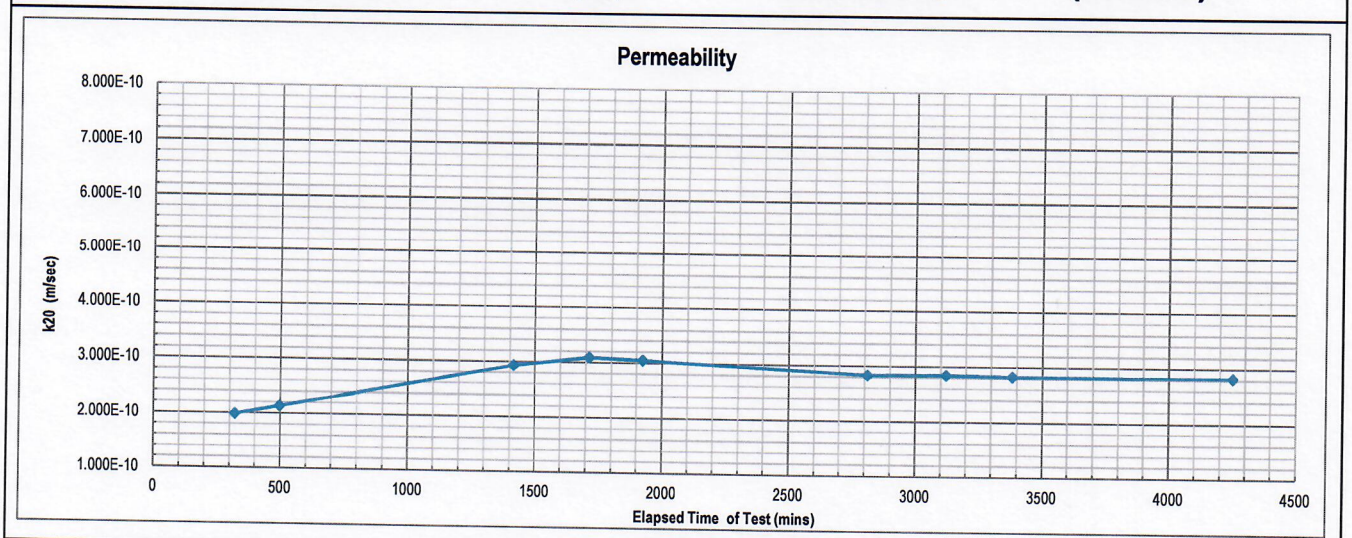
Test Method AS 1289 6.7.2, 5.1.1 , KH2 (Based on K H Head (1988) Manual of Laboratory Testing,10.7)

Client	Soil Engineering Services	**Report No.**	17120609-FHPT
		Workorder No.	0003628
Address	PO Box 7760 GARBUTT QLD 4814	**Test Date**	21/12/2017
		Report Date	5/01/2018
Project	CNS379 - Daintree Saltwater Barramundi Farm, Wonga Beach		
Client ID	C/7653 - PHYS#2 Settlement Pond 2 - Pond Floor	**Depth (m)**	Not Supplied
Description	CLAY - brown	**Sample Type**	Remoulded Soil Specimen

RESULTS OF TESTING

Compaction Method	**AS1289.5.1.1 - Standard Compaction**		
Maximum Dry Density (t/m^3)	**1.26**	Hydraulic Gradient	**9.4**
Optimum Moisture Content (%)	**33.0**	Surcharge (kPa)	**3.0**
Placement Moisture Content (%)	**32.3**	Head Pressure Applied (kPa)	**10.79**
Moisture Ratio (%)	**98.0**	Water Type	**35900ppm Salt Water**
Placement Wet Density (t/m^3)	**1.68**	Percentage Material Retained/Sieve Size (mm)	**0 % /9.5 mm**
Density Ratio (%)	**100.5**		

PERMEABILITY $k_{(20)}$ = **2.8×10^{-10}** **(m/sec)**



Remarks: The above specimen was remoulded to a target of 100% of Standard Maximum Dry Density and at Optimum Moisture Content.

Sample/s supplied by client The compaction data was supplied by the client.

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

Tested at Trilab Brisbane Laboratory.

Authorised Signatory

C. Channon

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Laboratory No. 9926

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Trilab Pty Ltd ABN 25 065 630 506

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING

APPENDIX D

RESULTS OF ACID SULPHATE SOIL TESTING

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Shaun Hansen
Client	SOIL ENGINEERING SERVICE
Address	PO BOX 7760 GARBUTT QLD 4814
Telephone	0427 994 652
Facsimile	61 7 4774 7677
Email	shaun@soilengineeringservices.com
Project	**Daintree saltwater Barramundi**
Order Number	**CNS379**
Samples	6

LABORATORY DETAILS

Manager	Jon Dicker
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE130800 R0**
Date Received	12 Dec 2017
Date Reported	15 Dec 2017

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146).

SIGNATORIES

Anthony Nilsson
Operations Manager

Jon Dicker
Manager Northern QLD

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	CE130800.001 Soil 07 Dec 2017 C/7650	CE130800.002 Soil 07 Dec 2017 C/7654	CE130800.003 Soil 07 Dec 2017 C/7655	CE130800.004 Soil 07 Dec 2017 C/7656
Moisture Content Method: AN002 Tested: 12/12/2017							
% Moisture	%w/w	0.5		25	57	48	32
TAA (Titratable Actual Acidity) Method: AN219 Tested: 13/12/2017							
pH KCl	pH Units	-		6.7	6.0	5.9	5.6
Titratable Actual Acidity	kg H2SO4/T	0.25		<0.25	0.86	0.49	0.49
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5		<5	17	10	10
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01		<0.01	0.03	0.02	0.02
Sulphur (SKCl)	%w/w	0.005		0.029	0.037	0.031	0.040
Calcium (CaKCl)	%w/w	0.005		0.025	0.15	0.10	0.056
Magnesium (MgKCl)	%w/w	0.005		0.025	0.30	0.19	0.10
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 13/12/2017							
Peroxide pH (pH Ox)	pH Units	-		4.5	1.9	2.1	2.1
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25		0.61	44	27	12
TPA as moles H+/tonne	moles H+/T	5		12	898	554	240
TPA as S % W/W	%w/w S	0.01		0.02	1.44	0.89	0.38
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5		12	881	544	230
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25		0.61	43	27	11
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01		0.02	1.41	0.87	0.37
ANCE as % $CaCO_3$	% CaCO3	0.01		<0.01	<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5		<5	<5	<5	<5
ANCE as S % W/W	%w/w S	0.01		<0.01	<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005		0.10	1.6	0.92	0.40
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5		62	994	574	252
Sulphur (Sp)	%w/w	0.005		0.13	1.6	0.95	0.44
Calcium (Cap)	%w/w	0.005		0.038	0.20	0.13	0.059
Reacted Calcium (CaA)	%w/w	0.005		0.014	0.056	0.023	<0.005
Reacted Calcium (CaA)	moles H+/T	5		7	28	11	<5
Magnesium (Mgp)	%w/w	0.005		0.037	0.33	0.19	0.090
Reacted Magnesium (MgA)	%w/w	0.005		0.012	0.033	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5		10	27	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005		-	-	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5		-	-	-	-
SPOCAS Net Acidity Calculations Method: AN220 Tested: 15/12/2017							
s-Net Acidity	%w/w S	0.01		0.10	1.6	0.94	0.42
a-Net Acidity	moles H+/T	5		62	1000	580	260
Liming Rate	kg CaCO3/T	0.1		4.7	76	44	20
Verification s-Net Acidity	%w/w S	-20		0.03	0.53	0.31	0.13
a-Net Acidity without ANCE	moles H+/T	5		62	1000	580	260
Liming Rate without ANCE	kg CaCO3/T	0.1		4.7	76	44	20

Parameter	Units	LOR	Sample Number: CE130800.005 Sample Matrix: Soil Sample Date: 07 Dec 2017 Sample Name: C/7657	Sample Number: CE130800.006 Sample Matrix: Soil Sample Date: 07 Dec 2017 Sample Name: C/7658
Moisture Content Method: AN002 Tested: 12/12/2017				
% Moisture	%w/w	0.5	**48**	**34**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 13/12/2017				
pH KCl	pH Units	-	**5.9**	**6.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**0.86**	<0.25
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**17**	<5
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.03**	<0.01
Sulphur (SKCl)	%w/w	0.005	**0.034**	**0.060**
Calcium (CaKCl)	%w/w	0.005	**0.092**	**0.068**
Magnesium (MgKCl)	%w/w	0.005	**0.17**	**0.12**
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 13/12/2017				
Peroxide pH (pH Ox)	pH Units	-	**1.9**	**2.3**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**29**	**21**
TPA as moles H+/tonne	moles H+/T	5	**599**	**422**
TPA as S % W/W	%w/w S	0.01	**0.96**	**0.68**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**581**	**418**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**29**	**21**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.93**	**0.67**
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	**0.94**	**0.60**
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	**588**	**375**
Sulphur (Sp)	%w/w	0.005	**0.98**	**0.66**
Calcium (Cap)	%w/w	0.005	**0.11**	**0.075**
Reacted Calcium (CaA)	%w/w	0.005	**0.020**	**0.008**
Reacted Calcium (CaA)	moles H+/T	5	**10**	<5
Magnesium (Mgp)	%w/w	0.005	**0.18**	**0.12**
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	-
SPOCAS Net Acidity Calculations Method: AN220 Tested: 15/12/2017				
s-Net Acidity	%w/w S	0.01	**0.97**	**0.61**
a-Net Acidity	moles H+/T	5	**610**	**380**
Liming Rate	kg CaCO3/T	0.1	**45**	**28**
Verification s-Net Acidity	%w/w S	-20	**0.31**	**0.20**
a-Net Acidity without ANCE	moles H+/T	5	**610**	**380**
Liming Rate without ANCE	kg CaCO3/T	0.1	**45**	**28**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

TAA (Titratable Actual Acidity) **Method: ME-(AU)-[ENV]AN219**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB051817	pH Units	-	5.9	1%	98%
Titratable Actual Acidity	LB051817	kg H2SO4/T	0.25	<0.25	0%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB051817	moles H+/T	5	<5	0%	92%
Titratable Actual Acidity (TAA) S%w/w	LB051817	%w/w S	0.01	<0.01	0%	92%
Sulphur (SKCl)	LB051817	%w/w	0.005	<0.005	2%	90%
Calcium (CaKCl)	LB051817	%w/w	0.005	<0.005	7%	103%
Magnesium (MgKCl)	LB051817	%w/w	0.005	<0.005	8%	99%

TPA (Titratable Peroxide Acidity) **Method: ME-(AU)-[ENV]AN218**

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
Peroxide pH (pH Ox)	LB051816	pH Units	-	0%	100%
TPA as kg H_2SO_4/tonne	LB051816	kg H2SO4/T	0.25	0%	102%
TPA as moles H+/tonne	LB051816	moles H+/T	5	0%	102%
TPA as S % W/W	LB051816	%w/w S	0.01	0%	102%
ANCE as % $CaCO_3$	LB051816	% CaCO3	0.01	0%	
ANCE as moles H+/tonne	LB051816	moles H+/T	5	0%	
ANCE as S % W/W	LB051816	%w/w S	0.01	0%	
Sulphur (Sp)	LB051816	%w/w	0.005	6%	95%
Calcium (Cap)	LB051816	%w/w	0.005	2%	111%
Magnesium (Mgp)	LB051816	%w/w	0.005	7%	103%

METHOD SUMMARY

CE130800 R0

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN218	Soil samples are subjected to extreme oxidising conditions using hydrogen peroxide. Continuous application of heat and peroxide ensure all sulfide is converted to sulfuric acid. Excess peroxide is broken down by a copper catalyst prior to titration for acidity. Calcium, magnesium, and sulfur are determined by ICP-OES. Also included is a carbonate modification step which, depending on pH after the initial oxidation, gives a measure of ANC.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	SPOCAS Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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APPENDIX E
LIMITATIONS

LIMITATIONS

SCOPE OF SERVICES

This geotechnical report (the report) has been prepared in accordance with the scope of services set out in the agreement between PGI and Daintree Saltwater Barramundi Farms Pty. Ltd. and is subject to any qualifications, assumptions and litigations set out in the report. In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

In preparing the report, PGI has relied upon data, surveys, and plans provided by the client. Except as otherwise stated in the report, PGI has not verified the accuracy or completeness of the data, to the extent that the any statements, opinions, facts, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. PGI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have not been fully disclosed to PGI.

GEOTECHNICAL INVESTIGATION

Geotechnical engineering reports are prepared to meet the specific scope of the client and may not necessarily be adequate for a construction contractor. This report was prepared expressly for the client and expressly for purposes indicated by the client or his representative. Use by any other persons for any purpose, or by the client for a different purpose, might result in problems. The client should not use this report for other than its intended purpose without seeking additional geotechnical advice.

LIMITATIONS OF SITE INVESTIGATION

In making an assessment of a structure from a single borehole there is the possibility that variations may occur that were not encountered. Site exploration identifies specific subsurface conditions only at those points from which samples have been taken. The risk that variations will not be detected can be reduced by increasing the frequency of test locations; however this often does not result in any overall cost savings for the project. The data derived from the investigation and subsequent laboratory testing have been extrapolated to form an inferred model and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the structure. Actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The borehole records are the subjective interpretation of subsurface conditions at a particular location, made by trained personnel. The interpretation may be limited by the method of investigation, and cannot always be definitive. For example, inspection of an excavation or test pit allows a greater area of the subsurface profile to be inspected than borehole investigation; however, such methods are limited by depth and site disturbance restrictions. In borehole investigation, the actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions may be modified by changing natural forces or man-made influences. A geotechnical engineering report is based on conditions which existed at the time of subsurface exploration.

Construction operations, at or adjacent to the site, and natural events, such as floods or groundwater fluctuations may also affect subsurface conditions and thus the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept appraised of any such events, and should be consulted to determine if additional tests are necessary.

EXPLORATORY LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final exploratory logs are developed by geotechnical engineers based upon their interpretation of field logs and laboratory evaluation of field samples. Customarily, only the final exploratory logs are included in geotechnical engineering reports. These logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings. To minimise the likelihood of exploratory log misinterpretation, contractors should be given access to the complete geotechnical engineering report prepared or authorised for their use. Providing the best available information to contractors helps prevent costly construction problems. For further information on this matter reference should be made to 'Guidelines for the Provision of Geotechnical Information in Construction Contracts' published by the Institution of Engineers Australia, National Headquarters, Canberra 1987.

OTHER LIMITATIONS

PGI will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

Appendix B

2004 ASSMP

DOCUMENT CONTROL SHEET

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Job Number:
Original Date of Issue: 23/11/2004

DOCUMENT DETAILS

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Principle Author:	Ben Pohlner
Client:	Wonga Beach Aquaculture Resort Pty Ltd
Client Address:	Lot 3, Vixies Rd, WONGA BEACH 4873
Client Contact:	Jeff McCloy
Synopsis:	Acid Sulfate Soil Management Plan for the remediation and management of existing roads and bunds.

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	10/12/04	Adam Schmalz		Ben Pohlner	
1	17/12/04	Kevin Trinder		Ben Pohlner	

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Acid Sulfate Soil Management Plan

WONGA BEACH AQUACULTURE RESORT PTY LTD

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Acid Sulfate Soil Management Plan

WONGA BEACH AQUACULTURE RESORT PTY LTD

1.0 INTRODUCTION

BTEQ Pty Ltd (BTEQ) has prepared a basic Draft Acid Sulfate Soil Management Plan (ASSMP) for the Wonga Beach Aquaculture Farm located at Vixies Road, Wonga Beach. The purpose of the ASSMP is to mitigate the potential impact of disturbed Acid Sulfate Soils (ASS) on the surrounding waterways, properties, and flora and fauna.

The previous owners have undertaken extensive earthworks on the property including clearing of vegetation, digging of canals and the construction of the aquaculture facility. These works were reportedly undertaken approximately 10 – 14 years ago. It is not known how acid sulfate soils were managed during the undertaking of these activities.

Wonga Beach Aquaculture Resort Pty Ltd have previously sought advice from the Environmental Protection Agency (EPA) and Department of Natural Resources and Mines (DNRM) on the issue and have complied fully with that advice. Copies of letters from relevant agencies are shown in Appendix One, along with a summary of remediation works undertaken to date.

2.0 METHODOLOGY

2.1 Field Sampling

Field sampling was undertaken during November 2004 by BTEQ staff, with the assistance of staff from Wonga Beach Aquaculture Resort. Only two samples were taken from the site for analysis, as these samples were considered representative of the two types of material present and currently disturbed.

The first sample was taken from the evaporation area (refer Figure 1). Only the top 10cm of soil was removed and submitted to the laboratory for analysis. This material was a dark heavy clay with no evidence of mottling, jarosite, or acid sulfate. This sample was not expected to show high levels of ASS or PASS.

The second sample taken was of material excavated from an existing drain on the property. It is estimated this sample was excavated from between 0.8 m to 1.5m below the standing ground level. This material was a blue sandy clay heavily mottled with jarosite and other components. This sample was expected to contain significant amounts of ASS and PASS.

Components of the investigation include:

- Soil sampling and characterisation;
- Preliminary sample analysis (determinations of field pH and pH after oxidation);
- Laboratory testing; and
- Reporting.

Considering the topography, soil stratification and characterisation over the site, the sampling intensity was chosen to give an indication of the Acid Sulfate potential of the soils already disturbed. From observations around the site, only two dominant soil types were encountered and a sample was taken of each.

Soil samples were collected using a stainless steel trowel and stored in sealable polyethylene bags (with air excluded). Samples were immediately placed in an esky (with ice) and frozen following the completion of sampling.

2.2 Field pH and pH After Oxidation Measurements

Field pH (1:5 soil:water suspension) and pH after oxidation (peroxide) were determined by the laboratory for each sample, using the methods listed in Table 1 (below). Results are provided in Analytical Reports as Appendix Two.

Table 1: Field pH and pH After Oxidation Methods

Parameters	Methodology
pH	1:5 soil/water suspension, Electrometric determination (TPS 90 FL).
pH after oxidation	Oxygen after hydrogen peroxide (30%), Electrometric determination (TPS 90 FL).

2.3 Laboratory Analysis

Both samples were submitted for further laboratory assessment on the basis of field pH and oxidised pH testing, with the aim of determining actual levels of ASS and PASS for both soil types encountered over the site.

SGS Analytical Laboratories was commissioned by BTEQ to conduct further analysis on selected samples. Full laboratory analysis results are provided in Appendix Two.

3.0 RESULTS

3.1 Analytical results

A summary of analytical results and lime required for neutralisation is presented in Table 2.

Table 2: Summary of Analytical Results

Sample	pH	Oxidised pH	S POS	Lime Required*
Unit	std	std	% w/w	Kg/t
Wonga Beach 1	3.38	2.4	0.46	Refer to Appendix 3. Dependant on Volume disturbed.
Wonga Beach 2	3.1	1.7	1.7	

*The required liming rate is taken from *"Instructions for the Treatment and Management of Acid Sulfate Soils, 2001"* Queensland Government. July 2001. Version 1.0. and includes the 1.5 safety factor.

4.0 ASS MANAGEMENT PLAN

The following ASS Management Plan has been prepared in accordance with advice from EPA and DNRM.

Liming rates have been determined via reference to analytical results of samples collected from site (refer Table 2).

Before any construction or earthworks commence, the following management plan (refer Table 3) is to be implemented by site management.

4.1 ASS Treatment Methods

When ASS is to be disturbed, the following treatment methods are to be employed.

ASS are identified by distinct colour and texture changes in the soil. Any ASS disturbed during maintenance activities will be neutralised in-situ with the addition of a sufficient quantity of lime, or stockpiled and subsequently treated.

If methods of ASS treatment other than liming are proposed to be used, additional consultation with, and approval from, DNRM and EPA will be undertaken.

4.1.1 Liming Rate

Liming of the ASS will be at least 1.5 times the theoretical acid production potential of the material. Standard liming rates to be used are as detailed by *"Instructions for the Treatment and Management of Acid Sulfate Soils, 2001"* Queensland Government. July 2001. Version 1.0. (refer to the conversion table and liming rates in Appendix Three). Liming rates were calculated based on the laboratory analysis results (refer Appendix Two). For the purpose of ASS treatment, it has been determined that **the heavily mottled blue sandy clay has an**

Oxidisable Sulphur (S%) of 1.7, and the dark brown unmottled heavy clay has an Oxidisable Sulphur (S%) of 0.46.

The above Oxidisable Sulphur (S%) results need to be referenced to the table in Appendix Three, and the quantity of material to be disturbed will determine the amount of lime required.

4.1.2 Stockpiling of ASS

Stockpiled ASS should be appropriately designed, utilising bunds and drains to ensure any acidic runoff can be held on-site prior to treatment and release. Preferably, stockpiled ASS should be contained within the unused section of drain identified in Figure 2.

4.1.3 Management of Roadways

The existing roadways around the property have shown to be constructed of material consistent with Sample 2, which has been excavated many years prior, and placed to form elevated bunds / roadways.

It is important to note that remediation of roadways has already commenced, in compliance with advice from Kristie Watling and Andrew Date (See Appendix One).

From consultation with Kristie Watling (DNRM), she believes an appropriate management method for future remediation works of the roadways and bunds is to lime the road surface accordingly and mix with a ripper (down to approximately 20cm) before adding additional lime on surface and capping with imported material. Confirmation testing (with laboratory analysis) is then to be undertaken at between 50 – 100m intervals to ensure roadways have been limed sufficiently.

The following steps are to be followed when managing the roadways:

1. Calculate the surface area of the roadway to be treated.
2. Determine the depth of disturbance (depth of ripper).
3. Calculate volume of material to be disturbed.
4. Determine from Table of Liming Rates (Section 4.1.1 and Appendix Three) the appropriate quantity of lime required to neutralise the volume of material to be disturbed, assuming all roadway material is **the heavily mottled blue sandy clay has an Oxidisable Sulphur (S%) of 1.7.**
5. **Double required liming rate to ensure adequate neutralising capacity.**
6. Spread lime evenly on roadway.
7. Mix in as best as possible with ripper and other machinery to calculated depth.
8. Soil samples to be taken at 50 to 100 m intervals and submitted to the laboratory for analysis to ensure adequate lime has been utilised.
9. Cap and compact with minimum 20cm imported material, ensuring sides of roadways are also treated and capped.

4.1.4 pH monitoring of waters on site

A monitoring plan has been drafted (Figure 3) to monitor and ensure waters on site are kept at a pH above 6.5. Monitoring is to be undertaken weekly, and after a significant rain event (>20mm in any 24hr period) at all locations shown in Figure 3.

Table 3: ASS Management Plan

ELEMENT	MANAGEMENT PLAN
Objective	▪ To minimise disturbance of Acid Sulfate Soil (ASS) during any maintenance activities, and correctly manage the ASS so as to ensure the protection of the surrounding environment from ASS impacts.
Management Strategy	▪ Where possible, avoid known ASS areas. ▪ Where disturbance is unavoidable in order to remediate existing disturbance, ensure ASS impacts are managed on-site to the satisfaction of DNRM and EPA.
Potential Impacts	▪ Acid water release into the environment resulting in harm to surrounding environments.
Actions/Controls	▪ Consult this management plan before remediation, excavation or soil disturbance. ▪ In ASS prone areas, a person trained in ASS identification will be present during all remediation, excavations or disturbances. ▪ All roadways are to be neutralised as outlined in Section 4.1.3 of this report. ▪ All water discharges during remediation, earthworks, drain maintenance, or runoff from ASS stockpiles, must be tested for pH and treated if necessary to meet ANZECC water quality criteria before release off-site. ▪ All removal of sediment from drains will require the excavation to the original drain floor only. Any further excavation will require an additional ASS Management Plan and associated approvals.
Maintenance	▪ Continual visual assessment of soils and waters in areas of potential ASS. ▪ Any ponded water present on-site is to be monitored regularly for pH as per Section 4.1.4 and Figure 3 of this report and treated as necessary to maintain a pH between 6.5 - 8.5.
Performance indicators	▪ Elimination of water discharges from the site below pH 6.5 or above pH 8.5.
Monitoring	▪ Continuous visual monitoring by trained personnel for signs of ASS presence. ▪ Daily pH monitoring of water as per Section 4.1.4 and Figure 3. ▪ In the event that soil is to be disturbed for any reason, ASS neutralisation testing is to be conducted after treatment at a rate of one test for every 500m^3 of acid sulfate soil disturbed.
Corrective Action	▪ If necessary, water will be treated with sufficient ag lime or hydrated lime to bring the pH of the water above 6.5. ▪ A review of this ASS Management Plan.

5.0 CONCLUSION

Based on the sampling undertaken for this report, it is evident that high levels of ASS are present over the site. However, providing that the remediation measures outlined by this management plan are carefully and effectively implemented, it is not expected that any significant ASS problems will occur as a result of the activities occurring on site.

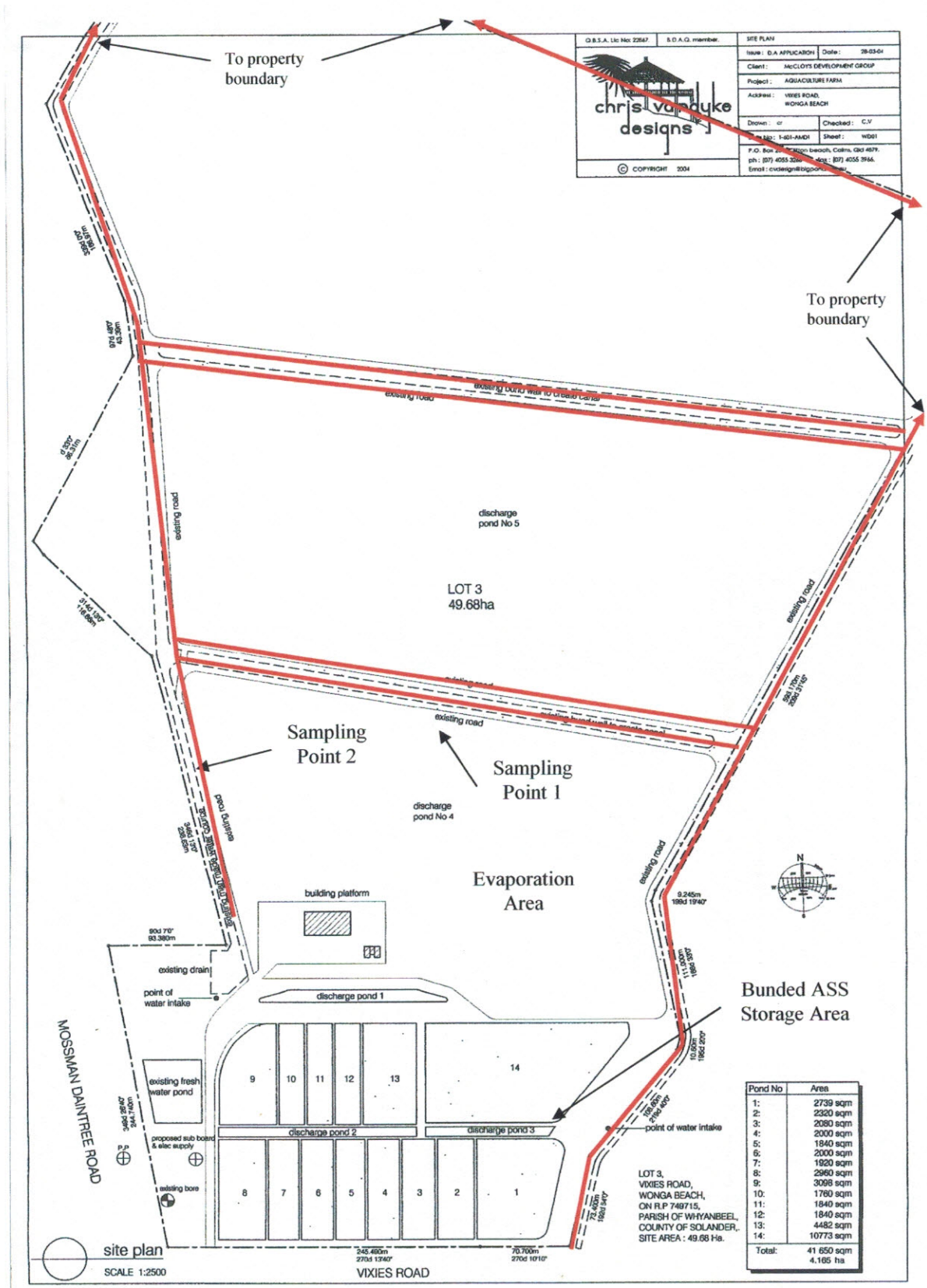
6.0 REFERENCES

"Sampling and Analysis Procedure for Lowland Acid Sulfate Soils (ASS) in Queensland – Revision 4 October 1998" (1998) Queensland Acid Sulfate Soil Investigation Team (QASSIT), Queensland Department of Natural Resources.

"Instructions for the Treatment and Management of Acid Sulfate Soils, 2001" Queensland Government. July 2001. Version 1.0.

FIGURE ONE

WONGA BEACH AQUACULTURE RESORT SITE MAP SHOWING EXISTING DRAINS AND ASS SAMPLING LOCATIONS



NOTE: **RED LINES INDICATE APPROXIMATE LOCATION OF ROADWAYS / BUNDS TO BE REMEDIATED**

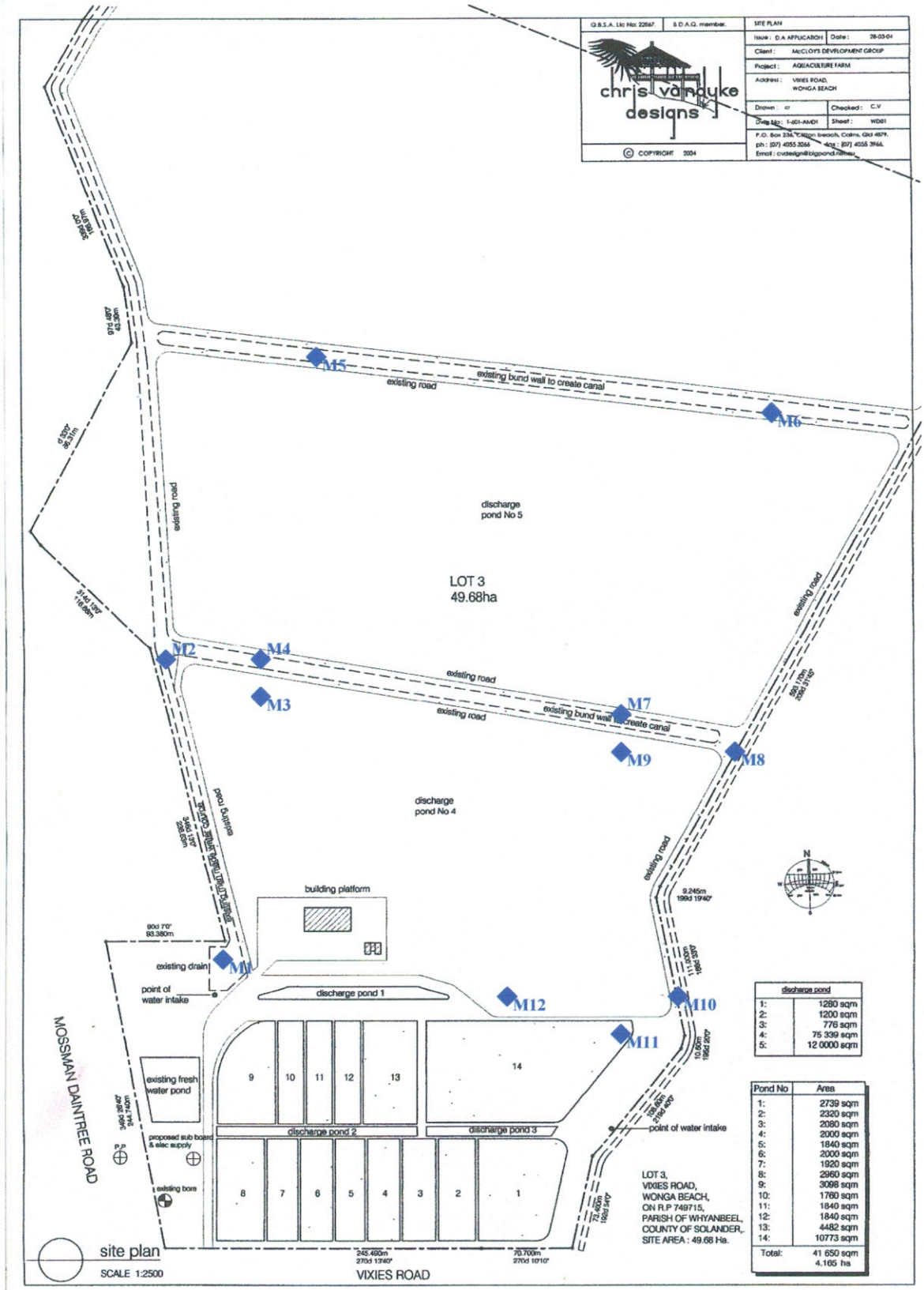
FIGURE TWO

AERIAL PHOTOGRAPH OF SUBJECT AREA (2001)

036

FIGURE THREE

WONGA BEACH AQUACULTURE RESORT SITE MAP SHOWING WATER pH MONITORING LOCATIONS


chris vandyke designs
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SITE PLAN
Issue : D.A APPLICATION
Date : 28-03-04
Client : McCLOYS DEVELOPMENT GROUP
Project : AQUACULTURE FARM
Address : VIXIES ROAD, WONGA BEACH
Drawn : cr
Checked : C.V
Sheet : WD01
P.O. Box 236, Clifton beach, Cairns, Qld 4879.
ph : (07) 4055 3066 fax : (07) 4055 3966.
Email : cvdesign@bigpond.net.au
M1
M2
M3
M4
M5
M6
M7
M8
M9
M10
M11
M12
existing road
existing bund wall to create canal
existing road
existing bund wall to create canal
existing road
existing road
existing road

APPENDIX ONE

RELEVANT CORRESPONDANCE WITH GOVERNMENT AUTHORITIES REGARDING ASS ISSUES

Notes on ASS

Tuesday 11th May

Kristie Watling from QASMT &Paula Tomkins from GBRMPA conducted a site inspection to investigate ASS on our farm. EPA's Mark Cavicchiolo rang &organized this meeting.

On site soil test were conducted on materials dug from roadways and also from the base of the settlement pond behind our shed. They also took pH readings from our production pond number 10, as well as soil samples from that roadway.

A report was sent back and a fact sheet was provided. I have included correspondence sent to me from Kristie and also from Andrew Date regarding Application rates

Liming has also been carried out on this property since change of ownership in 2002.Delivery dockets are available for proof that these works been completed. A description of lime, Dates, and tonnage's are as follows.

2002 - 1.5T@ Ag lime ponds 1-9
2003 - 1.5T@ Ag lime ponds 9-13

23rd AUG/2004 – 12T Ag lime Applied to roads, settlement pond and drains including intake cannel.

18th NOV/2004- 1.5T@ Ag lime to ponds number 1 and 3

22nd NOV/2004 – 22T Ag lime to settlement ponds, roadways, intake cannel and associated drains.

Queensland Government

Natural Resources, Mines and Energy

Author Kristie Watling
Directorate / Unit QASSIT
Phone 3896 9229

8 June 2004

Mark Hober
Wonga Beach Aquaculture
Lot 3 Vixie Road
Wonga Beach Qld 4873

Dear Mark

Site visit to Wonga Beach Aquaculture, 11 May 2004

As you know, Paula Tomkins (from the Great Barrier Reef Marine Park Authority, GBRMPA) and myself visited your aquaculture facility on the 11 May 2004.

Please find enclosed a copy of the photos we took during the visit, and a copy of the results from the field pH tests that were conducted at your property. I've also included some general information on acid sulfate soils.

Please feel free to contact me on 3896 9229 if you have any questions.

Yours sincerely

K Watling

Kristie Watling
Land Resource Officer

CC. Mark Cavicchiolo
Environmental Protection Agency
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80 Meiers Road, Indooroopilly
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NRM facts

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Acid Sulfate Soils in Queensland

Acid sulfate soils (ASS) are soils and sediments that contain iron sulfides, commonly pyrite. When exposed to air due to drainage or disturbance these soils produce sulfuric acid (battery acid), often releasing toxic quantities of iron, aluminium, and heavy metals.

The acid, aluminium, and heavy metals can seep into waterways, kill fish, other aquatic organisms and vegetation, and can even degrade concrete and steel pipes and structures to the point of failure.

How are acid sulfate soils formed?

In Australia, the sediments that are of most concern are those which formed within the last 10,000 years, after the last major sea level rise. When the sea level rose and inundated the land, sulfate in the sea water mixed with land sediments containing iron oxides and organic matter. The resulting chemical reaction produced large quantities of iron sulfides in waterlogged environments.

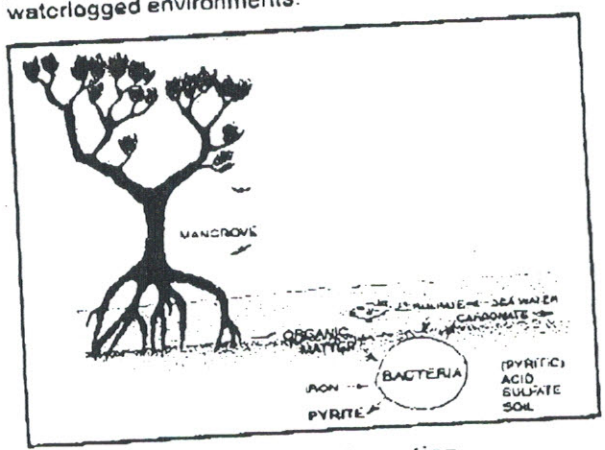

Figure 1 Acid sulfate soils formation

Iron sulfides such as pyrite are formed in sediments of coastal lowlands where there is sufficient sulfur present. The sulfides are stable until exposed to air at which point they produce sulfuric acid.

Where do ASS occur?

There are an estimated 2.3 million hectares of acid sulfate soils along 6 500km of Queensland coastline. Acid sulfate soils are typically found in lowland areas such as estuaries and floodplains, tidal mangrove flats, lakes and wetlands, and swamps at elevations commonly less than 5 metres above sea level.

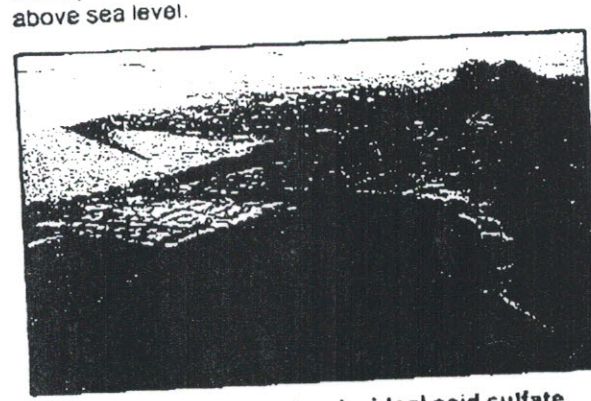

Figure 2 A coastal lowland – ideal acid sulfate soil forming environment

What happens when ASS are disturbed?

Acid sulfate soils are benign when in a waterlogged environment. However, when these soils are drained or excavated, oxygen from the atmosphere reacts with the iron sulfides in the soil. This results in the production of sulfuric acid (battery acid) which has a pH of less than 1. The acid breaks down the soil structure, releasing toxic quantities of aluminium and other associated metals.

The acid and metals remain in the soil until rainfall is sufficient to leach them out. The acid and metals may then leak into nearby waterways, creeks, and streams, with often catastrophic environmental and economic impacts.

Land uses that may be affected by acid sulfate soils include residential and canal developments, road construction, aquaculture, marinas, golf courses, agriculture, sand and gravel extractions, ditching for mosquito control, drainage works, national parks and reserves, and coastal lake developments.

Environmental impacts

The acid water and toxic heavy metals can kill fish and also increase their susceptibility to diseases such as 'red spot'. Fish can be trapped behind flood gates or be caught in an acid plume, resulting in death. Avoidance of acid water environments by

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QNRM01139

Author: Kylie Hey

Produced by: QASSIT

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Identifying Acid Sulfate Soils

Acid sulfate soils (ASS) are soils and sediments that contain iron sulfides, commonly pyrite. When exposed to air due to drainage or disturbance these soils produce sulfuric acid (battery acid), often releasing toxic quantities of iron, aluminium, and heavy metals.

Release of acid and metals can cause significant harm to the environment, engineering structures and even human health. Areas of acid sulfate soils should be identified before disturbance to ensure that appropriate measures can be taken to minimise potential problems.

Identification of ASS

Maps indicating acid sulfate soils in key coastal areas from the NSW border to Noosa are available from the Department of Natural Resources and Mines. Mapping projects are continuing in key areas.

A number of landscape features can indicate the presence of acid sulfate soils and highlight areas which may require further investigation. Laboratory analysis of soil samples is necessary to confirm the presence of acid sulfate soils.

Elevation

Acid sulfate soils are commonly found less than 5 metres above sea level, particularly in low-lying coastal areas. Mangroves, salt marshes, floodplains, swamps, wetlands, estuaries, and brackish or tidal lakes, are ideal for acid sulfate soil formation.

Figure 1 A coastal floodplain – a typical acid sulfate soil environment

Vegetation

Species that commonly indicate acid sulfate soil areas include mangroves, marine couch, tea-trees (*Melaleuca* spp.), phragmites (a tall acid tolerant grass species), and she-oaks (*Casuarina* spp.).

Soils

In their undisturbed, waterlogged state, acid sulfate soils may range from dark grey muds to grey sands or peats. Initially, they have a pH close to neutral (6.5–7.5), but may become very acidic when exposed to air (pH <3). When disturbed, the soils may smell of rotten eggs (hydrogen sulfide gas).

ASS symptoms

A number of indicators provide evidence of problems associated with the disturbance of acid sulfate soils.

Vegetation

Stunted or dead vegetation, acid scalds and poor vegetation regrowth in previously disturbed areas are indicative of the impacts of acid sulfate soil exposure. (Salinity may cause similar symptoms.)

Figure 2 Acid scalds and death of vegetation due to the exposure of acid sulfate soils

Water bodies affected by acid sulfate soil runoff can be altered over time to favour plants that are more acid tolerant. Water lilies, rushes and sedges can dominate water bodies preventing light penetration, killing bottom-dwelling vegetation, which then decays, and reduces dissolved oxygen in the water.

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Managing Acid Sulfate Soils

Acid sulfate soils are soils and sediments that contain iron sulfides and occur in coastal lowlands, estuaries, floodplains, wetlands and mangrove environments. When exposed to oxygen through drainage or disturbance, these soils produce sulfuric acid (battery acid). Rainfall can flush the acid into nearby waterways, killing fish, other aquatic organisms and vegetation. The acidified water can even degrade concrete and steel infrastructure.

Common land uses on acid sulfate soils include the development of canal and residential estates, marinas, sand and gravel extraction, agriculture, road construction, aquaculture and golf courses.

In many circumstances, acid sulfate soils can be successfully managed. However, inappropriate management may result in degraded areas, long-term engineering problems, reduced productivity and less profitable outcomes.

There are a variety of management options available to treat acid sulfate soils. Selection of an appropriate management option will depend on the physical and chemical characteristics of the acid sulfate soil, the hydrological circumstances and the environmental sensitivity of the site. Where a major disturbance of acid sulfate soils is being proposed, a soil scientist or engineer experienced in acid sulfate soils management should be consulted. An acid sulfate soil investigation must be carried out at each site prior to any disturbance to help determine the most appropriate management.

Preferred management strategies

Avoidance

Acid sulfate soils are inert when left in waterlogged, undisturbed conditions. Avoidance, by not disturbing or developing in areas affected by acid sulfate soils is often the most environmentally responsible and cheapest option. Avoidance is the most preferred management strategy, and it should be considered at all sites. 'Hot spots' that are likely to cause problems need to be identified so they can be avoided or given special treatment.

Minimisation of disturbance

If acid sulfate soils can't be avoided, their disturbance should be minimised. Strategies that aim to minimise the disturbance of acid sulfate soils include: i) redesign of earthworks for sites with a variable distribution of acid sulfate soils so that areas with high levels of sulfides are avoided; ii) limiting disturbances on site so that only shallow disturbances are undertaken; iii) redesign of existing drains so that they are shallower and wider and do not penetrate sulfidic layers; and iv) minimising groundwater fluctuations by avoiding activities such as the construction of deep drains and the installation of new groundwater extraction bores.

Neutralisation

Neutralisation of acid sulfate soils involves the physical incorporation of neutralising/alkaline materials into the soil. Agricultural lime is the best choice for acid sulfate soil application. Thoroughly mixing the appropriate amount and type of lime into disturbed acid sulfate soils will neutralise any acid produced. Lime has an alkaline pH and buffers any acid produced whilst raising the soil pH to acceptable levels.

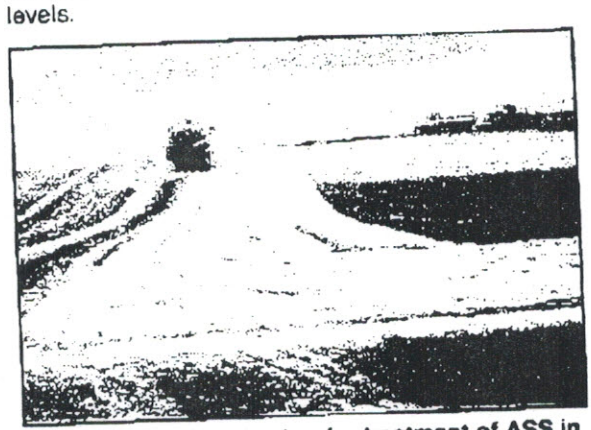

Figure 1 Lime application for treatment of ASS in North Queensland

Hydrated lime is often more appropriate for treating acid waters due to its higher solubility. After acid water has been treated to pH 6.5–8.5, it can usually be safely released from the site at a controlled rate to prevent significant changes to the quality of offsite waters.

The amount of neutralising agent required is calculated using soil and water test results, taking into account the neutralising capacity of the lime source. Other materials that may be useful to neutralise soil or water include quicklime, mixed lime, sodium

L62 June 2004
©The State of Queensland (Department of Natural Resources, Mines and Energy) 2004
QNRME04137
Authors: Kristie Watling and Sue-Ellen Dear
Produced by: QASSIT

Visit to Wonga Beach Aquaculture
Tuesday 11 May 2004

Kristie Watling (NRM&E Indooroopilly) and Paula Tomkins (GBRMPA Townsville)

Photos mentioned in the report are provided on the CD

Mark Hober met us at the site entrance and took us to the area behind the ponds/farm where substantial excavations had occurred in the past.

Photo 15 is looking along the road that was previously constructed by excavating the drain seen on the left of the photo. Photo 16 is looking the other way along the road and drain. We tested the pH and EC of the water in the drain at this location, at the surface and at depth. Surface water pooled on the other side of the road in the swampy area was also measured for pH (water sample 3).

Water Sample No.	pH	EC (mS/cm)[1]
1 (surface)	5.9	24.8
2 (depth)	5.5	24.7
3	2.3	n/a

Photo 17 shows a close up of the road where we conducted two field tests; sample 1 was at the surface and some jarosite was visible, while sample 2 was at a depth of 0.05 m in darker, moister material.

Soil Sample No.	pH_F[2]	pH_{FOX}[3]	Reaction[4]	ΔpH
1	2.6	0.6	XXXX	2.0
2	2.8	0.8	XXXX	2.0

We then went back to the pond area of the property. Photo 18 was taken while standing on one of the internal pond walls, looking towards the main entrance of the property. Photo 19 was taken from the same location, looking towards the sheds. We tested the pH of the water in the adjacent pond, and conducted a field test on some soil from the pond wall.

Water Sample No.	pH
3	6.1

Soil Sample No.	pH_F	pH_{FOX}	Reaction	ΔpH
3	3.4	2.9	X	0.5

We collected a soil sample from this area and re-tested it back in the office.

Soil Sample No.	pH_F	pH_{FOX}	Reaction	ΔpH
3 – repeat 1	4.4	3.8	X	0.6
3 – repeat 2	3.6	3.1	X	0.5

[1] EC upper limit for drinking water is ~1.6 mS/cm; upper limit for agriculture is ~8 ms/cm; seawater is ~55 mS/cm

[2] pH of soil:water mix

[3] pH of soil:hydrogen peroxide mix

[4] Strength of reaction with hydrogen peroxide: no reaction –, low reaction X, medium reaction XX, high reaction XXX, extreme reaction XXXX

Queensland Government
Environmental Protection Agency

Facsimile Cover Sheet

Cairns District, Northern Region
5 – 5B Sheridan Street • PO Box 2066 CAIRNS QLD 4870
Phone enquiries (07) 4046 6734 • Facsimile (07) 4046 6606

Date 29 July 2004 Trans/No

Please deliver to Name Mark Hober Fax number 4098 7201
Business/Section Wonga Beach Aquaculture

From Name Andrew Date Telephone 4046 6755
Unit Environmental Protection Agency, Cairns District, Northern Region

Subject Lime rates

Number of pages *(including facsimile cover sheet)* 2

Special precedence ☐ Urgent ☐ Confidential **Original is being forwarded** ☐ Yes ☐ No

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Message Mark

I talked to Kristie from Dept Natural Resources and Mines about the liming rate.

She said that it really depended on the % of sulfur in the soil that could be oxidized (which would need tests). Instead she recommended that you spread the lime evenly:

- over the roadways (tops of the walls) where you had been cleaning out the drains and
- on the ground before you tip the material out of the truck and
- if possible sprinkle a bit on top of each load in the truck with the excavator bucket before tipping the load out
- or leave a thick line of lime at the bottom of the piles you have been tipping along the side of the roadways so that the run-off from rain passes through the line of lime before running back into the creek

She said the key is to get as much lime mixed in with the soil as possible. This will provide a better nuetralising effect than spreading it on the surface.

I am trying to get a clear definition of 'dredging' to determine if the excavation of material for maintenance of the drains need an approval. If it isn't dredging you may still need to submit an approved plan based on the Department of Natural Resources Acid Sulfate Soils Management Plan (I can send you a copy of this if you need it).

Also could you fax to me information about
- the amount of water you pump in or the number of hours you run the pump per week and the output of the 6"China pump and the mobile pump
- the amount of water you pump to Pond 14 and the amount you re-use (pump back to the grow-out ponds)
- any readings you may have on the water quality in Pond 14 or Discharge Pond 4 (I assume you check it before you pump it back)

I am printing out the guideline/information sheets about applying for licenses and will post them to you

Cheers

Andrew

APPENDIX TWO

ANALYTICAL RESULTS

SGS

CERTIFICATE OF ANALYSIS

17 November, 2004

Mr Ben Pohlner
BT Environmental & Development Consultants P/L
PO Box 14158
MT SHERIDAN QLD 4868

Your Order No: BT-C0044 **Laboratory Report No: 48214**
Your Project:

Dear Sir or Madam:

The following samples were received from you on the date indicated.

Quantity Received:	2
No. of containers:	2
Sample Type:	Soil
Date of Receipt:	8 November 2004

These samples were analysed in accordance with your instructions.

The results are contained in the following pages of this report.
Unless otherwise stated, solid (soil) samples are analysed on a dry basis and liquid (water) samples are analysed as received.

Should you have any queries regarding this report, please contact the undersigned.

Yours faithfully,

SGS Environmental Services

Jon Dicker
Operations Manager
CAIRNS

Margaret Nankervis
Business Manager
CAIRNS

This Document should not be reproduced except in full

Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia www.au.sgs.com
t +61 (0)7 4035 5111 f +61 (0)7 4035 5122

Member of the SGS Group

SGS

Laboratory Report No: 48214

RESULTS

SGS Reference	Your Reference	Moisture % H_2O*	pH $_{KCl}$	TAA (pH 6.5) kg H_2SO_4/tonne	pH $_{OX}$	TPA (pH 6.5) kg H_2SO_4/tonne	TSA (pH 6.5) kg H_2SO_4/tonne	ANC_E % $CaCO_3$
Blank		-	6.7	-	6.2	-	-	-
48214-01	**Wonga Beach 1**	33	3.8	4.8	2.4	26	21	<0.1
R48214-01	***Repeat Wonga Beach 1***	-	3.8	4.7	2.4	26	21	<0.1
48214-02	**Wonga Beach 2**	7	3.1	16	1.7	72	55	<0.1
	Limit of Reporting	1	0.1	0.5	0.1	0.5	0.5	0.1
	ASSMAC Method†	2B1	23A	23F	23B	23G	23H	23Q

Our Reference	Your Reference	S $_{KCl}$* % w/w	S $_{P}$* % w/w	S $_{POS}$* % w/w	Ca $_{KCl}$* % w/w	Ca $_{P}$* % w/w	Ca $_{A}$* % w/w	Mg $_{KCl}$* % w/w	Mg $_{P}$* % w/w	Mg $_{A}$* % w/w
Blank		-	-	-	-	-	-	-	-	-
3214-01	**Wonga Beach 1**	0.11	0.56	0.46	0.043	0.050	0.007	0.057	0.057	<0.005
48214-01	***Repeat Wonga Beach 1***	0.11	0.58	0.47	0.043	0.050	0.007	0.056	0.058	<0.005
48214-02	**Wonga Beach 2**	0.67	2.4	1.7	0.020	0.020	<0.005	0.14	0.13	<0.005
	Limit of Reporting	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	ASSMAC Method	23Ce	23De	23Ee	23Vh	23Wh	23Xh	23Sm	23Tm	23Um

Results determined on a dry basis.

* NATA accreditation does not cover the performance of this analysis

† ASSMAC - Acid Sulfate Soils Management Advisory Committee - Acid Sulfate Soil Manual, August 1998

APPENDIX THREE

ASS CONVERSION TABLE WITH LIMING RATES

Appendix One: Table Reproduced from Dear *et al*., 2000 by permission.

TABLE 2 Treatment categories and lime required to treat a weight of disturbed acid sulfate soil – based on soil analysis

The tonnes (t) of pure fine lime required to fully treat the total weight/volume of ASS can be read from the table at the intersection of the weight of disturbed soil (row) with the soil sulfur analysis (column). Where the exact weight or soil analysis figure does not appear in the heading of the row or column, use the next highest value (or calculate values exactly).

Disturbed	**Soil Analysis - Oxidisable Sulfur (S %) + TAA** (in equivalent units of %S)													
(tonnes) *	***0.03***	***0.06***	***0.1***	***0.2***	***0.4***	***0.6***	***0.8***	***1***	***1.5***	***2***	***2.5***	***3***	***4***	***5***
1	0	0	0	0	0	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.2	0.2
5	0	0	0	0.05	0.1	0.1	0.2	0.2	0.4	0.5	0.6	0.7	0.9	1.2
10	0	0.05	0.05	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.2	1.4	1.9	2.3
15	0	0.05	0.1	0.1	0.3	0.4	0.6	0.7	1.1	1.4	1.8	2.1	2.8	3.5
20	0.05	0.1	0.1	0.2	0.4	0.6	0.7	0.9	1.4	1.9	2.3	2.8	3.7	4.7
25	0.05	0.1	0.1	0.2	0.5	0.7	0.9	1.2	1.8	2.3	2.9	3.5	4.7	5.9
35	0.05	0.1	0.2	0.3	0.7	1.0	1.3	1.6	2.5	3.3	4.1	4.9	6.6	8.2
50	0.1	0.1	0.2	0.5	0.9	1.4	1.9	2.3	3.5	4.7	5.9	7.0	9.4	12
75	0.1	0.2	0.4	0.7	1.4	2.1	2.8	3.5	5.3	7.0	8.8	11	14	18
100	0.1	0.3	0.5	0.9	1.9	2.8	3.7	4.7	7.0	9.4	12	14	19	24
200	0.3	0.6	0.9	1.9	3.7	5.6	7.5	9.4	14	19	24	28	38	47
500	0.7	1.4	2.3	4.7	9.4	14	19	24	35	47	59	70	94	117
750	1.1	2.1	3.5	7.0	14	21	28	35	53	70	88	105	141	176
1,000	1.4	2.8	4.7	9.4	19	28	38	47	70	94	117	141	187	234
2,000	2.8	5.6	9.4	19	38	56	75	94	141	187	234	281	375	468
5,000	7.0	14	23	47	94	141	187	234	351	468	585	702	936	1171
10,000	14	28	47	94	187	281	375	468	702	936	1171	1405	1873	2341

L	**Low treatment**: (<0.1 t lime). *Submit disturbance dimensions & Lab Analysis proof to Local Government (L.G.).* Apply 0.05 t (1 bag) or 0.1 t (2 bags) of lime.
M	**Medium treatment:** (≤0.1 to 1 t lime). *Submit disturbance dimensions & Lab Analysis proof to L.G.* Thoroughly mix lime (0.1-1 t) & bund the site.
H	**High treatment**:(>1 to 5 t lime). *Submit Earthworks Application, Management Plan & Lab Analysis proof to L.G* . Management, bunding & monitoring required.
VH	**Very High treatment:** (>5 tonne lime). Earthworks *Application or Impact Assessment required for L.G. (& State agencies*). Detailed management, monitoring & bundi

A detailed ASS site investigation & management plan is required if disturbing > 1,000 tonnes of ASS (oxidisable S ≥ 0.03 %S or equivalent TPA or TAA.)

Lime rates are for pure fine $CaCO_3$ using a safety factor of 1.5. A factor that accounts for Effective Neutralising Value is needed for commercial grade lime (see, Ahern *et al* 1998c).

An approximate weight can be obtained from volume by multiplying volume (cubic m) by bulk density (t/m^3). (use 1.7 if B.D. is not known)

*Tonnes approximately equal m^3 (volume) for soils with BD of 1g/cc or t/m^3. Dense fine sandy soils may have BD up to 1.7. Thus $100m^3$ may weigh up to 170t.

APPENDIX FOUR

SUMMARY OF ASS REMEDIATION WORKS UNDERTAKEN TO DATE

Notes on ASS

Tuesday 11th May

Kristie Watling from QASMT &Paula Tomkins from GBRMPA conducted a site inspection to investigate ASS on our farm. EPA's Mark Cavicchiolo rang &organized this meeting.

On site soil test were conducted on materials dug from roadways and also from the base of the settlement pond behind our shed. They also took pH readings from our production pond number 10, as well as soil samples from that roadway.

A report was sent back and a fact sheet was provided. I have included correspondence sent to me from Kristie and also from Andrew Date regarding Application rates

Liming has also been carried out on this property since change of ownership in 2002.Delivery dockets are available for proof that these works been completed. A description of lime, Dates, and tonnage's are as follows.

2002 - 1.5T@ Ag lime ponds 1-9
2003 - 1.5T@ Ag lime ponds 9-13

23rd AUG/2004 – 12T Ag lime Applied to roads, settlement pond and drains including intake cannel.

18th NOV/2004- 1.5T@ Ag lime to ponds number 1 and 3

22nd NOV/2004 – 22T Ag lime to settlement ponds, roadways, intake cannel and associated drains.

Appendix 6B

Geotech and ASS Investigation

PGI
Ground Engineering Services
60 William Street, West End
Queensland 4810
Tel: (07) 4724 3958
Mobile: 0438985494
Web: www.nqphigi.com.au

DAINTREE SALTWATER BARRA FARM, WONGA BEACH

Geotechnical Investigation Report

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APPENDIX E: LIMITATIONS

Report	Daintree Saltwater Barra Farm, Wonga Beach
Contract No	PGC0118014
Date	Friday, 09 February 2018
Document Status	Version 1.3 Final
Prepared by	Andrew Horspool
Reviewed by	Stephen Flux
Signed	Jan Postma

1.0 INTRODUCTION

Geotechnical investigation was undertaken to provide materials parameters for the proposed development at the Wonga Beach Saltwater Barramundi Farm. The work was commissioned by Daintree Saltwater Barramundi Farms Pty. Ltd.

The Queensland Government Guidelines for constructing and maintaining aquaculture containment structures recommend the assessment of the several criteria to allow risk assessment of proposed development sites. This report presents PGI's assessment of the following criteria indicated in the guidelines;

- Regional Geology;
- Site Soil Classification;
- Material performance.

2.0 SCOPE OF WORK

In pursuance of the above the following scope of intrusive and laboratory analysis was undertaken;

- 3No. sampling locations in existing structures
- Laboratory testing to establish material types and likely construction performance; and
- Permeability
- Cr Suite Acid Sulfate Soil Testing

The results of the fieldwork and testing are discussed in the following sections. Records of the laboratory testing are presented in Appendices B, C and D respectively. Sampling locations are indicated in the Site Plan presented in Appendix A

3.0 SITE DESCRIPTION

The farm is located on a 49 hectare property, on the southern arm of the Daintree River in Far North Queensland.

4.0 REGIONAL GEOLOGY

Published geological information derived from the Queensland Digital Geological Map Sheet 7965, Mossman indicates that the site is underlain by non-tidal coastal flat and back-swamp deposits, predominantly sand and mud. Conditions encountered in exploratory holes largely confirmed the published geology.

5.0 GEOTECHNICAL CRITERIA

A programme of laboratory testing was undertaken to confirm geotechnical capacities of the materials encountered in the investigation and their likely capacity for re-use in construction. The results of the testing are summarised in Table 1 and presented in full in Appendix B.

Table 1 – Summary of Laboratory Testing

Select Fill Specification			Testing Results		
			C7651	C7652	C7653
Sieve Size/Property	Lower Limit	Upper Limit	Phys#1, Settlement Pond 3, Bund Wall	Phys#2, Settlement Pond 2, Bund Wall	Phys#3, Settlement Pond 2, Pond Floor
37.5 mm	100%	100%	100	100	100
19 mm	80%	100%	100	100	100
9.5 mm	75%	100%	100	100	100
2.36 mm	60%	100%	97	98	98
0.6 mm	50%	100%	86	92	92
0.425 mm	45%	90%	81	90	80
Plasticity Index	15%	40%	10	8	11
Liquid Limit	30%	70%	44	36	41
Material Classification			CL	CL	CL

5.1.1.1.1 REUSE OF SITE MATERIALS

Results of testing indicate that site won materials largely conform to commonly specified select embankment fill specifications. Plasticity indices for the tested material are lower than recommended.

5.1.1.1.2 PERMEABILITY

The permeability of pond liner layers is a critical issue in the assessment of risk for aquaculture facilities. Laboratory coefficient of permeability testing was undertaken on three samples to establish K values for site won materials. The results are summarised in Table 2 and presented in full in Appendix C. Reference is made to the sampling locations in Table 2, with their physical locations presented on the site plan in Appendix A.

Table 2 – Summary of Permeability Testing Results

Sample	Location	Pre Test Criteria		Average Coefficient of Permeability (m/sec)
		Moisture Content (%)	Dry Density (t/m^3)	
C7651	Phys#1 Settlement Pond 1 Bund Wall	36.7	1.10	1.5×10^{-9}
C7652	Phys#2 Settlement Pond 2, Bund Wall	26.4	1.38	1.3×10^{-9}
C7653	Phys#2 Settlement Pond 2, Pond Floor	32.3	1.26	2.8×10^{-10}

Indicative rates of percolation through a liner constructed from site won compacted select fill suggest flow rates, Q (m^3/sec) in the order of 10^{-9} m/sec are likely for site won material placed in compacted layer construction.

In accordance with Appendix 4 of the Guidelines for construction of containment structures the permeability of site won materials has been assessed from the perspective of loss of water over the maximum likely fill period. Calculated values indicate loss from containment structures <1ML/Ha over the fill period of the ponds. This level of loss is deemed acceptable in the Guidance notes for facilities assessed as **Low Risk.**

6.0 ACID SULFATE SOIL INVESTIGATION

Acid sulfate soils (ASS) is the name given to naturally occurring soils and sediments that contain iron sulfides, such as pyrite (FeS2). Iron sulfides are chemically stable oxygen-free environments. Exposure to oxygen causes reactivity and the generation of sulfuric acid.

When ASS are exposed to air, the iron sulfides oxidise and sulfuric acid is produced. These soils contain oxidised iron sulfides and are known as actual acid sulfate soils (AASS). AASS are very acidic (pH <4), and often contain a yellow mineral called jarosite, KFe3(SO4)2(OH)6. Textures can vary from sands to clays.

The term acid sulfate soils includes both actual acid sulfate soils and potential acid sulfate soils. AASS and PASS are often found in the same soil profile, with AASS generally overlying PASS.

6.1 ACID SULFATE SOIL TESTING

Sampling and subsequent laboratory testing were undertaken to assess site won materials for the presence of acid forming materials. Results of the testing are summarised in Table 5 and presented in full in Appendix D.

Table 3 – Summary of SPOCAS Net Acidity Calculations

Sample	Location	SPOCAS Net Acidity Calculations		Estimated Treatment Level
		s-Net Acidity (%w/w S)	a-Net Acidity (moles H+/T)	Tonnes ($CaCO_3$)
C7650	ASS#1 - Drain	0.10	62	4.7
C7654	ASS#2 – Pond 2, Floor	1.60	1000	47
C7655	ASS#3 – Pond 2, Floor	0.94	580	47
C7656	ASS#4 – Pond 2, Floor	0.42	260	28
C7657	ASS#5 – Pond 1, Floor	0.97	610	47
C7658	ASS#6 – Pond 1, Floor	0.61	380	37

It has been assumed for the purpose of this report that >1000 tonnes of material will be disturbed in the development of the proposed facility. Estimated treatment levels ranging from high to extra high, in accordance with Queensland Acid Sulfate Soil Technical Manual were assessed from the results of testing.

7.0 CONCLUDING REMARKS

Intrusive investigation, sampling and testing were undertaken in accordance with Queensland Government Guidelines for constructing and maintaining aquaculture containment structures to establish suitability of in situ soils for the construction of the proposed facility.

7.1 AQUACULTURE CONTAINMENT FACILITIES - RISK ASSESSMENT

Risk assessment was undertaken in accordance with the Department of Agriculture and Fisheries (DAF) Guidelines for constructing and maintaining aquaculture containment structures. Section 3.2 and 3.3 of the Guidelines demand the assessment of the risk from the perspective of impacts on other resources, natural or otherwise, by the operation of a poorly constructed aquaculture facility.

Assessment of the proposed development in line with the risk assessment matrix suggests that the facility can be considered **Low Risk.** This assessment is based on the following criteria assessed as part of the investigation;

- Generally flat topography;
- Interaction with regional geology is considered unlikely from the results of the investigation
- Largely favourable site won soils available for the construction of impermeable liners to containment ponds
- Local groundwater is considered unlikely to be used locally for other processes
- Local land use is predominantly agricultural and the proposed development site is and existing aquaculture facility.

Assessment of likely leakage suggests a flow rate of <1.0ML/Ha for a fill period of 180 days less than the acceptable level of <5.0ML/Ha.

Assessment of laboratory permeability testing for site won CL materials suggests permeabilities of the order 10^{-9} m/sec which suggests that for a low risk facility a minimum liner thickness of 200mm, constructed from CL material.

7.2 SAMPLING

Sampling and testing at the site was undertaken in general accordance with the guidelines for constructing and maintaining aquaculture containment structures, Appendix 2: Minimum soil testing requirements, with a broad assessment of the materials encountered corresponding to USC CL.

7.3 GEOLOGY

Regional geology is not considered to a risk to the proposed development. Rock was not encountered during the investigation and consequently it is considered unlikely that rock would be encountered in the construction of the proposed development.

7.4 USC SOIL CATEGORISATION

Materials encountered on the site were predominantly CL class.

7.5 CONSTRUCTION MATERIALS

It is considered likely that materials on the site could be used as site won general fill for the construction of embankments, where blended with clay material to develop appropriate plasticity.

7.6 ACID SULFATE SOIL

It has been assumed for the purposes of this repot that >1000 tonnes of material will be disturbed in the development. Action criteria for projects disturbing more than 1000 tonnes of soil are set at the lowest value and require the development of a detailed management plan.

8.0 REFERENCES

Australian Standard AS 1726 'Geotechnical site investigations' 1993, Standards Australia

Australian Standard AS 1289, Methods of Testing Soil for Engineering Purposes,

Australian Standard AS 3798 "Guidelines on Earthworks for Commercial and Residential Developments", 2007, Standards Australia

Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines Version 4.0, 2014, Queensland Government, Science Division.

APPENDIX A
SITE PLAN

IMPORTANT NOTE

This plan was prepared as a concept plan only and accuracy of all aspects of the plan have not been verified.
All lots, areas and dimensions are approximate only, Subject to relevant studies, Survey, Engineering and Government approvals.
No reliance should be placed on the plan and RPS Australia East Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person who may use or rely on this plan.

Detail survey data shown has been compiled from various surveys from 2000 to 2005.

AERIAL IMAGERY.

© Google Earth 2015
© 2015 CNES/Astrium
Date of Capture: 2-5-2014

SETTLEMENT POND	AREA
1	1.206 ha
2	6.45 ha
3	11.59 ha
4	9.38 ha
TOTAL	**28.626 ha**

Pond areas are approximate only. Calculated at approx top of batter interpolated from detail surveys, LiDAR data & aerial imagery.

WATER INTAKE

SETTLEMENT POND 4
9.38 ha

SETTLEMENT POND 3
11.59 ha

SETTLEMENT POND 2
6.45 ha

SETTLEMENT POND 1
1.206ha

PRODUCTION PONDS

SEE SHEET 2

PHYS #1 Bund Wall (-0.3m)

PHYS #2 Bund Wall (-0.3m)

PHYS #3 Pond Floor

ASS#1 (Drain)

ASS #2 (-.1m)
ASS #3 (-0.5m)
Floor of Pond

ASS#4 (-0.5m)
Floor of Pond

ASS #5 (-0.1m)
ASS #6 (-0.5m)
Floor of Pond

HOOK-A-BARRA TOURIST FACILITY

MOSSMAN DAINTREE ROAD

VIXIES ROAD

SOUTH DRIVE

2 RP744082
1 SP188690
3 SP150448
278 SR419
20 NPW695
3 SP128858
295 RP889328
50 SP155078
5 SP126931
11 SP188690
10 RP746153
9 SP176447
8 SP176447
17 SP235265
16 SP235265
7 RP746153
2 SP264298
6 RP746153
16 SP264298
52 RP851568
51 RP851568
1 SP108617
4 RP746152
2 SP108617
3 RP746152
2 SP235266
1 SP235266
22 RP843597
21 RP843597
19 RP865080
6 RP808307
5 RP808307
20 RP865080
Emt A
Emt B

0 50 100 150 200 250
metres

SCALE 1:5000 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE. (A3)

AMENDMENTS	
PROJECT MANAGER	O. Caddick-King
SURVEYED	2000-2005
COMPILED	AMK
CAD REF	9338-8.DWG
SHEET	1 OF SHEETS 2
SHEET SIZE	A3

DAINTREE SALTWATER BARRAMUNDI FISH FARMS PTY LTD

SITE PLAN
SHEET 1 OF 2
LOT 3 SP150448
WONGA BEACH

RPS Australia East Pty Ltd
ACN 140 292 762

135 Abbott St
PO Box 1949
CAIRNS QLD 4870

T +61 7 4031 1336
F +61 7 4031 2942
W rpsgroup.com.au

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SCALE	DATE	DRAWING NO.	ISSUE
1:5000	27/1/2015	9338-8	

APPENDIX B
RESULTS OF LABORATORY TESTING

ses
SOIL AGGREGATE & CONCRETE TESTING

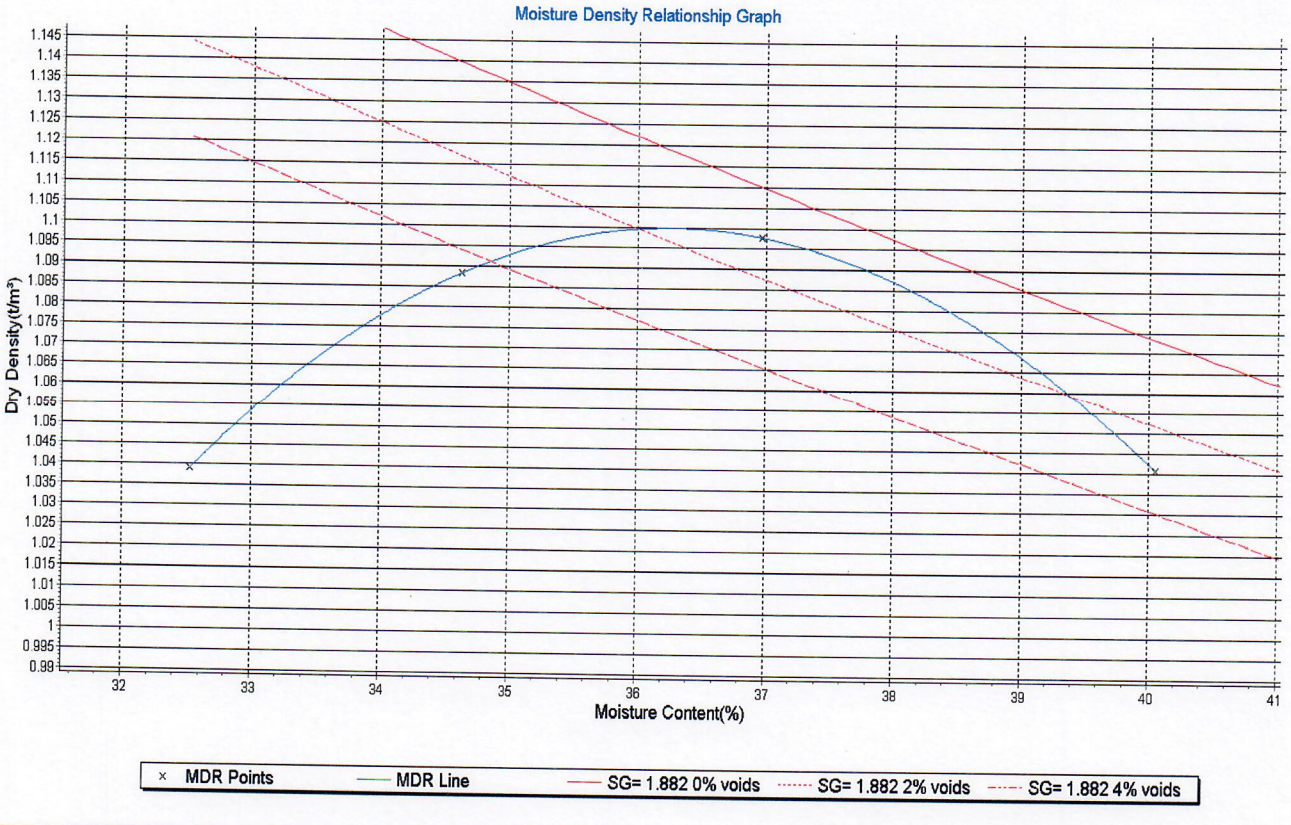
Soil Engineering Services
6/170-182 Mayers St, Manunda Qld 4870
P.O. Box 1054, Bungalow Qld 4870
Phone 07 4053 6840 **Fax** 07 4053 6746
Email cairns@soilengineeringservices.com
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Moisture Density Relationship Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 1/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**18/12/2017**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.5.1.1**
Location:	**Wonga Beach**	**Page 1 of 3**	

		SAMPLE LOCATION
Sample Number :	C/7651	Settlement Pond 3
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4	Bund Wall
Sampled By :	Shaun Hansen	PHYS#1
Date Sampled :	7/12/2017	-0.3m
Date Tested :	13/12/2017	Test Number :
Material Type :	Existing Material	Lot Number :
Material Source :	Existing Material	Moisture Method : AS1289.2.1.1
Remarks :		

Maximum Size (mm) :	19.0	**Maximum Dry Density (t/m³) :**	**1.1**
Oversize Dry (%) :	0.0	**Optimum Moisture Content (%) :**	**36.5**
Oversize Density (t/m³) :			



NATA WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing

APPROVED SIGNATORY

S Hansen

Shaun Hansen - Laboratory Manager
NATA Accreditation Number
19463

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SOIL AGGREGATE & CONCRETE TESTING

Soil Engineering Services
6/170-182 Mayers St, Manunda Qld 4870
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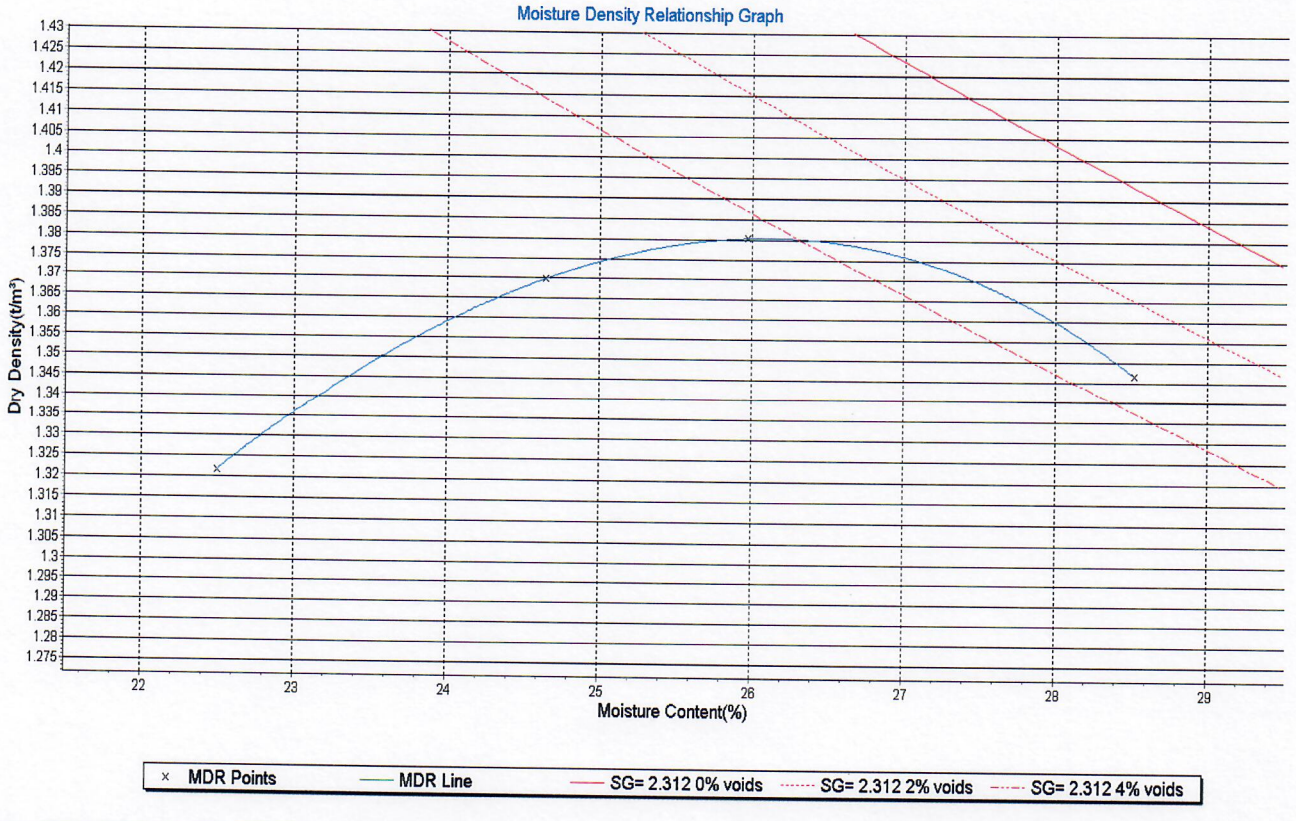
Email cairns@soilengineeringservices.com
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Moisture Density Relationship Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 1/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**18/12/2017**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.5.1.1**
Location:	**Wonga Beach**	**Page 2 of 3**	

		SAMPLE LOCATION
Sample Number :	C/7652	Settlement Pond 2
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4	Bund Wall
Sampled By :	Shaun Hansen	PHYS#2
Date Sampled :	7/12/2017	-0.3m
Date Tested :	13/12/2017	Test Number :
Material Type :	Existing Material	Lot Number :
Material Source :	Existing Material	Moisture Method : AS1289.2.1.1
Remarks :		

Maximum Size (mm) :	19.0	**Maximum Dry Density (t/m³) :**	**1.38**
Oversize Dry (%) :		**Optimum Moisture Content (%) :**	**26**
Oversize Density (t/m³) :			



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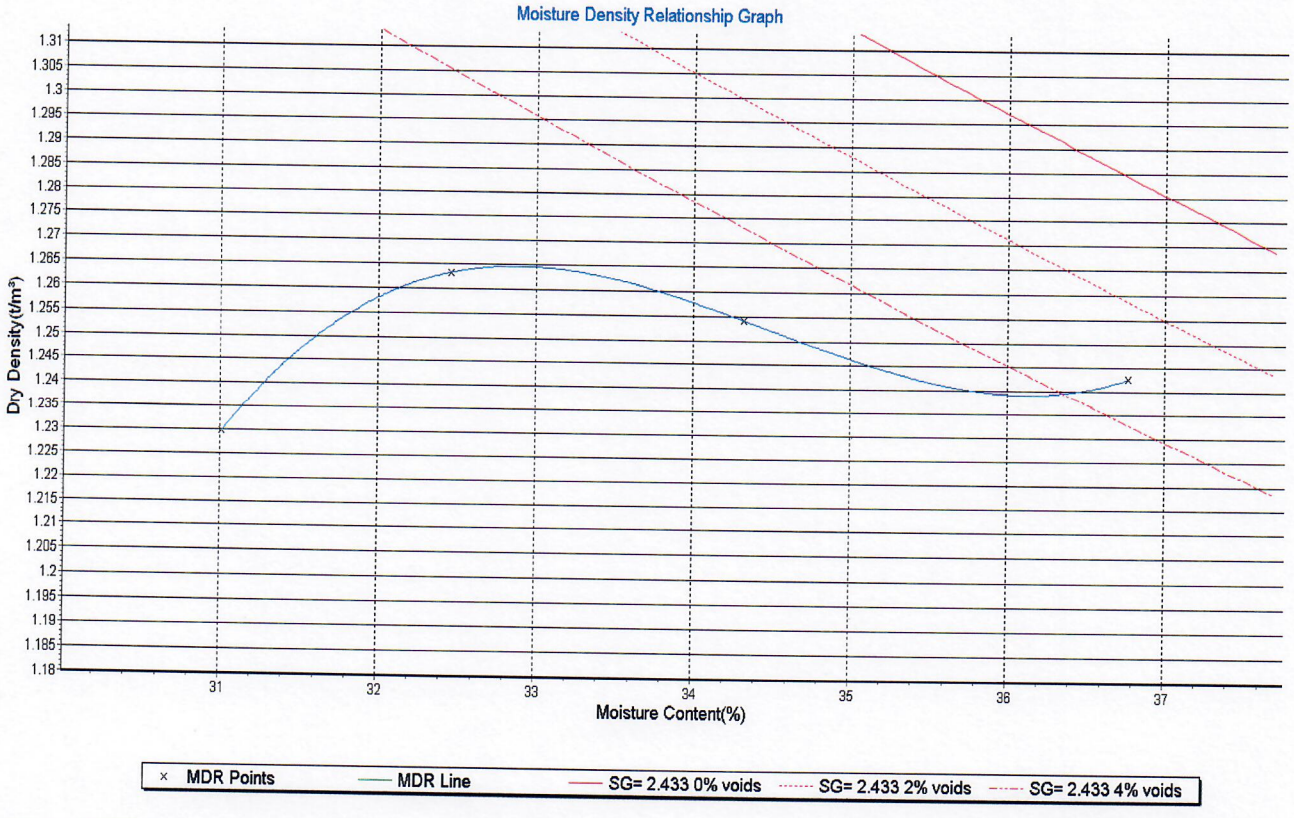
ABN 34 149 057 182
Accreditation public testing facility #19463

Moisture Density Relationship Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 1/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**18/12/2017**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.5.1.1**
Location:	**Wonga Beach**	**Page 3 of 3**	

Sample Number :	C/7653	SAMPLE LOCATION	
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4	Settlement Pond 2	
Sampled By :	Shaun Hansen	Floor Of Pond	
Date Sampled :	7/12/2017	PHYS#3	
Date Tested :	13/12/2017	Test Number :	
Material Type :	Existing Material	Lot Number :	
Material Source :	Existing Material	Moisture Method :	AS1289.2.1.1
Remarks :			

Maximum Size (mm) :	19.0	**Maximum Dry Density (t/m³) :**	**1.26**
Oversize Dry (%) :		**Optimum Moisture Content (%) :**	**33**
Oversize Density (t/m³) :			



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NATA Accreditation Number
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Document Code RF124-7

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SOIL AGGREGATE & CONCRETE TESTING

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Phone 07 4053 6840 **Fax** 07 4053 6746
Email cairns@soilengineeringservices.com
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Quality of Materials Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 2/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**10/01/2018**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.3.6.1**
Location:	**Wonga Beach**		**Page 1 of 3**

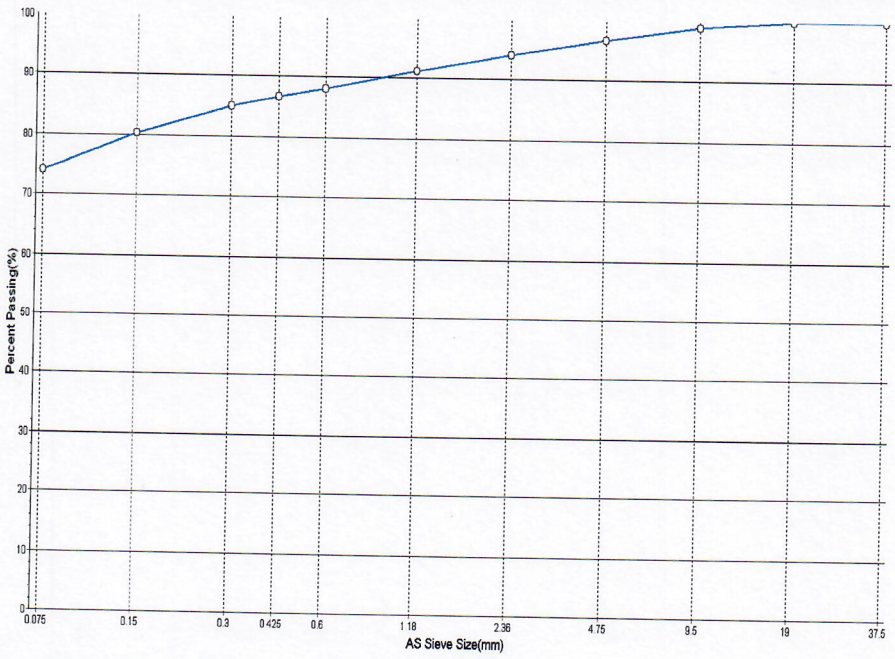
Sample Number :	C/7651
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4
Sampled By :	Shaun Hansen
Date Sampled :	7/12/2017
Date Tested :	13/12/2017
Material Type :	Existing Material
Material Source :	Existing Material
Remarks :	

SAMPLE LOCATION

Settlement Pond 3
Bund Wall
PHYS#1
-0.3m

Test Number :	
Lot Number :	
Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75.0		
63.0		
53.0		
37.5	**100**	
26.5		
19.0	**100**	
16.0		
13.2		
9.5	**99**	
6.7		
4.75	**97**	
2.36	**94**	
1.18	**91**	
0.600	**88**	
0.425	**87**	
0.300	**85**	
0.150	**80**	
0.075	**74**	



	Test Method	Results		
Liquid Limit (%) :	**AS1289.3.1.2, 3.2.1, 3.3.1 & 3.4.1**	**44**	Shrinkage Comments :	**No Defects**
Plastic Limit (%) :		**34**	Mould Length (mm) :	**150.2**
Plasticity Index (%) :		**10**	Sample History	**Oven Dried**
Linear Shrinkage (%) :		**5.5**	Sample Preperation:	**Oven Dried**
Soil Description :				

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APPROVED SIGNATORY

SHansen

Shaun Hansen - Laboratory Manager
NATA Accreditation Number
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SOIL AGGREGATE & CONCRETE TESTING

Soil Engineering Services
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Phone 07 4053 6840 **Fax** 07 4053 6746
Email cairns@soilengineeringservices.com
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Quality of Materials Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 2/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**10/01/2018**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.3.6.1**
Location:	**Wonga Beach**	**Page 2 of 3**	

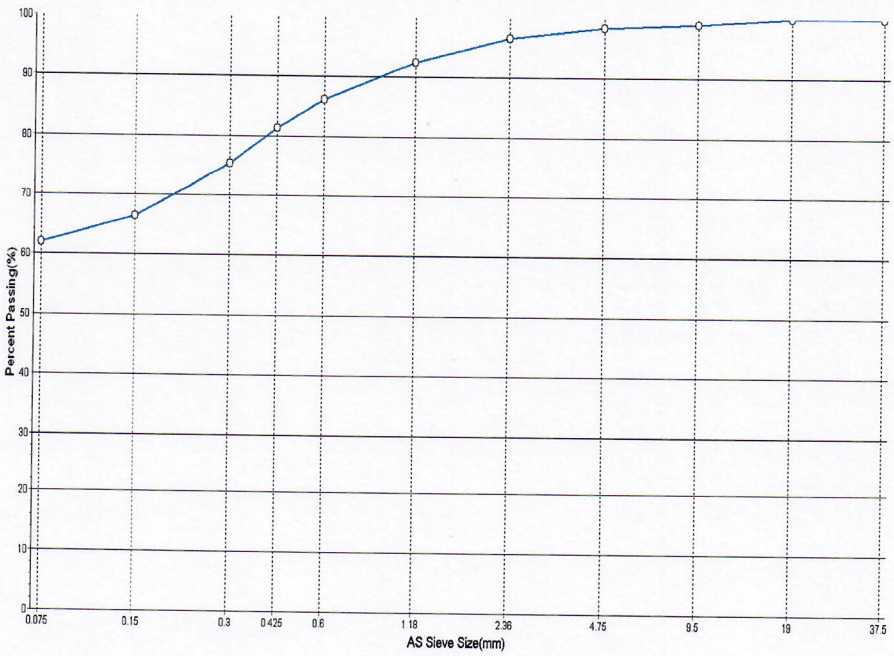
Sample Number :	C/7652
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4
Sampled By :	Shaun Hansen
Date Sampled :	7/12/2017
Date Tested :	13/12/2017
Material Type :	Existing Material
Material Source :	Existing Material
Remarks :	

SAMPLE LOCATION

Settlement Pond 2
Bund Wall
PHYS#2
-0.3m

Test Number :	
Lot Number :	
Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75.0		
63.0		
53.0		
37.5	**100**	
26.5		
19.0	**100**	
16.0		
13.2		
9.5	**99**	
6.7		
4.75	**98**	
2.36	**97**	
1.18	**92**	
0.600	**86**	
0.425	**81**	
0.300	**75**	
0.150	**66**	
0.075	**62**	



		Test Method	Results		
Liquid Limit (%) :		**AS1289.3.1.2, 3.2.1, 3.3.1 & 3.4.1**	**36**	Shrinkage Comments :	**Slight Curling Occured**
Plastic Limit (%) :			**28**	Mould Length (mm) :	**150.0**
Plasticity Index (%) :			**8**	Sample History	**Oven Dried**
Linear Shrinkage (%) :			**4.5**	Sample Preperation:	**Oven Dried**
Soil Description :					

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6/170-182 Mayers St, Manunda Qld 4870
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Phone 07 4053 6840 **Fax** 07 4053 6746
Email cairns@soilengineeringservices.com
www.soilengineeringservices.com
ABN 34 149 057 182
Accreditation public testing facility #19463

Quality of Materials Report

Client :	**Eco Sustainability**	Report Number:	**CNS379 - 2/1**
Address :	**PO Box 230, Yorkeys Knob, QLD, 4878**	Report Date :	**10/01/2018**
Project Name :	**Daintree Saltwater Barramundi Farms PTY LTD**	Order Number :	
Project Number :	**CNS379**	Test Method :	**AS1289.3.6.1**
Location:	**Wonga Beach**	**Page 3 of 3**	

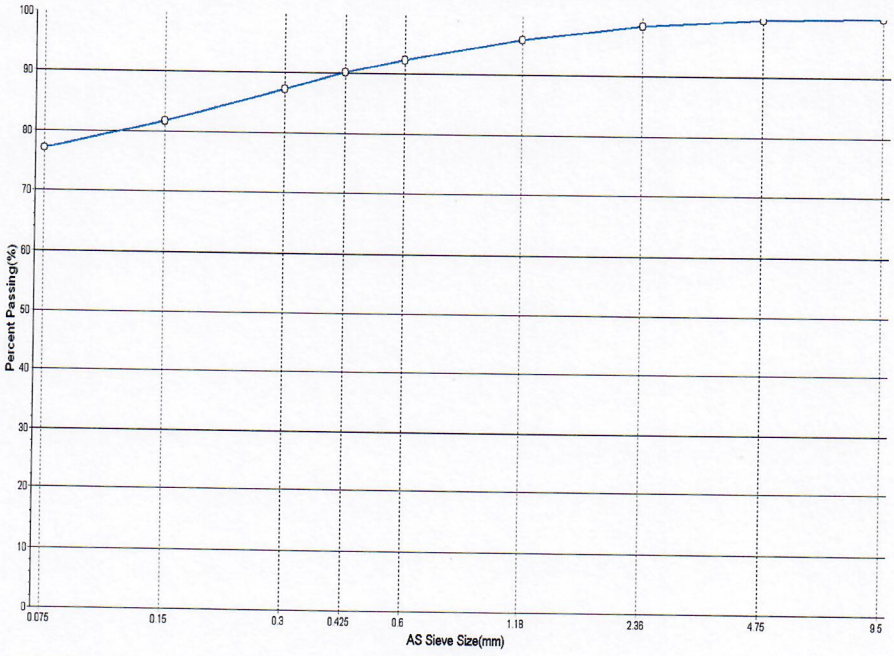
Sample Number :	C/7653
Sampling Method :	AS1289.1.2.1 - Clause 6.5.4
Sampled By :	Shaun Hansen
Date Sampled :	7/12/2017
Date Tested :	18/12/2017
Material Type :	Existing Material
Material Source :	Existing Material
Remarks :	

SAMPLE LOCATION

Settlement Pond 2
Floor Of Pond
PHYS#3

Test Number :	
Lot Number :	
Specification Number :	

AS Sieve Size(mm)	Percent Passing	Specification Limits
100		
75.0		
63.0		
53.0		
37.5		
26.5		
19.0		
16.0		
13.2		
9.5	**100**	
6.7		
4.75	**100**	
2.36	**98**	
1.18	**96**	
0.600	**92**	
0.425	**90**	
0.300	**87**	
0.150	**82**	
0.075	**77**	



		Test Method	Results		
Liquid Limit (%) :		**AS1289.3.1.2, 3.2.1, 3.3.1 & 3.4.1**	**41**	Shrinkage Comments :	**Slight Curling Occured**
Plastic Limit (%) :			**30**	Mould Length (mm) :	**150.1**
Plasticity Index (%) :			**11**	Sample History	**Oven Dried**
Linear Shrinkage (%) :			**4.5**	Sample Preperation:	**Oven Dried**
Soil Description :					

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Shaun Hansen - Laboratory Manager
NATA Accreditation Number
19463

Document Code RF145-22

APPENDIX C
RESULTS OF PERMEABILITY TESTING

Trilab
Soil Rock Calibration

Brisbane
346A Bilsen Road,
Geebung
QLD 4034
Ph: +61 7 3265 5656

Perth
2 Kimmer Place,
Queens Park
WA 6107
Ph: +61 8 9258 8323

PERMEABILITY BY FALLING HEAD TEST REPORT

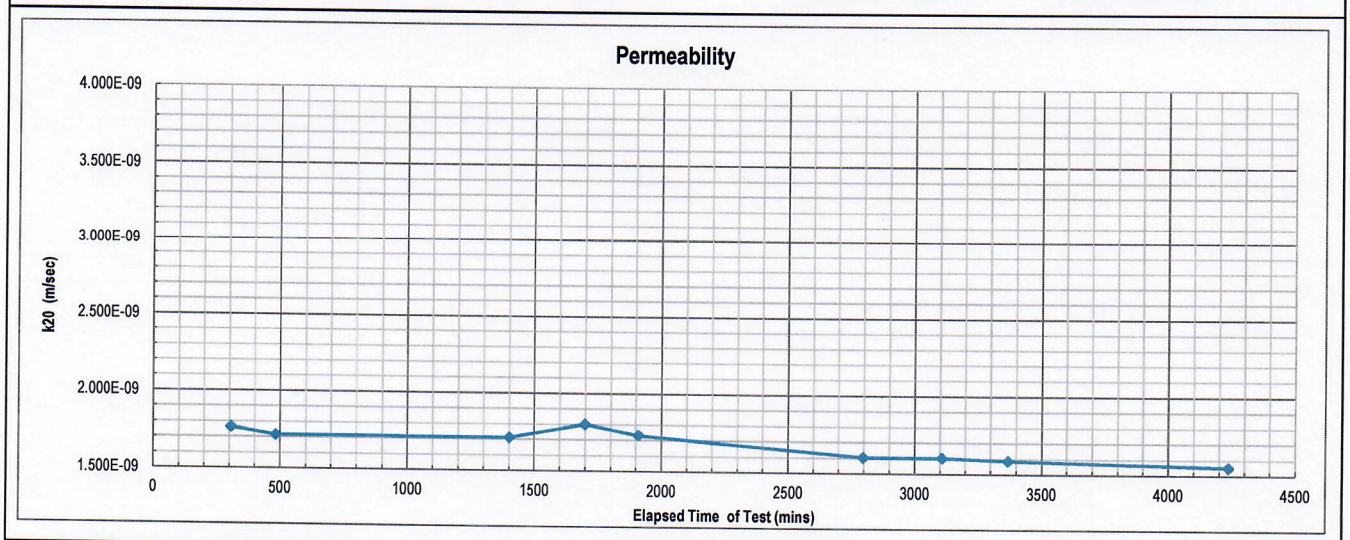
Test Method AS 1289 6.7.2, 5.1.1 , KH2 (Based on K H Head (1988) Manual of Laboratory Testing,10.7)

Client	Soil Engineering Services	**Report No.**	17120607-FHPT
		Workorder No.	0003628
Address	PO Box 7760 GARBUTT QLD 4814	**Test Date**	21/12/2017
		Report Date	9/01/2018
Project	CNS379 - Daintree Saltwater Barramundi Farm, Wonga Beach		
Client ID	C/7651 - PHYS#1 Settlement Pond 1 - Bund Wall - Location: -0.3m	**Depth (m)**	Not Supplied
Description	SILTY CLAY- brown	**Sample Type**	Remoulded Soil Specimen

RESULTS OF TESTING

Compaction Method	**AS1289.5.1.1 - Standard Compaction**		
Maximum Dry Density (t/m^3)	**1.10**	Hydraulic Gradient	**9.4**
Optimum Moisture Content (%)	**36.5**	Surcharge (kPa)	**3.0**
Placement Moisture Content (%)	**36.7**	Head Pressure Applied (kPa)	**10.79**
Moisture Ratio (%)	**100.6**	Water Type	**35900ppm Salt Water**
Placement Wet Density (t/m^3)	**1.50**	Percentage Material Retained/Sieve Size (mm)	**0 % /9.5 mm**
Density Ratio (%)	**99.6**		

PERMEABILITY $k_{(20)}$ = **1.5×10^{-09} (m/sec)**



Remarks: The above specimen was remoulded to a target of 100% of Standard Maximum Dry Density and at Optimum Moisture Content.

Sample/s supplied by client: The compaction data was supplied by the client.

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

Tested at Trilab Brisbane Laboratory.

Authorised Signatory
C. Channon

NATA ACCREDITED FOR TECHNICAL COMPETENCE
Laboratory No. 9926

The results of calibrations and tests performed apply only to the specific instrument or sample at the time of test unless otherwise clearly stated.
Reference should be made to Trilab's "Standard Terms and Conditions of Business" for further details.
Trilab Pty Ltd ABN 25 065 630 506

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING

Trilab
Soil Rock Calibration

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346A Bilsen Road,
Geebung
QLD 4034
Ph: +61 7 3265 5656

Perth
2 Kimmer Place,
Queens Park
WA 6107
Ph: +61 8 9258 8323

PERMEABILITY BY FALLING HEAD TEST REPORT

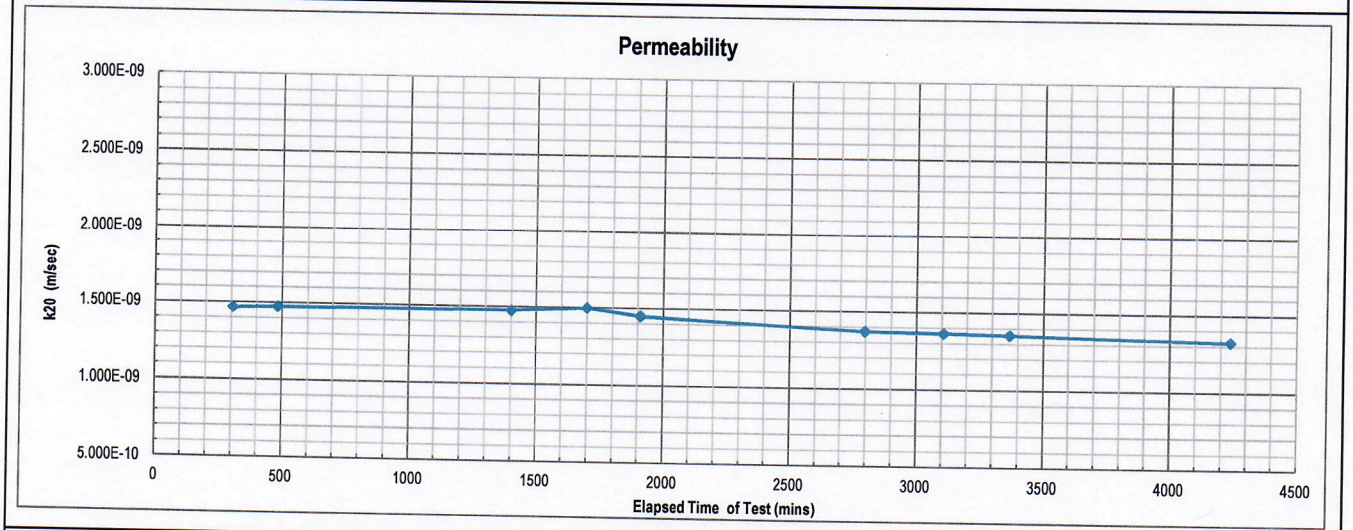
Test Method AS 1289 6.7.2, 5.1.1 , KH2 (Based on K H Head (1988) Manual of Laboratory Testing,10.7)

Client	Soil Engineering Services	**Report No.**	17120608-FHPT
		Workorder No.	0003628
Address	PO Box 7760 GARBUTT QLD 4814	**Test Date**	21/12/2017
		Report Date	5/01/2018
Project	CNS379 - Daintree Saltwater Barramundi Farm, Wonga Beach		
Client ID	C/7652 - PHYS#2 Settlement Pond 2 - Bund Wall - Location: -0.3m	**Depth (m)**	Not Supplied
Description	SILTY CLAY - brown	**Sample Type**	Remoulded Soil Specimen

RESULTS OF TESTING

Compaction Method	**AS1289.5.1.1 - Standard Compaction**		
Maximum Dry Density (t/m^3)	**1.38**	Hydraulic Gradient	**9.5**
Optimum Moisture Content (%)	**26.0**	Surcharge (kPa)	**3.0**
Placement Moisture Content (%)	**26.4**	Head Pressure Applied (kPa)	**10.79**
Moisture Ratio (%)	**101.5**	Water Type	**35900ppm Salt Water**
Placement Wet Density (t/m^3)	**1.74**	Percentage Material Retained/Sieve Size (mm)	**0 % /9.5 mm**
Density Ratio (%)	**99.9**		

PERMEABILITY $k_{(20)}$ = **1.3×10^{-09} (m/sec)**



Remarks: The above specimen was remoulded to a target of 100% of Standard Maximum Dry Density and at Optimum Moisture Content.

Sample/s supplied by client The compaction data was supplied by the client.

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

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Authorised Signatory

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Trilab
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Perth
2 Kimmer Place,
Queens Park
WA 6107
Ph: +61 8 9258 8323

PERMEABILITY BY FALLING HEAD TEST REPORT

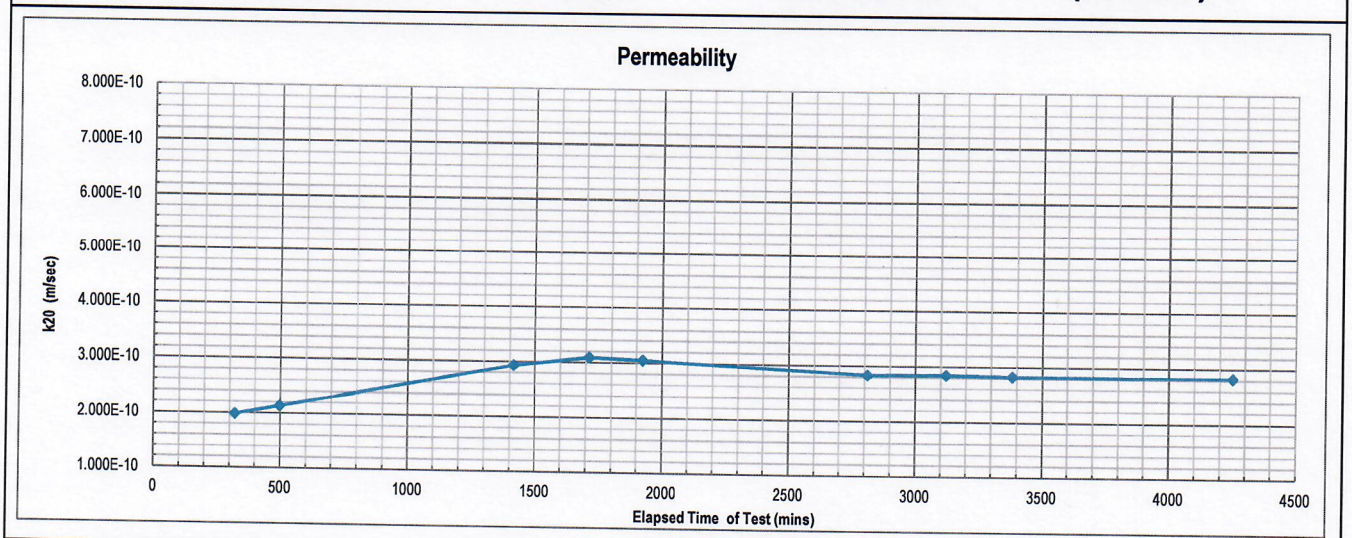
Test Method AS 1289 6.7.2, 5.1.1 , KH2 (Based on K H Head (1988) Manual of Laboratory Testing,10.7)

Client	Soil Engineering Services	**Report No.**	17120609-FHPT
		Workorder No.	0003628
Address	PO Box 7760 GARBUTT QLD 4814	**Test Date**	21/12/2017
		Report Date	5/01/2018
Project	CNS379 - Daintree Saltwater Barramundi Farm, Wonga Beach		
Client ID	C/7653 - PHYS#2 Settlement Pond 2 - Pond Floor	**Depth (m)**	Not Supplied
Description	CLAY - brown	**Sample Type**	Remoulded Soil Specimen

RESULTS OF TESTING

Compaction Method	**AS1289.5.1.1 - Standard Compaction**		
Maximum Dry Density (t/m^3)	**1.26**	Hydraulic Gradient	**9.4**
Optimum Moisture Content (%)	**33.0**	Surcharge (kPa)	**3.0**
Placement Moisture Content (%)	**32.3**	Head Pressure Applied (kPa)	**10.79**
Moisture Ratio (%)	**98.0**	Water Type	**35900ppm Salt Water**
Placement Wet Density (t/m^3)	**1.68**	Percentage Material Retained/Sieve Size (mm)	**0 % /9.5 mm**
Density Ratio (%)	**100.5**		

PERMEABILITY $k_{(20)}$ = **2.8×10^{-10}** **(m/sec)**



Remarks: The above specimen was remoulded to a target of 100% of Standard Maximum Dry Density and at Optimum Moisture Content.

Sample/s supplied by client The compaction data was supplied by the client.

Accredited for compliance with ISO/IEC 17025 - Testing.
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Tested at Trilab Brisbane Laboratory.

Authorised Signatory

C. Channon

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Laboratory No. 9926

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ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING

APPENDIX D

RESULTS OF ACID SULPHATE SOIL TESTING

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Shaun Hansen
Client	SOIL ENGINEERING SERVICE
Address	PO BOX 7760 GARBUTT QLD 4814
Telephone	0427 994 652
Facsimile	61 7 4774 7677
Email	shaun@soilengineeringservices.com
Project	**Daintree saltwater Barramundi**
Order Number	**CNS379**
Samples	6

LABORATORY DETAILS

Manager	Jon Dicker
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE130800 R0**
Date Received	12 Dec 2017
Date Reported	15 Dec 2017

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146).

SIGNATORIES

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Operations Manager

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Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	CE130800.001 Soil 07 Dec 2017 C/7650	CE130800.002 Soil 07 Dec 2017 C/7654	CE130800.003 Soil 07 Dec 2017 C/7655	CE130800.004 Soil 07 Dec 2017 C/7656
Moisture Content Method: AN002 Tested: 12/12/2017							
% Moisture	%w/w	0.5		25	57	48	32
TAA (Titratable Actual Acidity) Method: AN219 Tested: 13/12/2017							
pH KCl	pH Units	-		6.7	6.0	5.9	5.6
Titratable Actual Acidity	kg H2SO4/T	0.25		<0.25	0.86	0.49	0.49
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5		<5	17	10	10
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01		<0.01	0.03	0.02	0.02
Sulphur (SKCl)	%w/w	0.005		0.029	0.037	0.031	0.040
Calcium (CaKCl)	%w/w	0.005		0.025	0.15	0.10	0.056
Magnesium (MgKCl)	%w/w	0.005		0.025	0.30	0.19	0.10
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 13/12/2017							
Peroxide pH (pH Ox)	pH Units	-		4.5	1.9	2.1	2.1
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25		0.61	44	27	12
TPA as moles H+/tonne	moles H+/T	5		12	898	554	240
TPA as S % W/W	%w/w S	0.01		0.02	1.44	0.89	0.38
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5		12	881	544	230
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25		0.61	43	27	11
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01		0.02	1.41	0.87	0.37
ANCE as % $CaCO_3$	% CaCO3	0.01		<0.01	<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5		<5	<5	<5	<5
ANCE as S % W/W	%w/w S	0.01		<0.01	<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005		0.10	1.6	0.92	0.40
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5		62	994	574	252
Sulphur (Sp)	%w/w	0.005		0.13	1.6	0.95	0.44
Calcium (Cap)	%w/w	0.005		0.038	0.20	0.13	0.059
Reacted Calcium (CaA)	%w/w	0.005		0.014	0.056	0.023	<0.005
Reacted Calcium (CaA)	moles H+/T	5		7	28	11	<5
Magnesium (Mgp)	%w/w	0.005		0.037	0.33	0.19	0.090
Reacted Magnesium (MgA)	%w/w	0.005		0.012	0.033	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5		10	27	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005		-	-	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5		-	-	-	-
SPOCAS Net Acidity Calculations Method: AN220 Tested: 15/12/2017							
s-Net Acidity	%w/w S	0.01		0.10	1.6	0.94	0.42
a-Net Acidity	moles H+/T	5		62	1000	580	260
Liming Rate	kg CaCO3/T	0.1		4.7	76	44	20
Verification s-Net Acidity	%w/w S	-20		0.03	0.53	0.31	0.13
a-Net Acidity without ANCE	moles H+/T	5		62	1000	580	260
Liming Rate without ANCE	kg CaCO3/T	0.1		4.7	76	44	20

Parameter	Units	LOR	Sample Number: CE130800.005 Sample Matrix: Soil Sample Date: 07 Dec 2017 Sample Name: C/7657	Sample Number: CE130800.006 Sample Matrix: Soil Sample Date: 07 Dec 2017 Sample Name: C/7658
Moisture Content Method: AN002 Tested: 12/12/2017				
% Moisture	%w/w	0.5	**48**	**34**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 13/12/2017				
pH KCl	pH Units	-	**5.9**	**6.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**0.86**	<0.25
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**17**	<5
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.03**	<0.01
Sulphur (SKCl)	%w/w	0.005	**0.034**	**0.060**
Calcium (CaKCl)	%w/w	0.005	**0.092**	**0.068**
Magnesium (MgKCl)	%w/w	0.005	**0.17**	**0.12**
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 13/12/2017				
Peroxide pH (pH Ox)	pH Units	-	**1.9**	**2.3**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**29**	**21**
TPA as moles H+/tonne	moles H+/T	5	**599**	**422**
TPA as S % W/W	%w/w S	0.01	**0.96**	**0.68**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**581**	**418**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**29**	**21**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.93**	**0.67**
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	**0.94**	**0.60**
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	**588**	**375**
Sulphur (Sp)	%w/w	0.005	**0.98**	**0.66**
Calcium (Cap)	%w/w	0.005	**0.11**	**0.075**
Reacted Calcium (CaA)	%w/w	0.005	**0.020**	**0.008**
Reacted Calcium (CaA)	moles H+/T	5	**10**	<5
Magnesium (Mgp)	%w/w	0.005	**0.18**	**0.12**
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	-
SPOCAS Net Acidity Calculations Method: AN220 Tested: 15/12/2017				
s-Net Acidity	%w/w S	0.01	**0.97**	**0.61**
a-Net Acidity	moles H+/T	5	**610**	**380**
Liming Rate	kg CaCO3/T	0.1	**45**	**28**
Verification s-Net Acidity	%w/w S	-20	**0.31**	**0.20**
a-Net Acidity without ANCE	moles H+/T	5	**610**	**380**
Liming Rate without ANCE	kg CaCO3/T	0.1	**45**	**28**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

TAA (Titratable Actual Acidity) **Method: ME-(AU)-[ENV]AN219**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB051817	pH Units	-	5.9	1%	98%
Titratable Actual Acidity	LB051817	kg H2SO4/T	0.25	<0.25	0%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB051817	moles H+/T	5	<5	0%	92%
Titratable Actual Acidity (TAA) S%w/w	LB051817	%w/w S	0.01	<0.01	0%	92%
Sulphur (SKCl)	LB051817	%w/w	0.005	<0.005	2%	90%
Calcium (CaKCl)	LB051817	%w/w	0.005	<0.005	7%	103%
Magnesium (MgKCl)	LB051817	%w/w	0.005	<0.005	8%	99%

TPA (Titratable Peroxide Acidity) **Method: ME-(AU)-[ENV]AN218**

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
Peroxide pH (pH Ox)	LB051816	pH Units	-	0%	100%
TPA as kg H_2SO_4/tonne	LB051816	kg H2SO4/T	0.25	0%	102%
TPA as moles H+/tonne	LB051816	moles H+/T	5	0%	102%
TPA as S % W/W	LB051816	%w/w S	0.01	0%	102%
ANCE as % $CaCO_3$	LB051816	% CaCO3	0.01	0%	
ANCE as moles H+/tonne	LB051816	moles H+/T	5	0%	
ANCE as S % W/W	LB051816	%w/w S	0.01	0%	
Sulphur (Sp)	LB051816	%w/w	0.005	6%	95%
Calcium (Cap)	LB051816	%w/w	0.005	2%	111%
Magnesium (Mgp)	LB051816	%w/w	0.005	7%	103%

METHOD SUMMARY

CE130800 R0

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN218	Soil samples are subjected to extreme oxidising conditions using hydrogen peroxide. Continuous application of heat and peroxide ensure all sulfide is converted to sulfuric acid. Excess peroxide is broken down by a copper catalyst prior to titration for acidity. Calcium, magnesium, and sulfur are determined by ICP-OES. Also included is a carbonate modification step which, depending on pH after the initial oxidation, gives a measure of ANC.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	SPOCAS Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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APPENDIX E
LIMITATIONS

LIMITATIONS

SCOPE OF SERVICES

This geotechnical report (the report) has been prepared in accordance with the scope of services set out in the agreement between PGI and Daintree Saltwater Barramundi Farms Pty. Ltd. and is subject to any qualifications, assumptions and litigations set out in the report. In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

In preparing the report, PGI has relied upon data, surveys, and plans provided by the client. Except as otherwise stated in the report, PGI has not verified the accuracy or completeness of the data, to the extent that the any statements, opinions, facts, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. PGI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have not been fully disclosed to PGI.

GEOTECHNICAL INVESTIGATION

Geotechnical engineering reports are prepared to meet the specific scope of the client and may not necessarily be adequate for a construction contractor. This report was prepared expressly for the client and expressly for purposes indicated by the client or his representative. Use by any other persons for any purpose, or by the client for a different purpose, might result in problems. The client should not use this report for other than its intended purpose without seeking additional geotechnical advice.

LIMITATIONS OF SITE INVESTIGATION

In making an assessment of a structure from a single borehole there is the possibility that variations may occur that were not encountered. Site exploration identifies specific subsurface conditions only at those points from which samples have been taken. The risk that variations will not be detected can be reduced by increasing the frequency of test locations; however this often does not result in any overall cost savings for the project. The data derived from the investigation and subsequent laboratory testing have been extrapolated to form an inferred model and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the structure. Actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The borehole records are the subjective interpretation of subsurface conditions at a particular location, made by trained personnel. The interpretation may be limited by the method of investigation, and cannot always be definitive. For example, inspection of an excavation or test pit allows a greater area of the subsurface profile to be inspected than borehole investigation; however, such methods are limited by depth and site disturbance restrictions. In borehole investigation, the actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions may be modified by changing natural forces or man-made influences. A geotechnical engineering report is based on conditions which existed at the time of subsurface exploration.

Construction operations, at or adjacent to the site, and natural events, such as floods or groundwater fluctuations may also affect subsurface conditions and thus the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept appraised of any such events, and should be consulted to determine if additional tests are necessary.

EXPLORATORY LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final exploratory logs are developed by geotechnical engineers based upon their interpretation of field logs and laboratory evaluation of field samples. Customarily, only the final exploratory logs are included in geotechnical engineering reports. These logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings. To minimise the likelihood of exploratory log misinterpretation, contractors should be given access to the complete geotechnical engineering report prepared or authorised for their use. Providing the best available information to contractors helps prevent costly construction problems. For further information on this matter reference should be made to 'Guidelines for the Provision of Geotechnical Information in Construction Contracts' published by the Institution of Engineers Australia, National Headquarters, Canberra 1987.

OTHER LIMITATIONS

PGI will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

Appendix 7A

2017 Marine Plant and Fisheries Values Assessment

Daintree Salt Water Barramundi

Marine Plant and Fisheries Values Assessment

August 2017

environment PACIFIC

The services provided by Environment Pacific for Daintree Saltwater Barramundi are limited to those identified in this report. This report may only be used and relied on by Daintree Saltwater Barramundi for the purpose agreed between Environment Pacific and Daintree Saltwater Barramundi as set out in section 1. Environment Pacific also excludes implied warranties and conditions, to the extent legally possible. The opinions, conclusions and recommendations are based on conditions encountered and information reviewed at the date of this report. Environment Pacific has no responsibility or obligation to update this report to account for events or changes occurring since this time.

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2017 Marine Plant and Fisheries Values Assessment Report

Document Status

Rev	Author	Signature	Reviewer	Signature	Date
A	A Small		K Keane		08/08/2017
B					

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1. Introduction

1.1 Background

Daintree Saltwater Barramundi are proposing to expand their operations at Vixies Road, Wonga Beach, approximately 17km north of the town of Mossman. The proposed expansion will require reconfiguration of a number of existing settlement ponds of which two, settlement 3 and settlement pond 4, are currently not in production use (see Figure 1).

Both of these settlement ponds have had limited development in recent years, with the most significant being a historical bund built across settlement pond 4 to exclude tidal flows from entering the southern section of this settlement pond. Breaches in the bund wall have allowed increased tidal ingress in recent years, and settlement pond 4 is in the active process of reinstatement of mangrove communities as tidal influences result in changes in the regrowth communities (both freshwater and marine) and thus approaching a more typical upper estuarine system as represented on the other side of the bund.

Conversely with changes in drainage regimes, settlement pond 3 has been increasingly isolated from tidal influences, and now is dominated by halophytic species that are in the process of being displaced by vegetation communities and species requiring significant freshwater inputs.

Daintree Salt Water Barramundi are proposing to reconfigure settlement pond 3 to enable expansion of their aquaculture venture. This will require removal of the arrested successional phase marine vegetation and recruiting freshwater vegetation. Daintree Salt Water Barramundi are proposing that settlement pond 4, adjacent to the complex mangrove communities of South Arm Creek, be allowed to continue to recruit to a natural state commensurate with the preclearing status of that locality.

1.2 Scope of this Report

As part of the development approval process, supporting information on the existing vegetation, and contribution of this vegetation to fisheries values is required. Environment Pacific were commissioned to undertake surveys for settlement ponds 2, 3, and 4, with the surveys for settlement pond 4 demarcated by a previously constructed bund wall, i.e. settlement pond 4 surveyed individually on either side of the bund.

This report includes:

- Identification and general demarcation of the vegetation communities as identified in the field.
- Presents general findings on the presence of marine species, community composition, abundance and structure/zonation.
- Identifies fisheries habitat values (via condition assessment) of settlement pond 4 (both sides of the bund) and settlement pond 3 where field surveys identified marine plants and/or marine affected environments.
- Identifies rehabilitation opportunities, noting particularly species likely to naturally colonise post disturbance and recommendations on species for active revegetation and revegetation approaches.

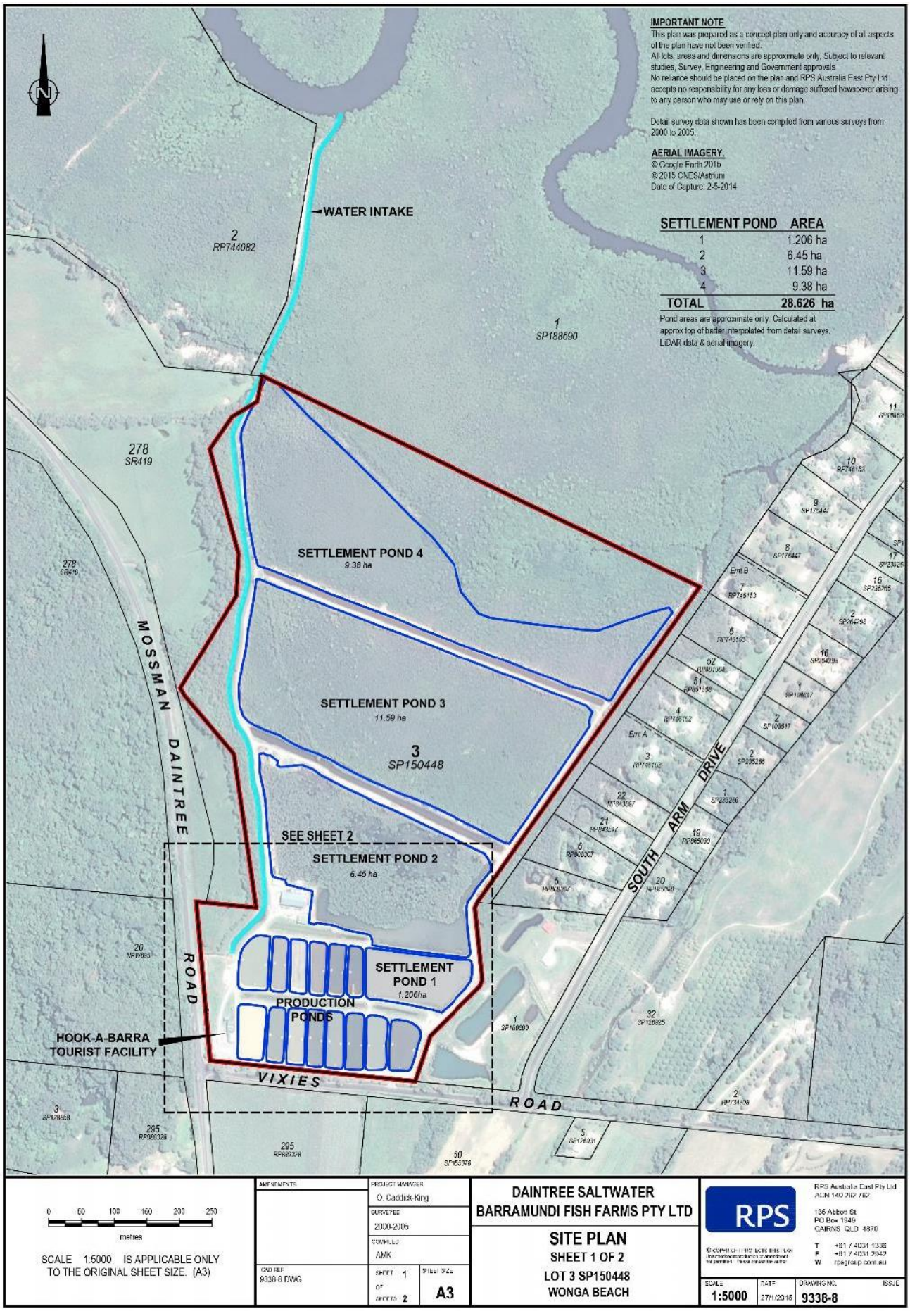


Figure 1 Layout and location of settlement pond survey area

2. Methodology

2.1 Vegetation Communities

Vegetation communities across the settlement ponds varied between freshwater wetlands, terrestrial successional vegetation and dense intertidal mangrove complexes. Surveys were also complicated by the known presence of saltwater crocodiles in the area, with subsequent attention being paid to safety issues with regard to practicality of surveys in more remote areas, notable around South Arm Creek. Subsequently a combination of methodologies were used to investigate the vegetation of the settlement ponds.

In the first instance a unmanned aerial vehicle (UAV – drone) equipped with a high resolution camera was used to obtain real time information on general community zonation and areas of interest across the settlement ponds. This information was processed in the field to identify specific areas for sampling to verify the vegetation patterns observed from the aerial imagery. The most effective methodology was to undertake variable wandering transects across the vegetation zones and collect information on vegetation community floristic composition, species abundance, and any general observations on edaphic factors, e.g. drainage and tidal aspects, that may have an impact on the community traversed.

2.2 Fisheries Assessment

There are numerous quantitative approaches relevant to the assessment of mangrove communities with respect to assessing their productivity and their contribution to fisheries values. The majority of these are based on long term monitoring of community dynamics and interactions and are unsuitable to providing a rapid assessment from a single day of observation Given this, a number of approaches have been developed that provide surrogate measures for estimating (qualitatively) mangrove productivity and fisheries values. For this survey these approaches employed:

- An assessment of the sesarmid crab activity (and crabs generally). The role and importance of sesarmid crabs in the nutrient cycling regime of mangroves is well documented (eg Micheli, 1993, Emmerson, & McGwynne 1992, Robertson 1986, Robertson et al 1989).
- Obvious indicators of mortality and stress on vegetation, including dieback, successional processes. In particular the initial drone aerial photographs identified significant areas of stress evidence by large areas of dieback being visible from the air. These were priority areas for site investigations.
- Other opportunistic observations, e.g. faunal guilds and utilisation of the settlement pond habitats, and edaphic factors related to salinity conditions, tidal ingress and freshwater inputs that impact on mangrove communities generally.

3. Vegetation and Marine Plant Communities

3.1 Summary

Settlement ponds 3 and 4 both illustrate clear examples of ongoing successional processes, albeit in opposite directs. Settlement pond 4 is characterised by previously established freshwater tolerant vegetation (e.g. *Melaleuca quinquenervia* freshwater wetlands) being rapidly displaced by more tidally dependent species. In particular the bund wall historically established to maintain a barrier between tidal areas and newly cleared areas has deteriorated to the position where daily tidal influxes are resulting in dieback of freshwater vegetation and the reinstatement of mangrove vegetation more typical of the original communities, i.e. those of the lower Daintree River tidal area.

Conversely, settlement pond 3 is displaying the opposite i.e. reverting from a mangrove/salt tolerant marine community to a non-tidal dependent community more typical of freshwater wetlands. Halophytic species such as *Excoecaria agallocha, Lumnitzera racemosa* and *Acrostichum speciosum* have historically been well established owing to the original saline conditions of the construction site. However this community can be considered to have been in an arrested state of succession as the lack of any tidal regime has not favoured further development of this community. *Lumnitzera racemosa* has died out in most areas, and Excoecaria agallocha remains the only dominant halophyte. Changes in edaphic site conditions over the last decade (notably drainage and salinity) have resulted in more freshwater reliant species becoming well established, and these appear to be rapidly recruiting. While though *E agallocha* and *A speciosum* remain locally abundant, their dominance is being challenged by the recruitment of *Melaleuca leucadendra* (in particular) and *Melaleuca quinquenervia* and *Melaleuca cajuputi* to a lesser extent. A characteristic of the changing soil conditions is illustrated by two key factors: 1) lack of faunal activity associated with tidal and intertidal areas (e.g. sesarmid crab activity), and 2) dominance of the ground stratum by sedges and grasses. The freshwater climbing fern, *Stenochlaena palustris*, was notable by its abundance, whereas elsewhere it was restricted to dieback areas of *Melaleuca quinquenervia,* where it also was in retreat as result of increasing salinity (settlement pond 4).

Settlement pond 2 is a freshwater system, with no obvious evidence of a tidal regime and comprised of species that are generally intolerant of tidal saline conditions. Typically this community is dominated by *Melaleuca cajuputi*, and most of the settlement pond is permanently inundated with freshwater with various areas of shallower water and/or areas regularly exposed, dominated by *Melaleuca quinquenervia*. Halophytic species persist: *Acrostichum speciosum* is present as isolated clumps with shallow water in the wetlands, but does not occur as a component of the various *Melaleuca* spp communities. *Excoecaria agallocha* is present as isolated individuals growing on the margins of the settlement pond but nowhere does it form a community.

3.2 Factors Influencing Composition and Distribution

3.2.1 Historical

In 1950 a new sugar mill for the Daintree area was advocated to be constructed in the lower Daintree River area to service proposed expansions of sugar cane assignments in the Wonga

Beach, lower Daintree, Forest Creek and Cape Kimberly districts (and ultimately Cow Bay, Cooper Creek, Noah Creek and Cape Tribulation further north). While the proposed mill never eventuated, a land selection ballot was undertaken of which the current Daintree Saltwater Barramundi property was a part. In accordance with the then existing Qld Lands Department ballot rules the land selection was to be cleared, either wholly or in part (but usually in excess of 90%), in order to facilitate the granting of a cane assignment. The Daintree Saltwater Barramundi Farm site was no exception, and clearing of the lot was undertaken in accordance with the conditions of the land selection ballot.

Subsequent to the clearing the land was found to be unsuitable for sugar cane, and grazing was undertaken until 1989 when an initial aquaculture operation was established. This operation was purchased and the area for aquaculture expanded between 2001 and 2003. Operational works undertaken following the initial ballot and up to and including 2003 included:

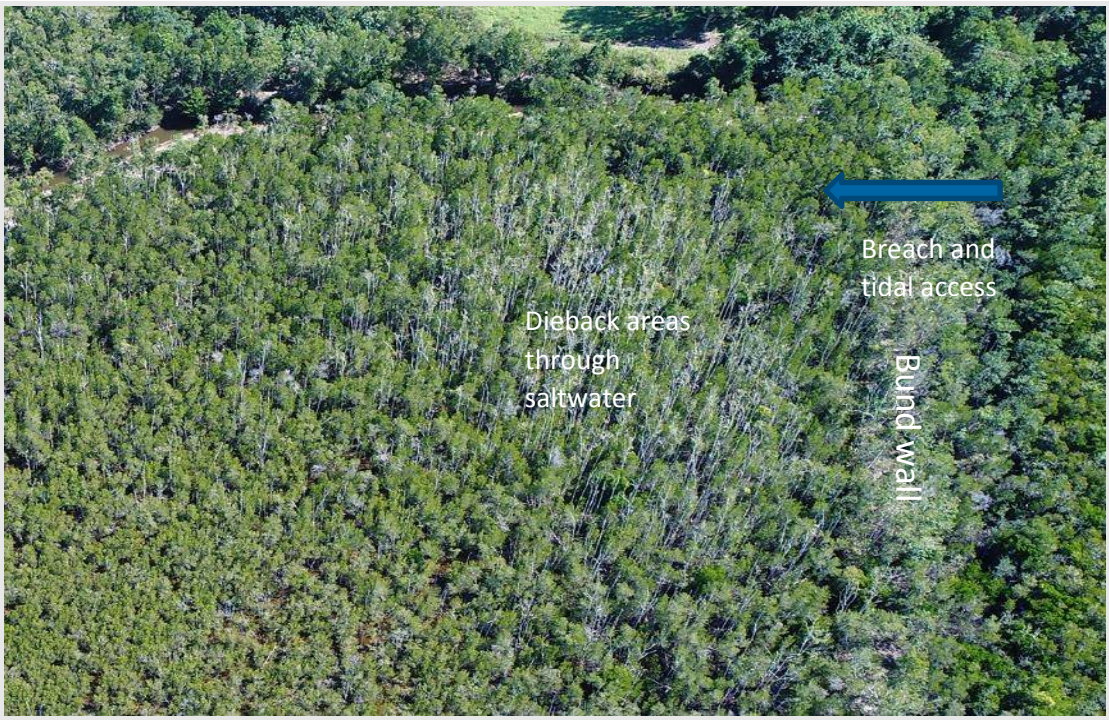
- Clearing of predominantly *Melaleuca* spp wetland complexes (with mangrove lined tidal drains).
- Construction of bund walls to demarcate tidal areas.
- Construction of settlement ponds.
- Realignment of natural tidal drainage lines.
- Construction of drains, internal roads and other supporting earthworks.

All of the above factors have influenced the vegetation species present, their distribution and abundance. The bund wall on the northern side of settlement pond 4 (closest to the Daintree River tidal complex) has not been maintained, and has been breached in a number of locations. The subsequent tidal water entering settlement pond four has had detrimental impacts on the regrowth *Melaleuca quinquenervia* communities in the north-west of settlement pond 4. This is evidenced by an area of approximately a hectare of *M quinquenervia* dieback. Breaches of the bund also occur regularly in the mid section of the bund and during the survey the incoming tide was observed to be overtopping the bund.

3.2.2 Successional Vegetation

Not all of the entirety of the land ballot selection was cleared: the northern section of settlement pond 4 was never cleared (roughly demarcated by the bund wall) being comprised entirely of complex mangrove systems and of no value as agricultural/grazing land. With the development of the fledging aquaculture business on the lot, the settlement ponds and associated infrastructure became increasingly sophisticated in terms of drainage and general site management. These sites have been graded, infilled, levelled and the top most soil horizon profiles present are not representative of the original edaphic site conditions. Subsequently the pattern of vegetation communities that have recruited into the unused settlement pond 3 and settlement pond 4 reflects these manipulated drainage and site conditions and does not reflect the generally observed and expected pattern of recruitment of wetland species following disturbance in the Wet Tropics.

Plate 1 *Melaleuca* dieback



Melaleuca quinquenervia dieback in north-west of settlement pond 4 in July 2017. Position of bund wall breach indicated. Standing white sticks are dead trees. No dieback is evidenced in aerial photos from 2013, so bund failure and tidal ingress on a daily basis has occurred only in the last 4 years (or less).

All of the vegetation observed in currently unused settlement ponds 3 and 4 constitutes successional vegetation ('regrowth') where the species composition, distribution and abundance is in response to highly modified local edaphic conditions of drainage (in particular), soil pH and soil salinity. This has generally resulted in relatively homogenous and simplistic succession over most of settlement ponds 3 and 4. Owing to the stable conditions maintained within both these ponds, succession appears to be arrested to this simple state. This has been confirmed through comparing the results of this survey with the observations made by FRC Environmental (July 2006) who made similar observations on the simplistic structure of the vegetation communities.

There are two exceptions, these being;

- the area of mangrove community north of the bund wall in settlement pond 4 that was not previously cleared, and retains a daily tidal connection with the Daintree River. This remains a complex mangrove community typical of the tidal reaches of the Daintree River, and
- the area of bund wall adjacent to the upper reach of South Arm Creek has been breached at some point approximately a decade ago, and a complex mangrove community now is present in this locality, sustained by daily tidal activity from South Arm Creek.

Settlement pond 2 was constructed within the original freshwater wetlands areas of the lot, taking advantage of relatively impervious clay soils to retain much of the freshwater wetlands characteristics of this location. While the species present in settlement pond 2 are generally all halophytic, there are no extensive areas of mangrove regrowth although individuals (not communities) are present.

3.3 Settlement Pond 4 and Bund Area

3.3.1 Settlement Pond 4

Settlement pond 4 occupies an area of approximately 16.5 ha, with a surveyed area of 9.38 ha being within the bunded section. The bunded section is discussed separately. Historically the surveyed area was cleared, and a bund wall created to separate the higher, less tidal influenced areas from the daily tidal influence of South Arm Creek. A road originally ran along the top of the bund wall, but has since fallen into disrepair and is now heavily vegetated. The bund wall itself has been breached in at least two areas, both areas leading to daily ingress of tidal water which has had a marked impact on localised successional process in settlement pond 4 in recent years (refer Plate 1 over). In the most obvious case the breach in the bund wall in the north west corner has resulted in a dramatic shift in salinity conditions which as resulted in dieback of the *Melaleuca quinquenervia* regrowth which had re-established following the initial clearing in this area.

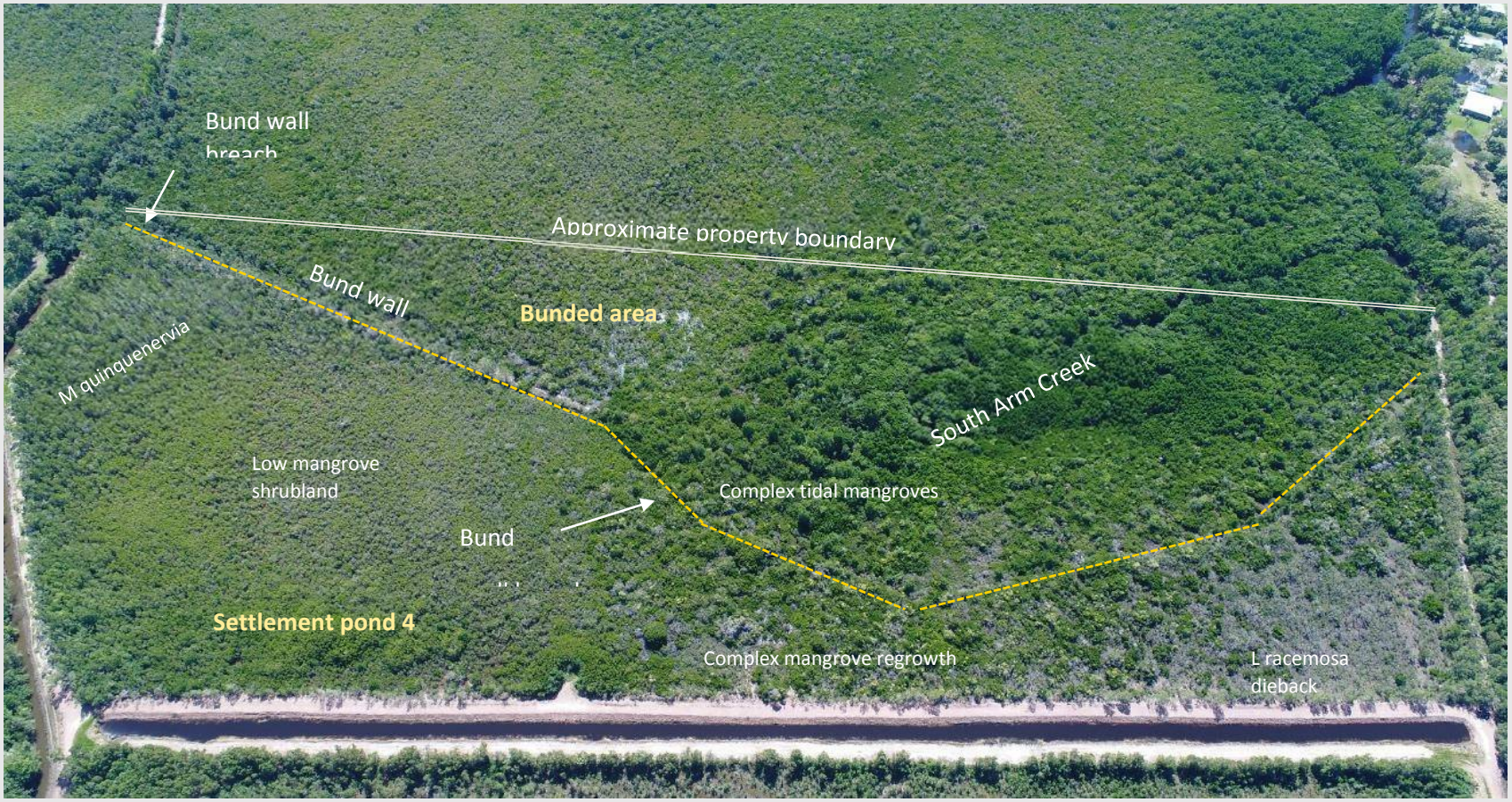
The other breach is in the centre portion of the bund wall, where the bund wall abuts the upper reach of South Arm Creek. This appears to a historical breach, i.e. aerial photos identify that this area possibly was breached a decade ago, with a complex mangrove system now overgrowing the bund wall. The July 2017 survey accessed this area and identified a very complex mangrove community in this locality, very typical of the Daintree River area.

Excluding the bunded area, settlement pond 4 includes the following communities:

Melaleuca quinquenervia dominated community: an area of approximately 1.7 ha in the north west of settlement pond 4. Areas of this community closest to the bund wall are dying back as a result of the bund wall breach allowing daily tidal ingress. Many immature young mangroves (*Brugiera* sp predominantly) are actively recruiting amongst the dying *M quinquenervia.* This is a recent breach, possibly less than 4 years old with no dieback evidence in 2013 aerial photos. Understorey is dense in places with mangrove fern *Acrostichum speciosum* and climbing fern *Stenochlaena palustris* locally dominant.

Plate 2 Tea tree regrowth	Notes
	Melaleuca quinquenervia dominated whipstick regrowth. Low (to 7m) dense successional vegetation with many narrow stems. Understorey dominated by mangrove fern *Acrostichum speciosum* and climbing fern *Stenochlaena palustris.* Many areas are exhibiting dieback as a result of saltwater intrusion from breach bund wall.

Plate 3 Overview of Settlement Pond 4 and Bund Area



Overview of Settlement Pond 4 and bunded area. Succession and recruitment south of the bund wall has been strongly influenced by breaches in the bund wall (through natural erosion via root penetration and water flow) allowing tidal water to influence the otherwise arrested successional state of the vegetation south of the bund wall. This has resulted in *Melaleuca quinquenervia* die back in the northwest of the settlement pond, and an increasingly complex community developing in the central portion bund area at the upper reach of South Arm Creek.

Low open *Excoecaria agallocha* and *Lumnitzera racemosa* shrubland: this is the largest area of homogenous vegetation community within settlement pond four, comprising 3.2 ha of low *Lumnitzera racemosa/Excoecaria agallocha* shrubland, mostly less than 3m in height. The majority of this community is influenced by a regular tidal regime, primarily monthly HAT that overtop the internal drains. These drains have more saline tolerant species (e.g. *Brugiera* spp) recruiting along them, notably immediately on the south side of the bund wall where tidal water from breaches on either side is having an increasing impact. This community is simple both floristically and structurally, and apart from the drain mentioned above, exhibits a state that could be said to be an arrested successional state as a result of a lack of any further influences on succession and recruitment.

Historical aerial photos indicate that this simple community has been extant since at least 2003 and the 2006 FRC assessment identified similar floristic and structural elements as this 2017 survey. However increasing saline influences have started to impact on the surrounding communities, and recruitment of species requiring a more regular tidal inundation e.g. Brugiera, appears to be increasing. Given the ongoing deterioration of the bund wall and increasing tidal influence it expected that this community will continue to be replaced by a more complex mangrove community (similar to the north side of the bund wall).

Plate 4 Low, simple mangrove shrubland	Notes
	Low, simple *Excoecaria /Lumnitzera* shrubland. Occasional *Melaleuca leucadendra* present as saplings on higher areas. Understorey is generally open.

Complex mangrove regrowth: this area in the central and south-east section of settlement pond 4 represents an area of approximately 2.8 ha and is the result of an old breach, possibly a decade old, with site surveys identifying many larger trees and a complex mangrove regrowth association dependent on regular tidal regimes. The recruitment has occurred with the ongoing deterioration of the bund wall and old road through this area and allows a regular tidal input, at least of the highest weekly tide, from nearby South Arm creek. The recruitment in this location reflects the species composition and general complexity of South Arm Creek immediately north of the bund wall, albeit with a higher number of mangrove species typically associated with upper freshwater influenced areas. and successional processes. Tallest mangroves in this site are *Lumnitzera racemosa* (tallest examples of these species in all surveyed areas) with large examples of *Excoecaria agallocha.* The understorey and subcanopy has a host of recruiting mangrove species typically found in more tidal areas: *Brugiera spp, Rhizophora spp, Xylocarpus*

spp, Aegialitis annulata. The understorey is sparse, dominated by *Acrostichum speciosum.* Vines, notably *Clerodendrum inerme*, form localised dense thickets. *Melaleuca leucadendra* saplings persist on the remnants of the bund wall/old track and larger individuals are present on the embankments of the settlement pond.

Plate 5 Complex mangrove regrowth	Notes
	Complex mangrove regrowth following bund in breach wall. This breach is possibly a decade old, and has allowed a significant intrusion of more complex mangrove associations in to the area south of the bund wall. The vine *Clerodendrum inerme* forms localised dense thickets.

Lumnitzera dieback area: dieback of mangroves of a particular species composition or age structure is a regular occurring feature in dynamic communities where changes in salinity are the primary cause of succession. An area of approximately 0.5 ha in the extreme south east of settlement pond 4 was noted as having a very high level of dieback, the extent of which was confirmed with aerial assessment (see below). This area is inevitably becoming subject to a higher and more regular tidal regime as further deterioration of the bund and road allows ever increasing salt water intrusion. Ultimately it is expected that this corner will become a complex mangrove successional community, similar in composition to the surrounding area.

Plate 6 Lumnitzera dieback area	Notes
	Area of *Lumnitzera* dieback in the south east corner of settlement pond 4. Changing salinity regimes arise from the increasing tidal influence of the deteriorating bund.

Simple *Excoecaria* Regrowth: this is a small (0.8 ha) successional community established on the south west embankment of settlement pond. It essentially forms an almost monotypic community of low *Excoecaria agallocha* regrowth on the southern embankment of the settlement pond 4 bund wall and is actively recruiting into areas of increasing salinity displacing *Melaleuca quinquenervia* and *Melaleuca cajuputi.*

Plate 7 *E agallocha* simple regrowth	Notes
	Simple almost monotypic *Excoecaria* regrowth on the southern embankment of settlement pond 4. This regrowth is typical of recent changes in salinity regimes; in this instance as a result of a larger saltwater inflow from the bund breach to the north west.

3.3.2 Bunded Area

The bunded area of settlement pond (as measured between the bund wall and the boundaries of the property, refer Figure 1) is an area of approximately 7.1 ha that incudes the upper reaches of South Arm Creek, a tributary of the Daintree River. The bund has been breached in a number of locations, notably near South Arm Creek and in the north-west corner of settlement pond 4, and an increasing tidal inflow from these breaches has resulted in successional changes occurring in the communities south of the bund (as described in the Section above). Additionally the bund and associated track in the eastern section of settlement pond 4 has deteriorated in most places, and a regular tidal influence is now occurring beyond the bund, notably in the south-east corner.

Conversely, the communities of the bunded area have continued to be maintained by regular tidal influences, both daily (in the riparian areas of South Arm Creek) and less frequently (but still regular e.g. weekly) in other areas. Subsequently the composition and distribution of the marine plant communities beyond the bunded area reflects a continuity of habitats as represented within the broader South Arm Creek/Daintree River tidal areas i.e. has a retained a completely natural pattern of zonation and dynamic processes.

Aerial photos of the original clearing for the sugar cane assignment were not available, but the original clearing extended further than the current alignment of the bund wall in the south east section and on-ground site surveys in July 2017 confirmed that clearing had occurred originally further north of the bund, varying between approximately 10 to 30m north of the bund. This community has been subject to a regular tidal influence and the regeneration and succession

has resulted in a successional community largely indeterminate from the complex regrowth occurring south of the bund in settlement pond 4. Not including this narrow band of successional vegetation the marine vegetation north of the bund wall can be clearly demarcated as two distinct communities.

Complex tidal mangrove community of South Arm Creek: This area (approximately 4.2 ha) is representative of some of the most complex mangrove associations in the lower Daintree River, with a wide representation of mangrove species genera, and multiple species representation within some genera. The presence of a large crocodile resulted in only the most cursory of inspections on the ground however aerial overfly did confirm the complexity of this system. Taller mangroves (*Rhizophora stylosa* and *R apiculata)* exceeded 15 m in height, and many larger tree genera (*Heritiera, Xylocarpus, Brugier*a spp) were prominent. Understorey species association was complex on the edges of the taller zone, and the substrate was marked by a very high level of general sesarmid activity (a high density of burrows present) and numbers of arboreal mangrove snails (which were not observed anywhere else during the 2017 survey).

Plate 8 South Arm Creek complex mangroves	Notes
	Complex *Rhizophora* spp riparian areas in upper reach of South Arm Creek near the bund wall breach.
	Low aerial oblique looking across South Arm Creek complex mangrove community.

Complex mangrove shrubland/woodland: this community is typical of the large expanses of mangrove shrubland/woodland characteristic of large areas of the tidal catchment of South Arm Creek (and the lower Daintree River area generally), and should be regarded as a continuation of this habitat generally. It is typified by a number of genera that are more tolerant of occasional fresh water inputs and has a complexity of shrub and vine species that are not generally represented elsewhere. Tall trees are not common, any taller examples present (to 8 m) generally being emergents of *Brugiera* spp, or *Rhizophora* spp on tidal drainage lines. The lower subcanopy is generally dominated by *Brugiera spp, Ceriops spp, Cynometra, Lumnitzera. Excoecaria agallocha* and *Acrostichum speciosum* are typical of areas which have higher freshwater inputs. There is no clear zonation of species within this community, the general distribution and relative abundance determined by tidal frequency and type.

Plate 9 Complex mangrove shrubland/woodland	Notes
	Drainage line within the general community highlights general abundance of diversity of marine species along tidal drains. Species composition becomes more simplistic with distance from tidal drains and with subsequent decrease in salinity effect.

3.1 Settlement Pond 3

Settlement pond 3 is primarily represented by an *Excoecaria agallocha* dominated community that has previously had recruited into this area prior to the further expanded development of the site for aquaculture between 2001 and 2003. The expanded development resulted in the alienation of nearly all tidal impacts on this community, with the only connection being a tidally influenced drain (HAT) that originally connected settlement pond 2 with settlement pond 4. This drain no longer has a tidal connection through settlement pond 3 (or settlement pond 2). A feature of the drainage line in the western section of settlement pond 3 is the established *Melaleuca quinquenervia* community which appears to be expanding by comparison with earlier aerial photographs and was evident with on-ground inspections of the dense tea tree regrowth. A number of larger trees are present, and of note was the increasing prevalence in *Melaleuca leucadendra* saplings/small trees which appeared to be successfully recruiting across at least 60% of the overall settlement pond, interspersed with the *E agallocha* community. This recruitment is in response to the decreased saline influence, higher freshwater inputs. A number of larger trees of *M leucadendra* and smaller *M cajuputi* are well established along the southern boundary on the embankment wall of settlement pond 3 and as isolated trees along the internal drain.

A key aspect of settlement pond 3 is the relative firmness of the substrate and lack of bare, open areas of soil. Marine muds as such (i.e. sticky clays) are not exposed within settlement pond 3, with the only areas of exposed clays being found along the internal drain, in conjunction with the *Melaleuca* communities in this location. The lack of tidally influenced soil conditions has allowed a unique understorey comprised primarily of sedges (particularly *Fimbristylis ferruginea*) with thickets of the freshwater fern *Stenochlena palustris* in many areas.

Plate 10 Overview of Settlement Pond 3

Overview of Settlement Pond 3. The north west and north east section of the settlement pond is dominated by *Melaleuca* spp regrowth and ponded fresh water is present along the drainage line that promotes this regrowth in the north west corner. Elsewhere *M leucadendra i*s prominently successfully recruiting into most of the remnant *Excoecaria agallocha* shrub lands. Much of this, notably in the central areas, is very open with the understorey dominated by sedges intolerant of prolonged saline influences.

Plate 11 E agallocha low shrubland	Notes
	E agallocha low shrubland across the majority of the site has a very high proportion of *Melaleuca leucadendra* individuals recruiting, indicating a lowering of the soil salinity condition over time (last decade) that is now favouring recruitment of other species. Understorey is dominated by sedges.
	Melaleuca quinquenervia and *M leucadendra* regrowth displacing *E agallocha* in freshwater influenced areas in settlement pond 2. This pattern of succession is increasing across settlement.

3.2 Settlement Pond 2

Settlement pond 2 has been used as part of the ongoing operations of the aquaculture facility since the original establishment in 1989 as a freshwater aquaculture venture. With the move to a saltwater aquaculture system this pond has been retained for its freshwater contribution as a nutrient settlement pond for the venture.

Settlement pond 2 represents a permanent freshwater wetland, with no marine vegetation communities present, and no tidal influence on the system. The species present, their distribution and abundance is determined by the depth (and temperature) of the water and not by salinity regimes. Almost entirely settlement pond 2 is dominated by three *Melaleuca* species:

- *Melaleuca cajuputi,* a species preferring deeper water and able to tolerate long periods of immersion in freshwater. This species does not tolerate regular tidal influences and

the presence of this species throughout its range (which extends north to Cape York Peninsular and into south-east Asia) is associated with permanent freshwater wetlands. This is the most dominant species within settlement pond 2.

- *Melaleuca quinquenervia* forms communities in shallower water in areas which are regularly exposed during fluctuations in the level of the wetlands. *Melaleuca quinquenervia* is more tolerant of saline influences than *M cajuputi,* but regular tidal inundation has adverse impacts on this species and in some areas, e.g. settlement pond 4, large areas of this community are dying back as a result of a daily tidal regime. Significant areas of settlement pond 2 have dense M quinquenervia regrowth occurring as whipstick regrowth to 6m tall.
- *Melaleuca leucadendra* is present as isolated individual larger trees, and is also present as numerous saplings and smaller trees around the drier areas of settlement pond 2, notably on the embankments of the pond bund walls. While tolerant of saline conditions to some degree, the species is typical of foreshore swale areas where ground water conditions are maintained by freshwater inflows.

Another Melaleuca species, *Melaleuca viridiflora,* is also present. This is not a wetland indicator species however, and is present only as isolated individuals on non-inundated terrestrial areas of the settlement pond bund walls and embankments.

Halophytic species are present within settlement pond 2, but nowhere forms a distinctive, tidally dependent community. *Excoecaria agallocha,* the dominant halophyte species across all areas surveyed, is present as isolated individuals along the settlement pond embankment.

Acrostichum speciosum is more tolerant of freshwater influences than *E agallocha,* and is a characteristic component of the interface between terrestrial and marine environments where there may be strong freshwater inflows. *A speciosum* has persisted in settlement pond 2 since the original construction and has formed isolated large clumps within permanently inundated areas.

A feature of settlement pond 2 is the colonisation of the wetlands by species that are typically represented in the coastal freshwater wetlands of the Wet Tropics. These include communities of bulkuru sedge *(Elaeocharis dulcis), Cyperus sphacelatus, Fimbristylis spp, Rhynchospora corymbosa, Hypolytrum nemorum, Lepironia articulata,* all of which are freshwater wetland species, none of which are tolerant of prolonged salinity influences.

Plate 12 Overview of Settlement Pond 2

Overview of settlement pond 2, illustrating the freshwater wetlands nature of the pond. *Melaleuca quinquenervia* and *M cajuputi* are present in almost equal abundance, their distribution determined by water depth and temperature. Small areas of freshwater sedges are present in the main open water channels and about the edges fo the settelemnt embankement, and halophytes in the form of *Acrostichum speciosum* (present as rare clumps within the wetland) and *Excoecaria agallocha* as isolated individuals on the embankment walls.

4. Fisheries Values Assessment

4.1 Overview

The productivity of mangrove communities is amongst the highest of any community in the world (aquatic or terrestrial) and is essential to the maintenance of a range of ecosystem services, e.g. as nursery areas to a host of aquatic marine/intertidal guilds, nutrient cycling, and water quality management. Mangrove communities are known to contribute to fisheries values through the provision of food supplies (both primary and secondary production), as nurseries proving shelter from predators and also as providing a barrier to physical stress, e.g. currents and wave action turbulence.

Detailed long term monitoring studies were beyond the scope of this survey, and the only quantitative information able to be collected related to the general abundance and distribution of sesarmid crab activity. Sesarmid crab activity is generally regarded as one of many surrogates that can be used to estimate the productivity of a mangrove area and qualitative comparisons across various habitats may provide a raw indication of the contribution of the habitats to general fisheries values. Of more use in assessing fisheries values on a small temporal survey scale is a site assessment of edaphic factors that may significant impact on ecosystem processes and hence productivity and fisheries values. In the case of this survey the primary indicator of impacts on ecosystem processes is the connection between tidal water ingress, frequency of inundation and subsequent salinity conditions. All of the successional processes and ecosystem stressors were identified in the field to be directly related to these conditions of salinity and tidal associations.

4.2 Settlement Pond 4

4.2.1 Bunded Area

The bunded survey area of 9.38 ha exhibits a range of fisheries values that vary from low to high, dependent on the vegetation community, the current status of succession, and the regularity of the tidal influence into this area. As noted previously breaches in the bund wall have allowed a more persistent tidal inflow into the settlement pond and this is resulting in rapid successional changes in vegetation communities. There are three key successional processes occurring in settlement pond 4 impacting on fisheries values. These include:

- Dieback of *Melaleuca quinquenervia* in the north west, being replaced by *Brugiera* and *Ceriops* dominated woodland.
- Low mangrove shrubland dominated by *Lumnitzera racemosa* and *Excoecaria agallocha* representing a previously arrested state of succession owing to the tidal restricting influence of the bund wall, and now subject to an increasing regular tidal input and establishment of more complex mangrove species. This is particularly evident in the area adjacent to the bund wall breach and general bund deterioration adjacent South Arm Creek.

- An increasing expansion in tidal influence in the south-east corner, resulting in extensive *Lumnitzera racemosa* dieback, with more typical regularly inundated genera such as *Rhizophora* and *Brugiera* recruiting into these areas.

Successional changes noted above all favour an increase in the general fisheries values within the bunded area of settlement pond 4. Primarily:

- a regular tidal regime improves ecosystem function, particularly in relation to tidal flushing and nutrient cycling.
- negating and reversing the effect of arrested succession will improve general biomass and productivity with a more diverse and functional mangrove ecosystem,
- reinstatement of a regular tidal regime will improve opportunities for faunal guilds that contribute to nutrient cycling e.g. sesarmid crabs.
- the reestablishment of a functional mangrove community contiguous with the existing communities in the South Arm Creek area will now include the full upper tidal reaches of South Arm Creek and improve fish passage and utilisation within the bunded area of settlement pond 4.

4.2.2 Faunal Activity

Faunal activity within settlement pond 4 was noted primarily through the observation of crab activity (primarily sesarmid crabs) and other opportunistic observations of mangrove dependent fauna (e.g. arboreal snails, mud whelks etc). A known large crocodile presence precluded the establishment of formal plots. Not withstanding sesarmid crab observations based on a $4m^2$ quadrats (2m x 2m plots) were used at four locations in settlement pond 4, and at two locations in settlement pond 3. Due to the sensitivity of sesarmid crabs to the effects of siltation (clogging of respiratory mechanisms) and dry conditions (direct dessication as these species can only survive in a moist environment), these are useful indicators of site conditions.

Simple counts of active burrows i.e. those in obvious use, were used to estimate sesarmid crab activity at each site. There are no formally identified thresholds that quantitatively relate crab activity to productivity in the Wet Tropics area, and essentially the use of crab burrow counts was to only provide an indicative utilisation of the area and likely contribution to productivity and hence fisheries values.

Table 1 Location of faunal activity sites and active burrow counts

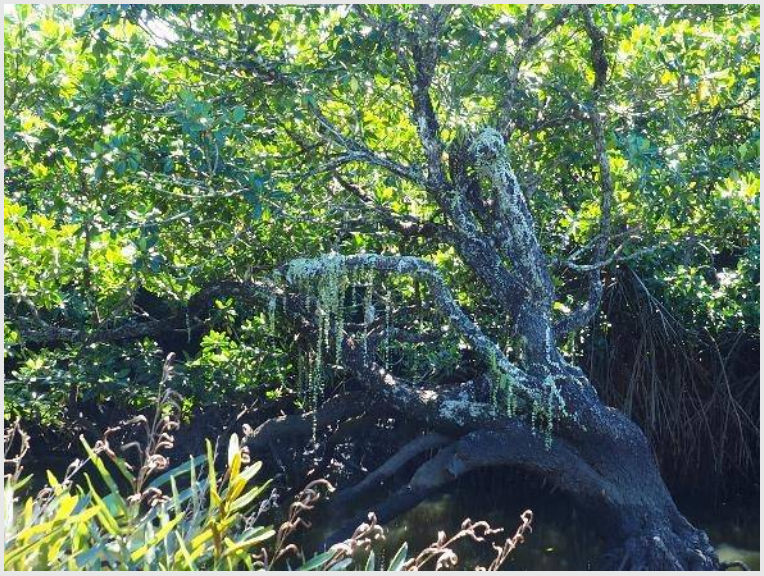
Site Number	Community	Location	Active crab burrows
1	Low mangrove shrubland	Settlement pond 4	5
2	Low mangrove shrubland	Settlement pond 4	7
3	Complex mangroves on South Arm Creek	Outside bund wall, settlement pond 4	24
4	Complex mangrove regrowth	Settlement pond 4	15
5	Arrested mangrove regrowth	Settlement pond 3	0
6	Arrested mangrove regrowth	Settlement pond 3	0

Plate 13 Sesarmid crab burrows	Notes
	Low mangrove shrubland, settlement pond 4. Density varied from 5 (site 1) to 7 (site 2). Site substrate was generally moist, but not daily tidally inundated.
	Complex mangrove shrubland, settlement pond 4, 15 active burrows/plot.
	Daily tidally inundated areas near bund wall breach adjacent South Arm Creek in complex mangrove regrowth. 24 active burrows were counted at this plot and this guild (and other crab species) are very widely distributed throughout this complex mangrove regrowth.

4.2.3 External bund area to property boundary

The area of settlement pond 4 external to the bund wall represents a marine vegetation community that is characteristic of the lower Daintree River/South Arm Creek tidal areas. As noted there are two key communities north of the bund, with these both contiguous with the extensive areas of mangroves beyond the property boundary. The fishery values of the Daintree River marine and tidal vegetation are regarded as extremely high, and a declared fish habitat area is present over much of South Arm Creek.

Subsequently no attempt was made to formalise a fisheries values assessment of these mangrove communities within settlement pond 4 other than to verify the natural state and high integrity of these systems as noted in earlier sections of this report. The mangrove communities within settlement pond 4 outside of the bunded area are representative of those immediately adjacent to and contiguous with the property, and are of high integrity and have a very high contribution to fisheries values in the upper section South Arm Creek. With the deterioration of the bund wall, and further development in the complexity of the mangrove community within settlement pond 4 overall, these values are expected to expand to include the previously bunded areas.

Plate 14 Complex mangroves, South Arm Creek	Notes
	The areas of mangroves along South Arm Creek within the property and adjacent to the bund wall are of very high integrity with a high species diversity and a high level of faunal activity. Including crocodiles. These areas are affected by daily tidal variability and provide very high fisheries values.

4.3 Settlement Pond 3

As noted in early sections, settlement pond 3 represents a community dominated by halophytes (*Excoecaria agallocha*) representing an arrested succession state which is now subject to ongoing recruitment and succession owing to the increasing influence of freshwater inputs and lack of tidal regimes.

The majority of the *E agallocha* areas are now co-occurring with a number of *Melaleuca* species, primarily *M leucadendra* in open areas, and *M quinquenervia* dense regrowth is actively displacing *E agallocha* with the formation of a closed canopy particularly along the freshwater drain to the west of the settlement pond. A distinctive feature of the successional processes is the prevalence of sedges in open areas, the majority of which are not tolerant of tidal saline conditions and are reliant on freshwater flows for their maintenance.

The successional processes occurring within the settlement pond 3 are resulting in a diminution of the values of this area to general marine fisheries values. This is occurring through a number of ecosystems processes including:

- Truncation of a tidal regime: there is no longer any tidal connection (which previously was tenuous at best) between this settlement pond and the upper reaches of South Arm Creek and associated habitats. This precludes any translocation or migration of tidally dependent aquatic species.
- Halophytic species representative of the interface between freshwater systems and marine systems are being displaced by species typical of freshwater systems. This is resulting in changes community wide across the settlement pond, the rapidity of which is directly related to increasing freshwater inputs (e.g. retention of overland flow from rainwater events) and decreasing saline influence.
- Mangrove community productivity decreasing as a consequence of the halophyte species displacements and no nutrient cycling pathway (e.g. presence of sesarmid crabs, tidal connections) present.
- Lack of typical intertidal faunal activity contributing to productivity; as noted, no sesarmid crabs were observed within this settlement pond in two replicated sites.

Plate 15 Typical open areas, Settlement Pond 2	Notes
	The groundcover for most of settlement pond 2 includes areas dominated by various sedges (e.g. *Fimbristylis, Cyperus*. The recruitment of *Melaleuca leucadendra* is evident. No sesarmid crab activity or any other typical intertidal faunal activity was observed across this settlement pond.

4.1 Settlement Pond 2

Settlement pond 2 is a freshwater wetland with no marine connection. The original drain no longer connects with a tidal environment and there is no corridor of exchange between this wetland and mangrove habitat that support fisheries in settlement pond 4 and beyond the bund wall to the tidal communities of South Arm Creek.

It is acknowledged that freshwater wetlands can be an important contributor to fisheries values i.e. in the provision of ecosystem services such as water quality management, interception of

nutrient loads, and in providing nurseries for catadromous species of fish that migrate into freshwater as juveniles before returning to saltwater. These contributions are only significant where there is a direct connection between the wetlands and the tidal/marine environment. In the case of settlement pond 2 this connection is not present, and the contribution of these dislocated wetlands to fisheries values is tenuous at best, with the wetlands serving primarily as a nutrient settlement pond that has an indirect contribution to downstream fisheries values.

The wetlands does include habitat to an array of other species notably birds, offering roosting, nesting and foraging resources to some protected species, including Burdekin ducks, and an array of migratory waterfowl that occur transitory and opportunistic visitors. None of these however have a direct contribution to marine fisheries values and settlement pond 2 remains a functional wetland for the operation of the aquaculture venture with ecosystem service benefits to a variety of fauna that are not directly connected to the marine/intertidal environment.

Plate 16 Typical open areas, Settlement Pond 2	Notes
	Burdekin ducks and avocets are regular visitors to settlement pond 2 which offers foraging, nesting and roosting opportunities for a variety of mobile fauna. The wetlands however do not have a direct contribution to fisheries values owing to the dislocation between the pond and the tidal environment.

5. Post Construction Rehabilitation Options

5.1 Rehabilitation Opportunities

Expansion of the aquaculture facility will require reconfiguration of the existing settlement ponds. It is currently envisaged that settlement pond 3 will be further developed and will require extensive removal of the existing vegetation in order to undertake the necessary earthworks for excavation and realignment of embankments, drains and bunds (where required).

No development works are proposed for settlement pond 4, with the intention that this pond be allowed to continue to rehabilitate to improve its current contribution to fisheries values. Restoration of the bunded area of settlement pond 4 to a condition commensurate with its preclearing status is well advanced through natural processes, i.e. deterioration and breaching of the bund wall allowing displacement of freshwater *Melaleuca quinquenervia* communities that became established following construction of the bund wall and containment of tidal inflows.

Active revegetation of settlement pond 4 is not required. The preferred option for rehabilitation of settlement pond 4 is to encourage the restoration of pre-clearing tidal inputs through removal of those sections of bund wall that still obstruct flow and reinstatement of preferential drainage lines that connect to the tidal areas of South Arm Creek. Not all of the bund wall needs to be removed: only those areas where the elevation of the bund wall still precludes overland tidal flow need to be breached and natural erosion process of incoming and outgoing tides will further accelerate the deterioration. Given the small volumes of earth removal required (the bund in many places is less than 50cm high), a small tracked excavator i.e. of ditch digging size, may negotiate the overgrown bund wall and sequential remove strategic small sections of the remaining bund, preferable in areas that could be used to natural tide flow paths.

Plate 17 Natural recruitment, settlement pond 4	Notes
	Brugiera spp saplings and seedlings established in *Melaleuca quinquenervia* dieback areas in the north west section of settlement pond 4 at the bund breach. Many mature *Brugiera* are now present, some exceeding 5m in height and propagules were noted as being distributed in excess of 100m from the breach, being carried by tidal inflow.

5.2 Natural Recruitment

5.2.1 Settlement Ponds

It is unknown what the future specifications are for the further development of the settlement ponds, i.e, depth of ponds, extent of earthworks and vegetation clearing. The information presented below assumes the excavation and construction of settlement pond 3 would commensurate with the operational requirements currently met by settlement pond 2. This includes the assumption that settlement pond 3 would be a closed wetland system, similar to settlement pond 2. Without any active planting a closed wetland system is likely to be slow in initial recruitment but would be expected to increase as plants mature and seed locally. Maintenance will be required to control aquatic pest species particularly pond apple (*Annona glabra*) and para-grass (*Urochloa mutica*), both likely to recruit into a wetland of their own accord. The species list includes species observed and known to occur in the local area that are frequently encountered in freshwater/brackish swamps near the tidal interface.

This is not a complete list of all the species that may recruit into a constructed wetland: Purely aquatic species (water lilies, submerged macrophytes) have not been included, and there will be other unobserved species of sedges and grasses that could recruit into settlement pond 3. It is expected that some halophyte species would persist, e.g *Acrostichum speciosum* and Excoecaria agallocha, as both are still present, albeit as isolated individuals, at settlement pond 2.

Table 2 Potential Natural Recruiting Species into Freshwater Wetlands

Species	Growth habit	Notes
Annona glabra	shrub/small tree	weed species, present in local area
Melaleuca cajuputi	small tree	on site
Melaleuca leucadendra	tree	on site
Melaleuca quinquenervia	tree	on site
Fimbristylis spp – *F. ferruginea* – *F. brownii* – *F. dichotoma*	sedges	 on-site local local
Elaeocharis spp – *E. dulcis* – *E. sphacelata* – *E. acuta* – *E. philippinensis*	sedges	 on-site on site local
Scleria sphacelata	sedge	On site
Carex fascicularis	sedge	local
Cyperus spp – *C. difformis* – *C. involucratus* – *C. alopecuroides*	sedges	 local, common pest of drains local, common pest of drains local

Species	Growth habit	Notes
– *C. polystachyos* – *C. platystylis* – *C. eragrostis*		local local local
Urochloa mutica	grass	weed species, on site
Lepironia articulata	sedge	local
Paspalum distichum	grass	weed species, on site
Ludwigia peploides	herbaceous	on site
Persicaria attenuata	herbaceous	local
Typha orientalis	grass	local
Echinochloa polystacha	grass	weed species
Leersia hexandra	grass	local
Phragmites australis	grass	local
Pseudoraphis spinescens	grass	local
Schoenoplectus spp – *S. subulatus* – *S. mucrunatus*	sedges	 local local

5.2.2 Settlement Pond 4

Recruitment into settlement pond 4 is occurring with natural successional processes ongoing. The rate at which recruitment will occur is largely dependent on the rate of deterioration of the existing bund and the subsequent changes in tidal influence and salinity regimes.

As settlement pond 4 is in the upper reaches of the tidal limits of South Arm Creek, it is not expected that the species composition will substantially change over the period of succession. Areas of complex mangrove regrowth in the breached bund area near South Arm Creek comprise a high diversity of mangrove species some of which are expected to extend their range only to the tidal limits of the creek: e.g. genera such as Rhizophora will still largely be confined to tidal fluctuations in the riparian areas. Most other genera are generally already represented in the mangrove regrowth areas, and natural recruitment will be more of change in the abundance, distribution and zonation of the species, rather than in diversity and presence/absence. Some species will be expected to naturally decline: halophytic species such as *Excoecaria agallocha Lumnitzera racemosa* and *Acrostichum speciosum,* will become less widespread and dominant but will persist in areas that have freshwater inputs. The genera Ceriops, Rhizophora, Brugiera are already present within settlement pond 4, but their general abundance and diversity is expected to increase.

The most significant natural rehabilitation processes is already observable. Areas of dieback of freshwater reliant communities of *Melaleuca quinquenervia* is the inevitable result of increasing salinity and tidal regularity owing to the breached bund wall. This natural trend will continue and it is not anticipated that *M quinquenervia* will remain as a community though some individuals may continue to persist along embankment walls and in areas of less tidal influence.

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Appendix 7B

2006 Marine Plants FRC

Wonga Beach Aquaculture

Fisheries Values of Marine Vegetation.

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Summary

1 Introduction

This report has been prepared at the request of Sciaccas Lawyers on behalf of Wonga Beach Aquaculture Resort Pty Ltd. It presents a description of marine vegetation communities; in the facilities settlement ponds (ponds 4 & 5); adjacent to the facilities inlet channel; below the containment bund; and downstream of the facility on the south Daintree River. It provides an assessment of the relative fisheries and conservation values of marine vegetation in the settlement ponds and addresses the inclusion of this vegetation in the Areas of State Significance (significant coastal wetlands) in the Wet Tropics Coast Regional Coastal Management Plan (EPA 2003). Vegetation in settlement pond four is mapped primarily as 'of concern' significant freshwater wetland in the costal management plan; vegetation in pond five is mapped as 'not of concern' significant estuarine wetland (EPA 2003).

2 Assessment of Fisheries Values

2.1 Introduction to Mangroves as Fisheries Habitat

Marine vegetated habitats, such as the mangroves of the Daintree River, have extremely high rates of primary and secondary productivity. They provide a range of ecological values and are thought to be of particular importance for maintaining biodiversity, providing ecosystem services and supporting both local and offshore fisheries (Beck et al. 2001, Beck et al. 2001, Skilleter & Loneragan 2003).

Mangroves often support a high abundance and diversity of fish and invertebrates, which are harvested by inshore fisheries. In addition to sustaining these adult populations, mangroves provide juvenile fish and crustaceans with rich and productive areas in which to forage and escape predators (Robertson and Duke 1987; Thayer et al. 1987; Chong et al. 1990; Laegdsgaard & Johnson 2001). Indeed, mangrove forests are widely recognised for their role as 'nurseries' for juvenile fish, crabs and prawns, and their subsequent contribution through recruitment to the productivity of offshore fisheries (Beck et al. 2001; Laegdsgaard & Johnson 1995). For example, adult mud crabs spawn off shore, post-larvae move into coastal waters, where they settle in association with seagrass meadows and adjacent sand bars, older juveniles typically move into narrow, mangrove-lined tidal waterways and adults move into larger channels and the open estuary (Hill et al. 1982).

The primary characteristics of mangrove habitats that are thought to contribute to their value in supporting and maintaining fish stocks and estuarine fisheries include; the availability of enhanced food supply in the form of elevated primary and secondary productivity; the provision of refuges from predation; and a reduced physical harshness and lower turbulence when compared with habitats with lower structural relief (Laegdsgaard & Johnson 2001, Skilleter & Loneragan 2003, Luxford 2004). These characteristics function synergistically and positively influence the growth and survival of juvenile fish and crustaceans.

2.2 Survey of Mangrove Communities

Field Survey

In May 2006, frc environmental conducted floral and faunal surveys of marine vegetation (predominantly mangrove) communities in the settlement ponds of the Wonga Beach Aquaculture Resort Pty Ltd. and downstream on, and adjacent to, the south Daintree River (Figure 2.1). Freshwater wetland flora dominates the vegetation in settlement pond four (EPA 2003), suggesting a lack of connection with downstream estuarine waters and little to no value as habitat for estuarine fisheries. Therefore, the relative habitat value of this vegetation to estuarine fisheries was not assessed.

Figure 2.1

Assessing the value of mangrove habitat at site eleven on the south Daintree River.

The relative value of mangrove communities as estuarine fisheries habitat was assessed at twelve locations; four sites (sites 1, 2, 3 & 4) in settlement pond five; three sites (sites 5, 6 & 8) on historically cleared land below the downstream bund; two sites adjacent to the facilities inlet channel (sites 9 & 10); and three sites on the south Daintree River (sites 7, 11 & 12)(Figure 2.2).

At each site, we conducted a broad description of the mangrove habitat in three large (10 × 10 m) quadrats. Within each of the large quadrats we assessed species composition, estimated canopy cover and canopy height and counted the number of live and dead trees. We then quantitatively assessed the floral and faunal communities of each large quadrat, in three haphazardly placed small (1.0 × 1.0 m) quadrats. Within each of the small quadrats we counted the number of seedlings, aboveground roots, crabs, molluscs and crab burrows and estimated the cover of leaf litter, large debris and mangrove algae (*Catenella nipae*). We also noted the relative proximity of each site to permanent water at low tide, and predicted the relative frequency of tidal inundation.

Data Analysis

The relative habitat value of mangrove communities in pond five (sites 1, 2, 3 & 4), on cleared land below the downstream bund (sites 5, 6 & 8) and adjacent to the farms' inlet channel was determined through comparison of habitat variables with undisturbed sites on the south Daintree River. Data was analysed using one-way Analysis of Variance (ANOVA) to test for differences in the relative habitat value of mangrove communities between sites.

Normalised habitat data was analysed using multivariate Principle Components Analysis (PCA) to provide a visual representation of the dissimilarities between mangrove communities from each site. PCA places samples as points on a 'map' using the 'best fitting' 2-dimensional plane; that is, using the habitat variables that best explain the differences between samples as axes (called PC1 and PC2) (Clarke & Warwick 2001). Habitat data was normalised to eliminate any confounding differences that may result from the arbitrary scaling of the respective variables.

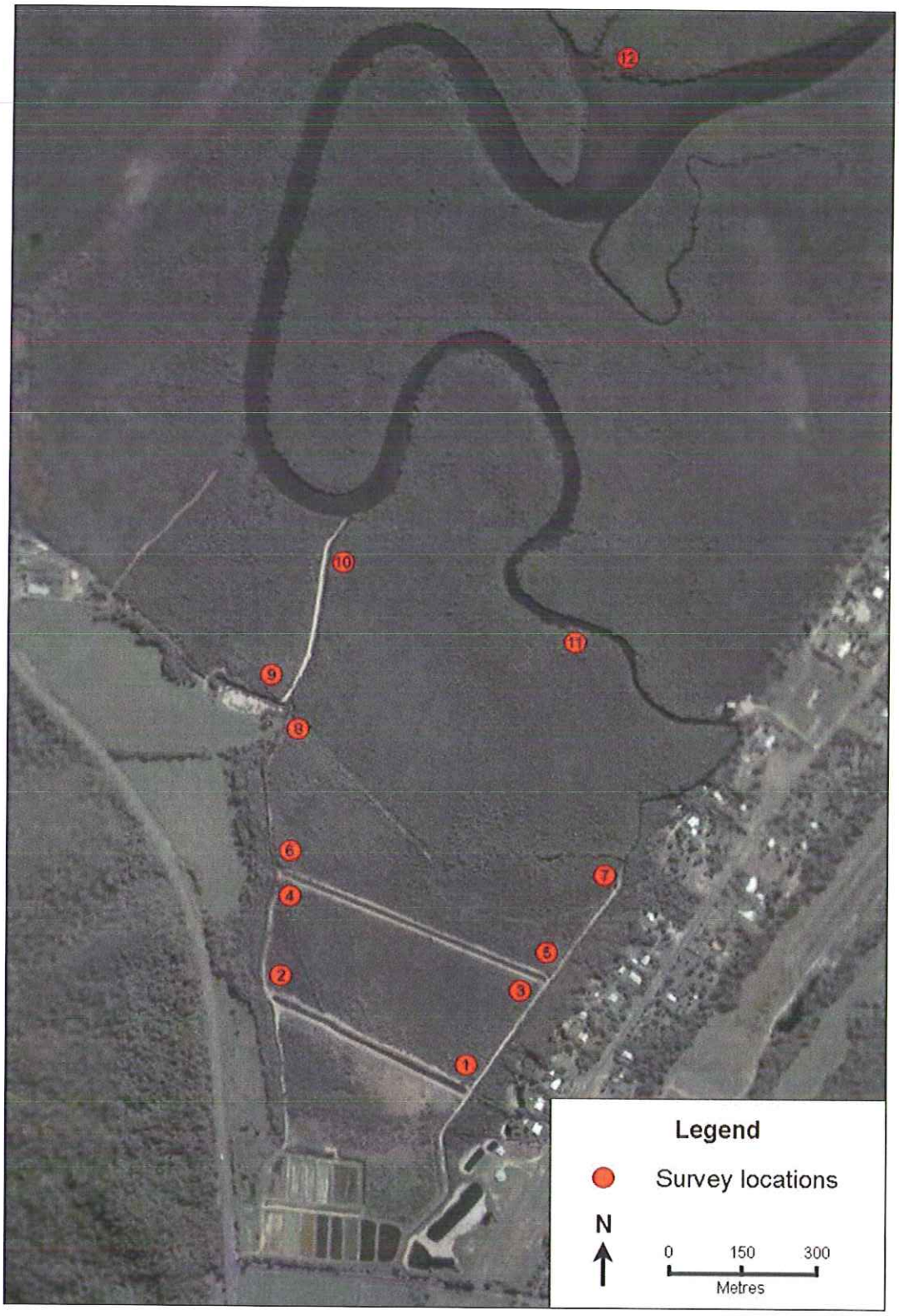

Figure 2.2 Mangrove communities surveyed to assess relative fisheries values.

3 Mangrove Communities of the property and the South Daintree River

3.1 Species Composition

The mangrove communities of pond five are relatively species poor. Milky mangrove (*Exoecaria agallocha*), white-flowered black mangrove (*Lumnitzera racemosa*) and mangrove fern (*Acrostichum speciosum*) are generally common at all sites (Figure 3.1). These species are tolerant of low salinities and are often common in areas with freshwater inflow. Seven small broad-leafed orange mangroves (*Bruguiera gymnorrhiza*) and two small red mangroves (*Rhizophora specious*) were found at site two. Freshwater wetland plants including swamp oak (*Melaleuca* sp.) and water chestnut (*Eleocharis* sp.) were common at many of the sites; waterlillies (*Nymphaea* sp.) were abundant at site four (Figure 3.2). The presence, and relative abundance, of these species is suggestive of a very low frequency of tidal inundation in pond five.

Figure 3.1

Mangrove community at site three in pond five.

Figure 3.2

Mangroves, water chestnut and waterlillies at site four in pond five.

Milky mangrove, white-flowered black mangrove and mangrove fern dominate mangrove communities on historically cleared land below the downstream bund (sites 5, 6 & 8)(Figure 3.3). Red-flowered black mangroves (*Lumnitzera littorea*) are also common at site five; red mangroves and large-leafed orange mangroves are relatively common at site six (Figure 3.4). Swamp oak (*Melaleuca* spp.) is common at sites six and eight.

Figure 3.3

Mangrove community at site five.

Figure 3.4

Mangroves and standing water at site six.

Large-leafed orange mangrove, small-leafed orange mangrove (*Bruguiera parviflora*) and cannonball mangrove (*Xylocarpus granatum*) dominate the mangrove community to the north of the farms' inlet channel, near the junction with the farms' downstream bund (site 9)(Figure 3.5). Mangrove fern, cedar mangrove (*Xylocarpus moluccensis*) and swamp oak are also common.

Red-flowered black mangrove, white-flowered black mangrove, red mangrove and large-leafed orange mangrove dominate the mangrove community adjacent to the farms' inlet

channel, near its confluence with the south Daintree River (site 10)(Figure 3.6). Yellow mangrove (*Ceriops tagal*) and cannonball mangrove are also common in this area.

Figure 3.5

Mangrove community at site nine.

Figure 3.6

Mangrove community at site ten.

Red mangrove, large-leafed orange mangrove and cannonball mangrove dominate communities along the south Daintree River (sites 7, 11 & 12)(Figure 3.7). Large-leafed red mangrove and cedar mangrove were also relatively common at sites eleven and twelve. Red-flowered black mangrove and white-flowered black mangrove were common at site seven.

Figure 3.7

Mangrove community at site twelve.

Sites six, seven and ten supported significantly more mangrove species than all other sites, with the exception of site two (Figure 3.8 & Appendix A). The relatively large number of mangrove species at site two is due to the presence of a small isolated stand of broad-leafed orange mangroves and red mangroves at this site.

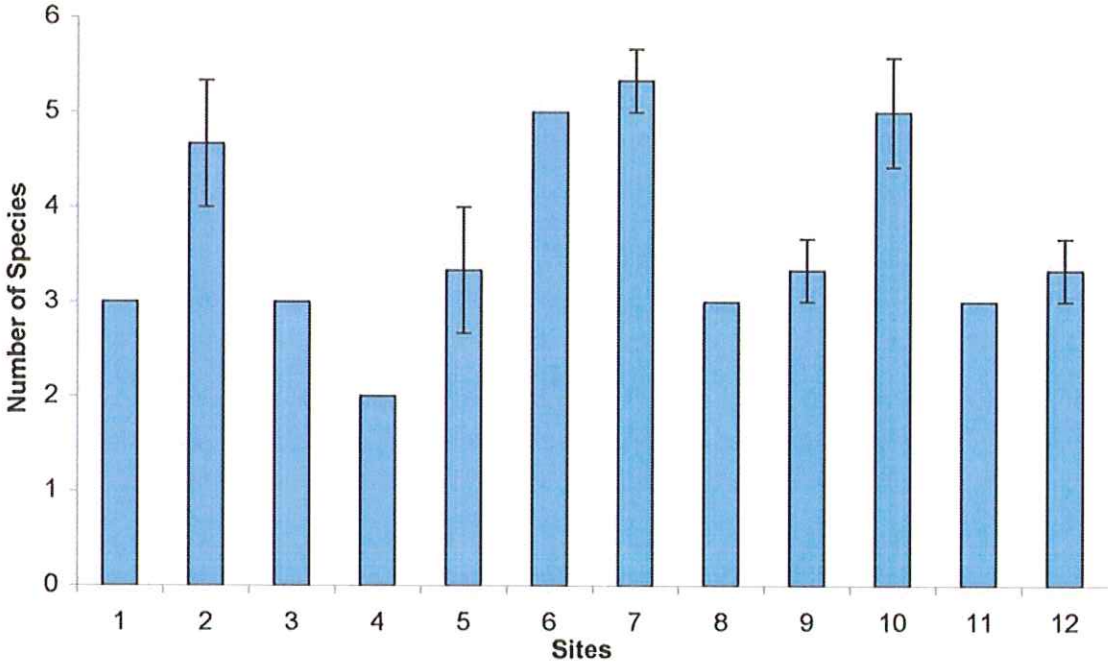

Figure 3.8 Mean number of mangrove species at each site surveyed (+/- 1SE).

3.2 Vegetative Characteristics

Canopy Cover

Canopy cover is highest at site twelve, where it is higher than all other sites except sites nine and ten (Figure 3.9 & Appendix A). Canopy cover is lowest at sites two and eight, where is lower than at all other sites except sites three, four, five and seven (Appendix A). Cover is generally relatively low (< 50%) at sites two, three and four in pond five and at sites five, seven and eight below the farms' downstream bund.

Canopy Height

Canopy height is greatest (> 10 m) at sites nine, eleven and twelve (Figure 3.10 & Appendix A). It is lowest (< 4 m) at sites one and three on pond five and relatively low at sites five and ten.

Number of Trees

The number of live trees was greatest at sites one and seven and relatively high at site three, four, five, six, eight, eleven and twelve (Figure 3.11). The number of live trees was significantly lower at site two and nine (Appendix A). The number of dead trees was low at all sites (Figure 3.11).

Density of Seedlings

The density of seedlings is significantly greatest (5 / m^2) at site twelve on the south Daintree River (Figure 3.12 & Appendix A). It is also high at site ten (2.22 / m^2). Seedling density is significantly lower (<1 / m^2) at all other sites.

Abundance of Aboveground Root Structures

The mean number of aboveground root structures per m^2 is significantly highest (30 - 40 / m^2) at sites nine, eleven and twelve (Figure 3.13 & Appendix A). The number of aboveground root structures is generally lowest (<10 / m^2) at sites one, two, three and four on pond five and at site eight below the bund. The number of root structures is also relatively low (12 – 15 / m^2) five, six, seven and ten.

Cover of Leaf Litter

The cover of leaf litter is significantly highest (61 – 80%) at sites one and three on pond five and at site eight below the bund (Figure 3.14 & Appendix A). Leaf litter covers a moderately large proportion (23 – 35%) of the substrate at sites two and four on pond five and sites six and nine. The cover of leaf litter is lowest at sites five, seven and ten below the bund and at sites eleven and twelve on the south Daintree River.

Cover of Large Woody Debris

The cover of large woody debris is significantly highest (approximately 12%) at site eight (Figure 3.15 & Appendix A). Large woody debris is relatively rare and covers less than 10% of the substrate at all other sites.

Cover of Mangrove Algae

No mangrove algae was present at sites in pond five or at two historically cleared sites (sites 5 & 8) below the farms' downstream bund. Algae cover was very sparse (<10%) at the third historically cleared site (site 6) and at the two sites on the farms' inlet channel. The cover of mangrove algae was greater (10 – 20%) at sites on the south Daintree River.

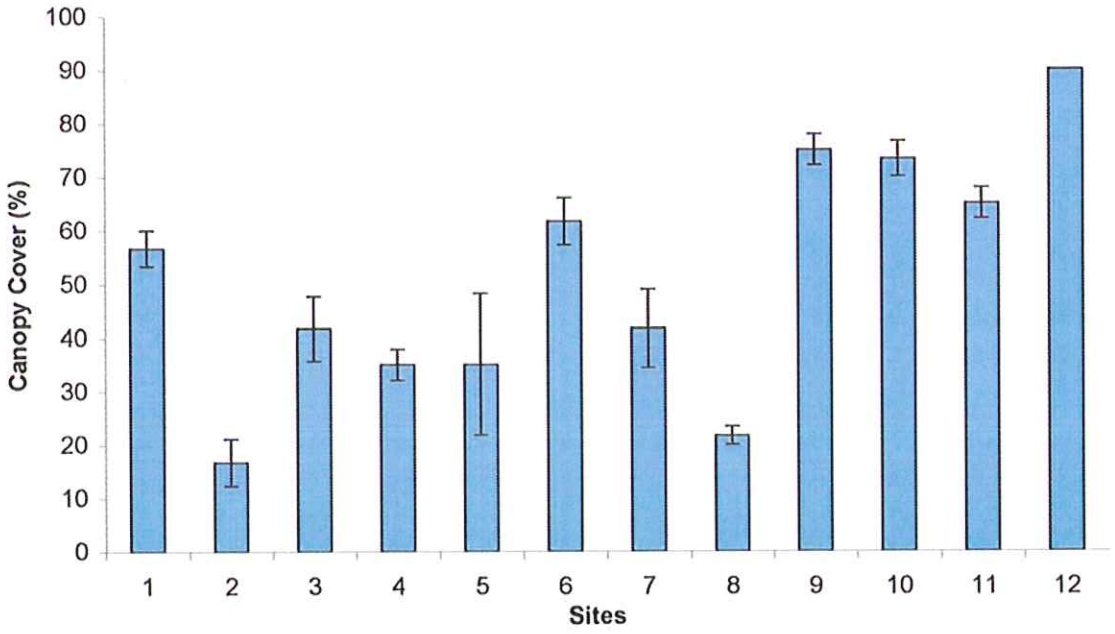

Figure 3.9 Mean canopy cover (%) of communities at each site surveyed (+/- 1SE).

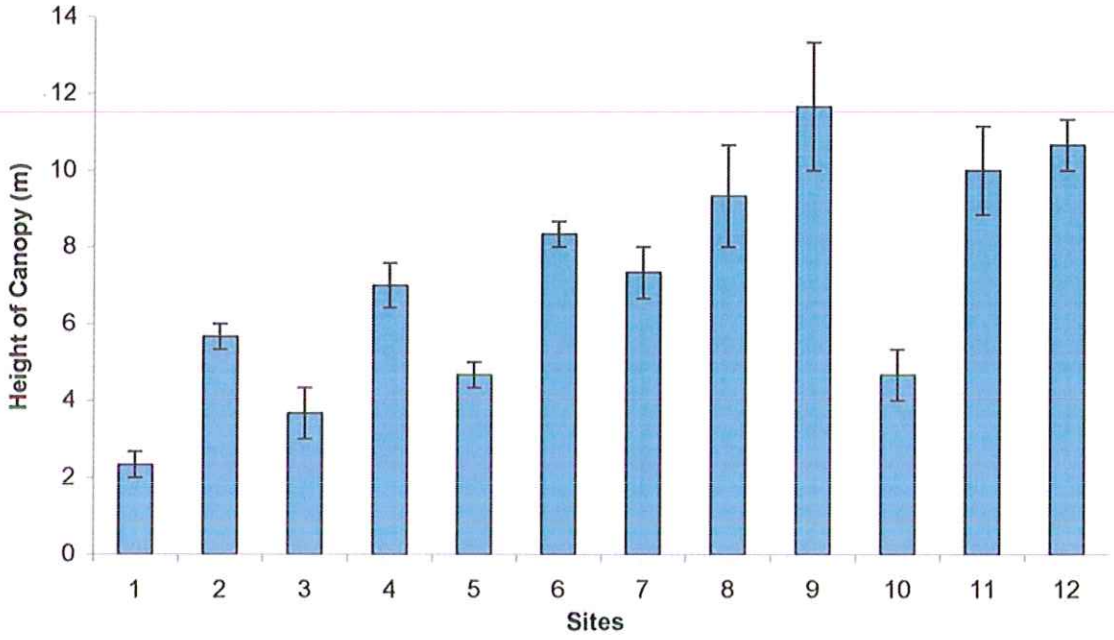

Figure 3.10 Mean canopy height (m) of mangrove communities at each site surveyed (+/- 1SE).

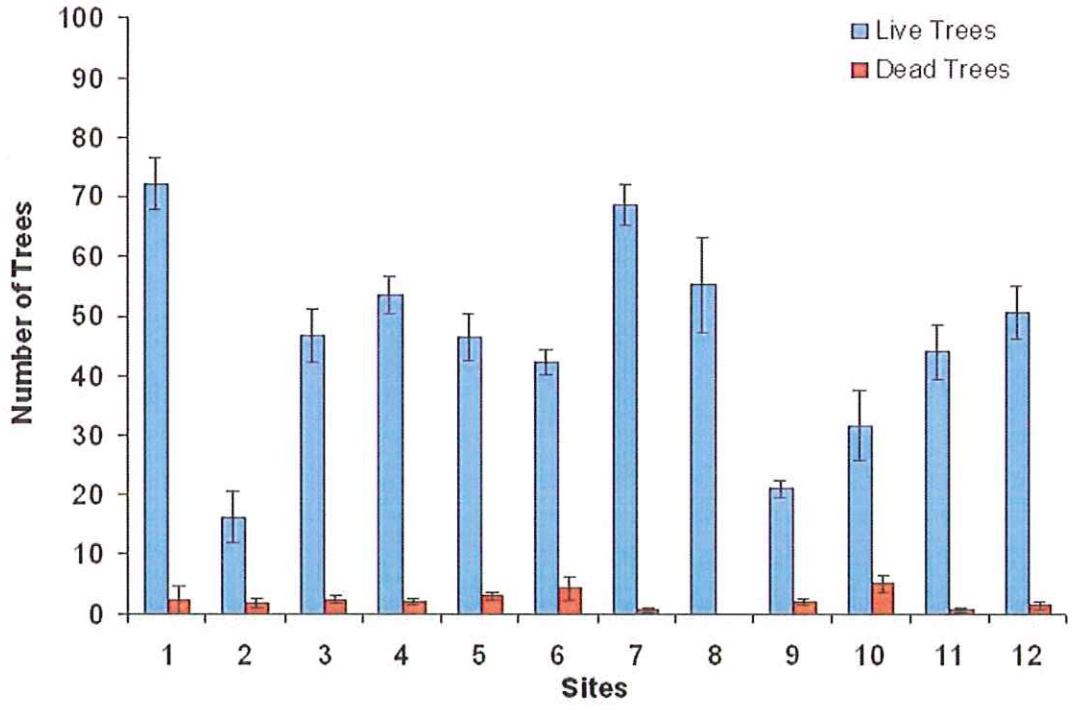

Figure 3.11 Mean number of trees per 10 m^2 at each site surveyed (+/- 1SE).

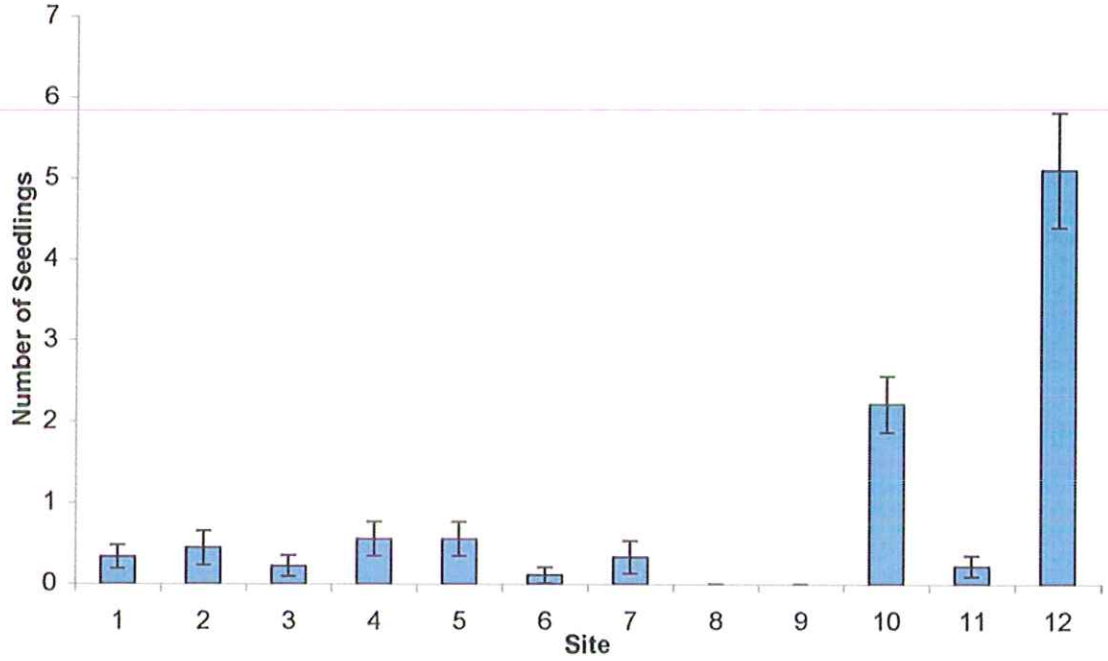

Figure 3.12 Mean number of seedlings in mangrove communities at each site surveyed (+/- 1SE).

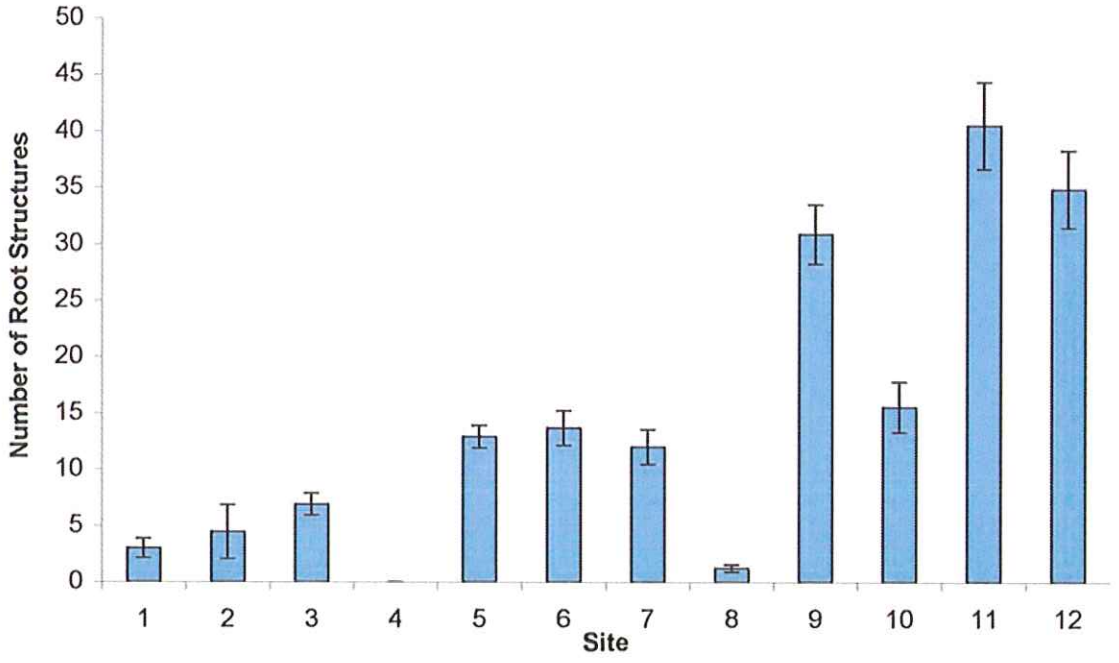

Figure 3.13 Mean number of root structures / m^2 in mangrove communities at each site surveyed (+/- 1SE).

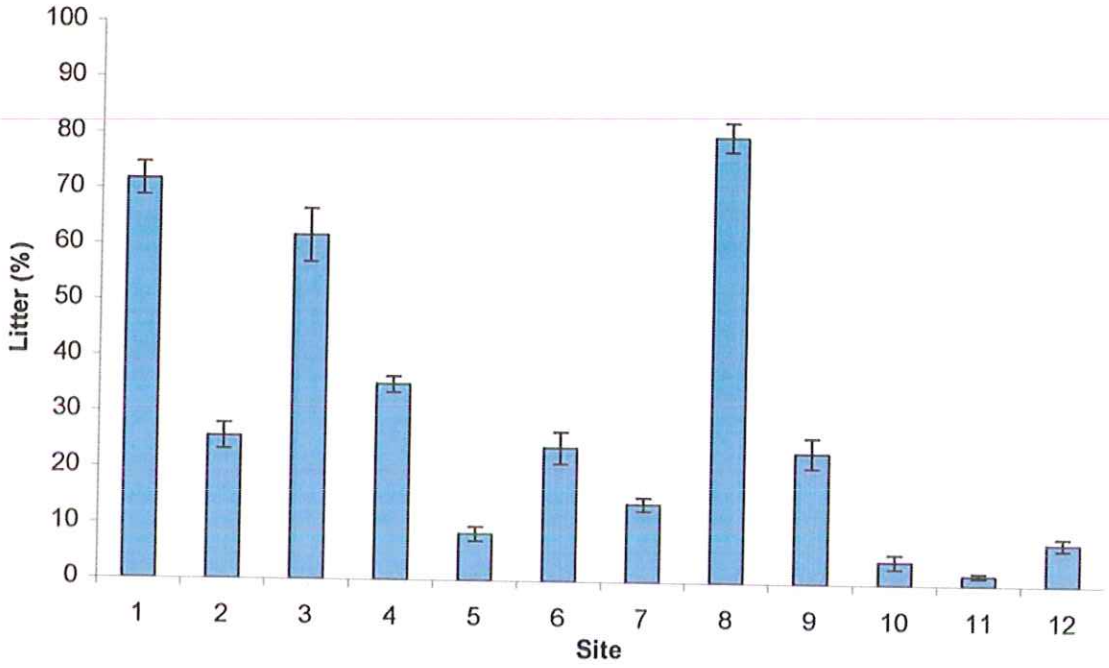

Figure 3.14 Mean percent cover of leaf litter in mangrove communities at each site surveyed (+/- 1SE).

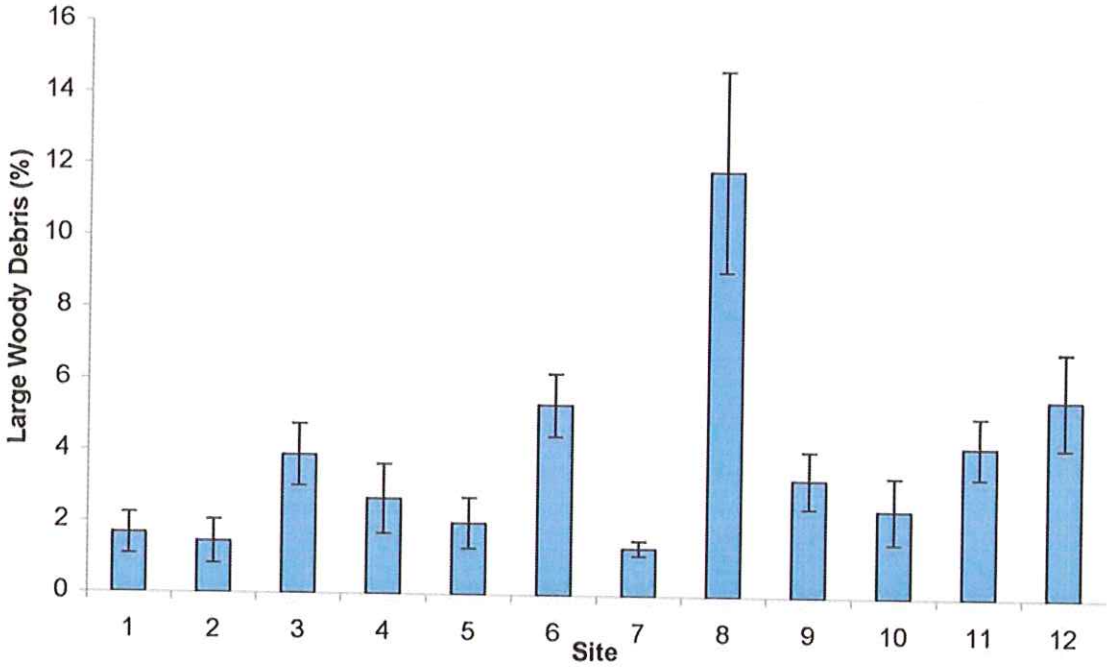

Figure 3.15 Mean percent cover of large woody debris in mangrove communities at each site surveyed (+/- 1SE).

3.3 Faunal Abundance

Maroon marsh crabs (*Perisesarma messa*), red-fingered marsh crabs (Parasesarma *erythrodactyla*) and mangrove crabs (*Neosarmatium* sp.) were present at sites seven, eight, nine and ten. Maroon marsh crabs and furry-clawed crabs (*Australoplax tridentata*) were present at sites eleven and twelve. Furry-clawed crabs and orange-clawed fiddler crabs (*Uca coarctata*) were also relatively abundant on the banks of the farms' inlet channel. Large mangrove cockles (*Polymesoda erosa*) were quite common at sites seven, eleven and twelve. Crabs and molluscs were sighted in sufficient abundance to permit comparison between sites.

No crab burrows were found in pond five (sites 1, 2, 3 & 4)(Figure 3.16). The highest densities of crab burrows were found in mangrove communities adjacent to the south Daintree River (sites 7, 10, 11 &12)(Figure 3.16). These sites also supported the greatest variety of burrow sizes (Figure 3.16), suggesting that a larger number of crab species are present in these communities. Significantly more small (< 10 mm) and medium (11 – 20 mm) crab burrows were present at sites seven, ten, eleven and twelve (Figure 3.16 & Appendix A). Site five also supported abundant medium sized crab burrows. Significantly more large (> 20 mm) crab burrows were present at sites six and nine).

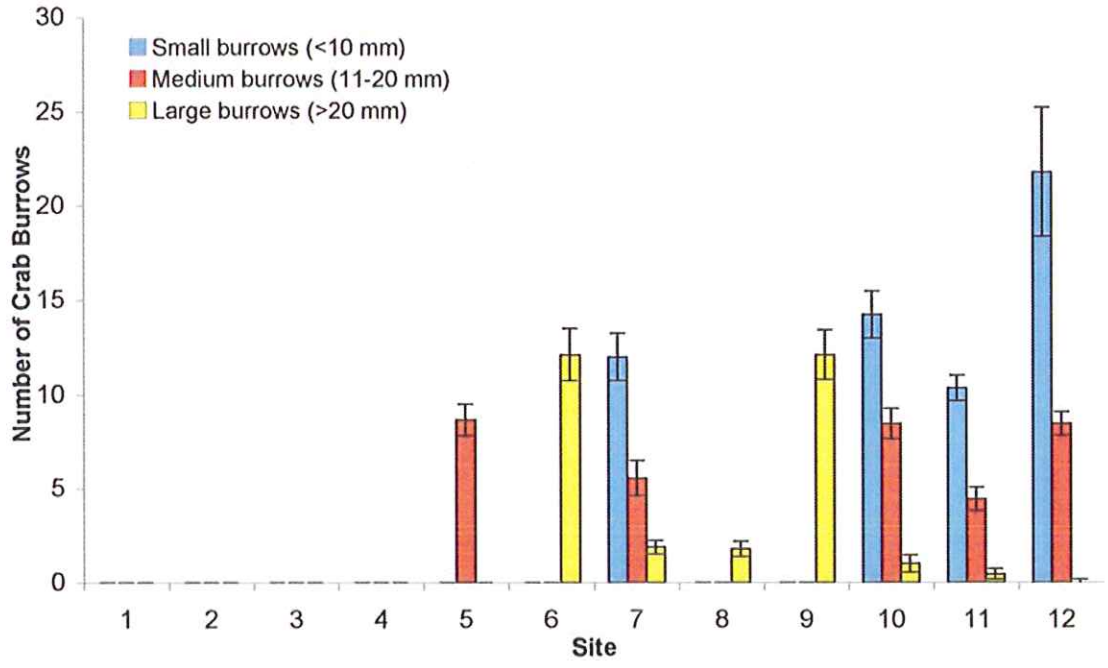

Figure 3.16 Mean number of crab burrows / m^2 in mangrove communities at each site surveyed (+/- 1SE).

3.4 Variation in Vegetative Characteristics and Faunal Abundance

Mangrove communities from settlement pond five; adjacent to the facilities inlet channel; below the containment bund; and downstream of the facility on the south Daintree River, differed in species composition, vegetative characteristics and the relative abundance of estuarine fauna and crab burrows (note the presence of relatively distinct site clusters in Principle Components Analysis (PCA))(Figure 3.17). The habitat characteristics or 'value' of mangrove communities in settlement pond five were very different to those from communities on the south Daintree River and adjacent to the facilities inlet channel. However they were relatively similar to those of communities on historically cleared land below the downstream containment bund (particularly site eight). This variation in relative habitat value between locations was primarily due to variation in the abundance of aboveground roots and crab burrows (Figure 3.17).

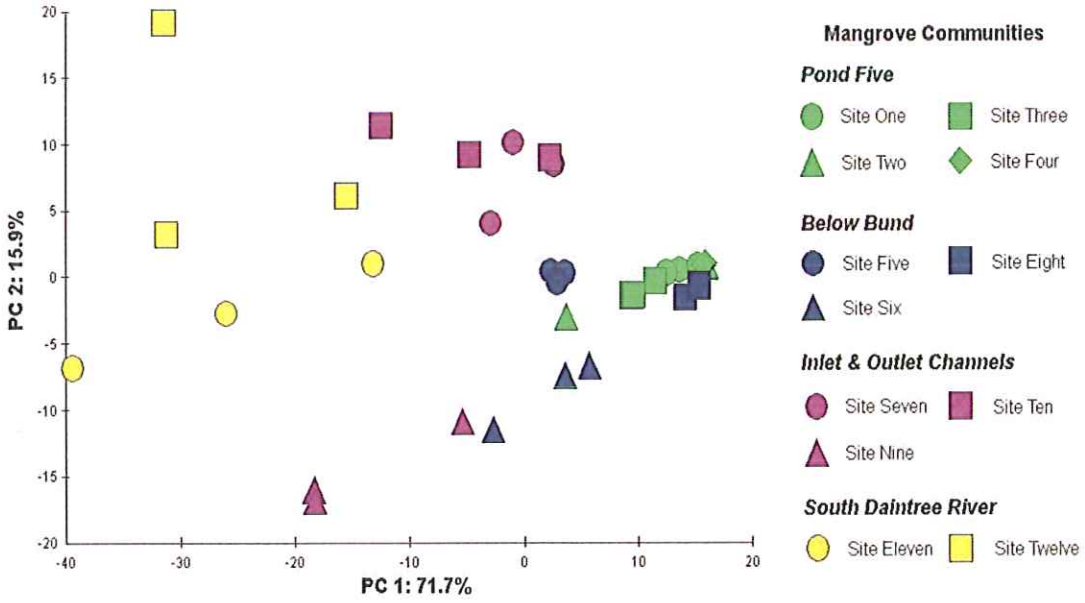

Figure 3.17 Principle Components Analysis (PCA) of the physical characteristics of mangrove communities of each site. The two axes account for 87.6 % of the variation in the data. PC1 primarily reflects variation in the abundance of aboveground roots; PC2 reflects variation the abundance of crab burrows.

Replicates from sites on the south Daintree River (7, 11 & 12) and adjacent to the inlet channel (9 & 10) are more diffusely distributed in PCA than those from sites in settlement pond five (1, 2, 3 & 4) or below the downstream containment bund (5, 6 & 8)(Figure 3.17). This reflects variation in both the structural heterogeneity of the mangrove habitat and the abundance of crab burrows at each location. Communities in settlement pond five and

below the downstream containment bund are characterised by a lack of structural habitat and an absence of crab burrows. This low value mangrove habitat is therefore less structurally variable than the habitat on the south Daintree River and adjacent to the inlet channel.

4 Relative Value of Mangrove Communities as Fisheries Habitat

4.1 Mangroves of Settlement Pond Five

The mangrove community of settlement pond five provides poor habitat to marine organisms and is likely to be of a very low value to estuarine fisheries. The community is completely dominated by mangroves that are tolerant of low salinities; freshwater wetland plants are relatively abundant; and the community contains a high cover of litter, suggesting poor tidal flushing and a very low frequency of tidal inundation. Mangroves have a low canopy height; provide a low degree of canopy cover; and offer little physical habitat (few seedlings, above ground roots and woody debris). However, limited structural relief is provided toward the downstream extent of the pond by remnant buttress roots of yellow mangroves, which were cleared prior to the establishment of the facility. This mangrove community supports no mangrove algae, crabs or molluscs and contains no crab burrows, reflecting the lack of connectivity with downstream estuarine waters.

4.2 Mangroves Below the Downstream Bund

Mangroves of historically cleared land below the downstream bund provide fair habitat to marine organisms and likely to have a low to moderate value to estuarine fisheries. The community is dominated by mangroves that are tolerant of low salinities, but contains a number of more truly estuarine species, including red mangroves and large-leafed orange mangroves. Leaf litter is abundant at some locations, suggesting a relatively low frequency and variable pattern of tidal inundation. Mangroves generally have a moderate canopy height and provide a low degree of canopy cover. The presence of some above ground roots; woody debris; and remnant buttress roots provide some structural relief. This mangrove community supports some mangrove algae and typically contains few crabs and crab burrows, though large marsh crabs are relatively abundant at certain locations.

4.3 Mangroves Adjacent to the Inlet Channel

The mangrove communities adjacent to the facilities inlet channel provide fair to good habitat for marine organisms and likely to have a moderate to high value to estuarine fisheries. These communities are dominated by mangrove species that are typical of

estuarine systems. Mangroves generally have a moderate canopy height and provide a high degree of canopy cover. Above ground roots and woody debris provide structural habitat. This mangrove community supports some mangrove algae and typically contains a relatively high abundance of crabs and crab burrows.

4.4 Mangroves of the south Daintree River

Mangroves of the south Daintree River provide high value habitat to marine organisms and are likely to be very important to estuarine fisheries. These 'climatic' communities support a high floral diversity and are dominated by mangrove species that are typical of lower estuarine systems. Mangroves generally have a tall canopy; provide a high degree of canopy cover; and contain abundant structural habitat (above ground roots, debris, tree trunks and seedlings). These mangrove communities support abundant mangrove algae and contain a relatively high abundance of crabs, mangrove cockles and crab burrows. These communities experience daily tidal inundation.

5 Conservation Values of Wetland Communities in Settlement Ponds Four and Five

5.1 Wetlands of State Significance

Vegetation in settlement ponds four and five is mapped as an Area of State Significance (significant coastal wetlands) in the Wet Tropics Coast Regional Coastal Management Plan (EPA 2003a). A significant coastal wetland is defined in the Wet Tropics Coast Regional Coastal Management Plan (EPA 2003a), as *"a wetland that is listed or mapped in a regional coastal plan or, in the absence of a regional coastal plan, an area that has the following characteristics:*

(a) it is listed as a wetland of international importance under the Ramsar Convention; or

(b) it is listed as a wetland of importance within the Queensland chapter of 'A Directory of Important Wetlands in Australia'; or

(c) it is an area of permanent or periodic inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres, that meets one or more of the following criteria:

- *(i) it is a good example of a wetland type occurring within a bioregion in Queensland;*
- *(ii) it plays an important ecological or hydrological role in the natural functioning of a major wetland system;*
- *(iii) it is important as a habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail;*
- *(iv) it supports a significant number of the bioregional populations of any native plant or animal taxa;*
- *(v) it supports native plant or animal taxa or communities that are considered endangered or vulnerable at the bioregional level; or*
- *(vi) it is of historical or cultural significance."*

Vegetation in settlement pond four is mapped primarily as 'of concern remnant native vegetation' (significant freshwater wetlands) in the costal management plan (EPA 2003a); vegetation in pond five is mapped as 'not of concern remnant native vegetation' (significant estuarine wetlands). Most (if not all) of the wetlands in the Wet Tropics region, along with most of the intertidal area along the coastline, are listed as being of State Significance. That is, levels of significance have not been assigned on a site-specific basis (for example as was done in south east Queensland by Mclean et al. 2001).

Vegetation in settlement ponds four and five is mapped as 'non-remnant' in the Queensland Herbariums' 'Regional Ecosystem' mapping (EPA 2003b). Vegetation in pond four is also mapped as 'essential habitat' for endangered, rare or threatened wildlife in the Queensland herbariums regional ecosystem mapping (EPA 2003b).

5.2 Wetlands of National Significance

The Great Barrier Reef and associated coastal areas is listed as a wetland of national importance (EA 2001). This wetland includes the mangrove communities of the lower Daintree River. Part of the wetland vegetation of settlement ponds four and five are included in the 'Lower Daintree River' Wetland of National Importance.

A wetland is listed as being of national importance if it (from Environment Australia 2001):

1. is a good example of a wetland type occurring within a biogeographic region in Australia;
2. is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
3. is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail;
4. supports 1% or more of the national populations of any native plant or animal taxa;
5. supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level; or
6. is of outstanding historical or cultural significance.

The Great Barrier Reef is listed as a wetland of national importance because it meets all six criteria (EA 2001). The Lower Daintree River wetland meets criteria one, two, three and five (EA 2001).

5.3 Wetlands of International Significance

Vegetation in settlement ponds four and five is not mapped as a wetland of international significance under the Ramsar Convention. The Ramsar convention protects wetlands

that are of international importance to migratory wader bird species. The closest Ramsar wetland is the Bowling Green Bay area, approximately 400 km south of Wonga Beach.

6 Conclusions

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Appendix A Results of Analysis of Variance (ANOVA) of Mangrove Habitat Data

Variable	Degrees of Freedom	Mean Squares	F Value	P Value
Mangrove Species	11, 24	3.33	8.57	**<0.0001**
Canopy Cover	11, 24	1544.44	17.51	**<0.0001**
Canopy Height	11, 24	26.44	12.53	**<0.0001**
Live Trees	11, 24	846.19	13.99	**<0.0001**
Dead Trees	11, 24	6.44	1.71	0.1325
Aboveground Root Structures	11, 96	1678.38	32.53	**<0.0001**
Seedlings	11, 96	19.38	22.39	**<0.0001**
Litter	11, 96	6601.91	97.96	**<0.0001**
Large Woody Debris	11, 96	76.80	4.92	**<0.0001**
Small Crab Burrows	11, 96	516.41	27.08	**<0.0001**
Medium Crab Burrows	11, 96	108.80	47.72	**<0.0001**
Large Crab Burrows	11, 96	55.54	49.77	**<0.0001**

Appendix 8

Daintree-Mossman EVS WQOs

Environmental Protection (Water) Policy 2009

Daintree and Mossman Rivers Basins Environmental Values and Water Quality Objectives

Basins Nos. 108 and 109 and adjacent coastal waters

Great state. Great opportunity.
And a plan for the future.
Queensland Government

Prepared by: Environmental Policy and Planning Division, Department of Environment and Heritage Protection

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November 2014

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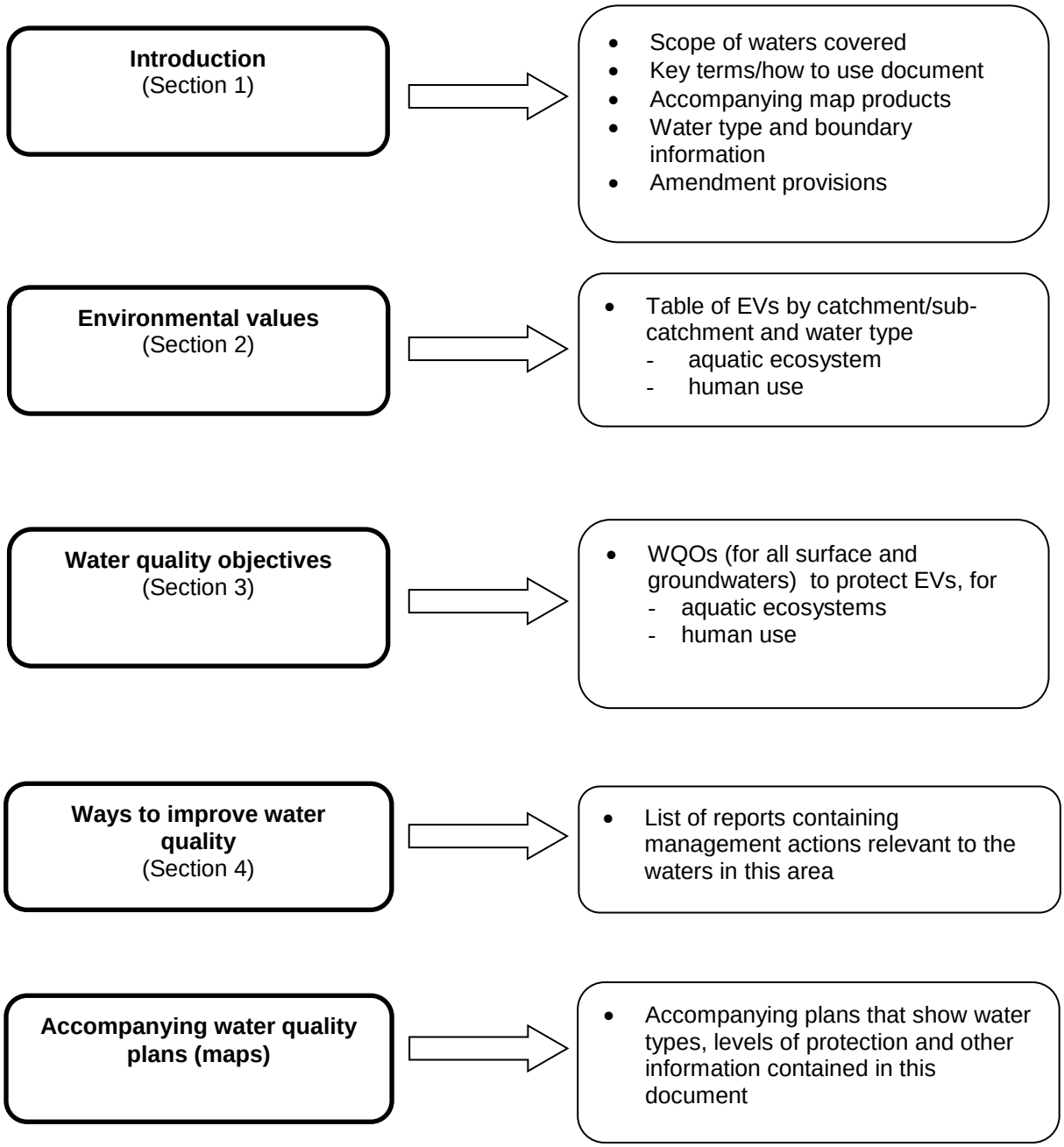

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Introduction and guidance on using this document

1 Introduction

This document is made under the provisions of the Environmental Protection (Water) Policy 2009 (EPP Water), which is subordinate legislation under the *Environmental Protection Act 1994* (EP Act).

The EPP Water and the EP Act provide a framework for:

- establishing environmental values (EVs) and management goals for Queensland waters, and deciding the water quality objectives (WQOs) to protect or enhance those EVs
- listing the identified EVs, management goals and WQOs under Schedule 1 of the EPP (Water).

This document contains the EVs, management goals, WQOs and map products for the waters of the Daintree and Mossman rivers basins (108 and 109)[1] and the adjacent coastal waters, to the limit of Queensland waters.

The document is listed under Column 2 of Schedule 1 of the EPP Water respectively for the Column 1 entries of the Daintree River basin (108) and the Mossman River basin (109) and adjacent coastal waters.

1.1 Purpose

The purpose of this document is to identify locally relevant environmental values and water quality objectives for the region, based on local historical data and in close consultation with the local community. These water quality objectives are used to help set development conditions, influence local government planning schemes and underpin report card grades for ecosystem health monitoring programs. These water quality objectives have been refined from national and state water quality guidelines and present a truer picture of the values and water quality of local waterways. This ensures the values the community holds for its waterways can be maintained and improved into the future, without imposing unrealistic standards from national guidelines that may be inappropriate for local conditions.

1.2 Waters to which this document applies-project waters

This document applies to all surface waters and groundwaters of the Daintree and Mossman River basins and adjacent coastal waters, as indicated in the accompanying plans WQ1081—surface waters, WQ1082—coastal waters and WQ1083—groundwaters.

The surface waters and groundwaters include the:

- Bloomfield River catchment
- Daintree River catchment
- northern coastal creeks, east of Bloomfield and north of the Daintree river catchment
- Saltwater Creek catchment
- Mossman River catchment
- Mowbray River catchment
- central coastal creeks, east of Mossman and north of Mowbray river catchment
- southern coastal creeks, east and south of Mowbray river catchment
- Daintree and Mossman basins wetlands, lakes and drinking water storages

[1] Queensland Drainage Division number and river basin names are published at Geoscience Australia's website www.ga.gov.au.

- Daintree and Mossman rivers basins groundwaters
- Daintree and Mossman enclosed coastal waters and open coastal waters to the limit of Queensland waters.

The geographical extent of waters is shown in the accompanying maps, and extends:

- north to the Endeavour (107) and the Normanby (105) rivers basins
- west to the Mitchell River basin (919)
- south to the Barron River basin (110)
- east to the jurisdictional limit of Queensland waters.

1.3 Guidance on using this document

1.3.1 List of acronyms and terms

ADWG means the Australian Drinking Water Guidelines (2011)-updated December 2013, prepared by the National Health and Medical Research Council (NHMRC)[2].

AWQG or ANZECC guidelines means the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (October 2000) prepared by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ)[3].

Aquatic ecosystem means the animals, plants and micro-organisms that live in water, and the physical and chemical environment and climatic regime in which they interact. The physical components (e.g. light, temperature) and chemical components (e.g. oxygen, nutrients), and to a lesser extent biological interactions, determine what lives and breeds in the aquatic ecosystem and the food web structure.

Basin means hydrologic drainage basin. Refer to the Geoscience Australia website www.ga.gov.au.

Catchment means the land area draining into a watercourse. The limits of a catchment are the heights of land (watershed) separating it from neighbouring catchments.

Developed fresh waters (or waters in developed areas) are waters in areas impacted through some form of development e.g. urban, industrial, rural residential or agricultural development and land uses. These waters are generally assigned the Moderately Disturbed (MD) level of protection.

Ecological health or condition of an aquatic ecosystem means the ability to maintain key ecological processes and organisms so that their species compositions, diversity and functional organisations are as comparable as possible to those occurring in natural habitats. There are four levels of aquatic ecosystems protection—High Ecological Value (HEV), Slightly Disturbed (SD), Moderately Disturbed (MD) and Highly Disturbed (HD). See 'Management intent' for waters under the EPP Water (section 14).

Environmental values means the EVs at Section 2. EVs for waters are the qualities of water that make it suitable for supporting aquatic ecosystems and human uses. EVs under the EPP Water are shown below.

[2] The Australian Drinking Water Guidelines are available on the National Health and Medical Research Council website www.nhmrc.gov.au.

[3] The ANZECC guidelines are available on the Australian Government's National Water Quality Management Strategy website.

Environmental values (EVs)	Potentially applicable to:	
	Tidal waters	Fresh (non-tidal) waters, including ground water
Aquatic ecosystem EV		
Environmental values may be stated for four levels of aquatic ecosystems protection	✓	✓
• high ecological value waters (effectively unmodified)		
• slightly disturbed waters (slightly modified)		
• moderately disturbed waters (adversely affected to a relatively small but measurable degree)		
• highly disturbed waters (measurably degraded).		
Human use EVs		
Suitability of the water for agricultural use (e.g. crop irrigation, stock watering, farm use)		✓
Suitability of the water for aquaculture (e.g. prawns, barramundi)	✓	✓
Suitability of the water for producing aquatic foods (e.g. fish, crustaceans) for human consumption	✓	✓
Suitability of the water for supply as drinking water (i.e. raw water, before treatment)		✓
Suitability of the water for industrial use (e.g. mining, minerals refining/processing)		✓
Suitability of the water for recreation:		
• primary contact (e.g. swimming)	✓	✓
• secondary contact recreation (e.g. boating)	✓	✓
• visual (no contact) recreation	✓	✓
The cultural and spiritual values of the water	✓	✓

GBRMPA guidelines means the Water Quality Guidelines for the Great Barrier Reef Marine Park, Great Barrier Reef Marine Park Authority 2010, published at the GBRMPA website.

Management goals means the goals stated in Section 2.2 of this document. Management goals are used to assess whether the corresponding environmental value is being maintained. They reflect the desired levels of protection for the aquatic system and any relevant environmental problems.

M**anagement intent** for waters—see Section 2.2.

Monitoring and Sampling Manual 2009 means the protocol document under the EP Act published on the department's website at www.ehp.qld.gov.au.

Queensland waters means waters within the state (i.e. headwaters to the three nautical mile jurisdiction limit).

QWQG means the Queensland Water Quality Guidelines, published at www.ehp.gov.au.

Soil degradation, for the purposes of the objective for irrigation water in section 2.2.3, means reduced permeability and soil structure breakdown caused by the level of sodium in the irrigation water, assessed using the sodium adsorption ratio.

Undeveloped fresh waters (or waters in undeveloped areas) are waters within protected areas such as National Park, Regional Park and forest reserves or in other undisturbed states. These waters are given High Ecological Value (HEV) or Slightly Disturbed (SD) levels of protection.

Water quality indicator for an environmental value, under the EPP Water, means a physical, chemical, biological or other property that can be measured or decided in a quantitative way. For example:

- the concentration of nutrients and pH value are examples of chemical indicators
- Secchi disc water clarity measure is an example of a physical indicator
- seagrass depth range, macro-invertebrate family richness are examples of biological indicators.

Water quality guidelines under the EPP Water means the quantitative measures (expressed as contaminant concentrations, loads or narrative statements) for indicators which protect a stated EV. For a particular water, the indicators and water quality guidelines for an EV are decided using the following documents (in order of priority):

- site specific documents for the water
- the QWQG
- the AWQG
- other relevant documents published by a recognised entity.

Water quality guidelines may be modified by economic and social impact assessments of protecting the EVs for waters.

Water quality objectives (WQOs) means the WQOs at Section 3 which protect the EVs at Section 2.

WQOs are the quantitative measures of the various water quality indicators that protect receiving waters aquatic ecosystem and human use EVs. WQOs are:

- numerical concentration levels, sustainable loads measures or narrative statements of indicators
- based on water quality guidelines, but may be modified by economic and social inputs
- receiving water quality objectives— not individual point source objectives or emission standards
- long-term goals for water quality management.

WQOs compliance assessment means the compliance assessment at Appendix D of the QWQG.

Water type means the grouping of waters within which water quality is sufficiently consistent that a single guideline value can be applied to all waters within each group (or water type). See section 1.5.

1.3.2 Use of this document

Section 1 – Introduction and guidance on using this document.

Section 2 – lists the identified EVs for protection for particular waters.

Section 3 – lists the WQOs to protect the corresponding aquatic ecosystems and human use EVs for each water type, including both surface waters and groundwaters.

This document refers to a number of water quality guidelines, codes and other reference sources. In particular, the QWQG provide detailed information on water types, water quality indicators, derivation of local water quality guidelines, monitoring and assessing compliance. ANZECC guidelines contain national level water quality guidelines, for example water quality guidelines for toxicants.

Section 4 – lists documents relevant to the improvement of water quality in the Daintree and Mossman River basins.

1.4 Information about mapped areas and boundaries

The boundaries in the accompanying pdf plans are indicative only. The corresponding GIS datasets are available as part of the Wet Tropics Environmental Values Schedule 1 Geodatabase November 2014—held at the department's offices at Level 10, 400 George Street Brisbane.

The GIS datasets may be downloaded free of charge from the Queensland Spatial Catalogue (QSpatial) at http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

For further information, please email the department at epa.ev@ehp.qld.gov.au

1.5 Water types and basis for boundaries

1.5.1 **Water types**

Water types in this document are identified in Section 3 and the accompanying plans. Water types include (see the QWQG and GBRMPA guidelines):

- upland fresh waters—small upper catchments freshwater streams above 150 metres altitude, moderate to fast flowing with steeper gradients than lowland fresh waters, downstream limit – lowland fresh waters
- lowland fresh waters—larger slow moving freshwater streams and rivers, below 150 metres altitude, downstream limit—upper estuary
- freshwater lakes/reservoirs—deep water habitat situated in dammed river channels
- upper/mid estuary waters:
  - upstream tidal limit—determined from EHP wetland mapping, declared downstream fresh water limit, mean high water springs or limiting structure
  - downstream limit—lower estuary
- enclosed coastal/lower estuary waters—occur at the downstream end of estuaries and include shallow coastal waters (<6m depth) in enclosed bays
- open coastal waters—extend from the seaward limit of the enclosed coastal water body to the jurisdictional limit of Queensland waters.[4]
- groundwaters—sub-artesian waters that occur in an aquifer
- wetlands—palustrine, lacustrine and estuarine—see EHP mapping at Wetlandsinfo website.
- marinas, boat harbours, tidal canals and constructed estuaries

1.5.2 **Water type boundaries**

The boundaries of different water types are mapped in the accompanying plans using the following attributes, see QWQG for definitions, including—

- altitude (from Australian Height Datum, Geoscience Australia)
- catchment or sub catchment boundaries
- coastline mapping
- downstream or tidal limit—structure (limiting), declared downstream limit or mean high water springs
- enclosed coastal waters (GBRMPA 2014)
- geographic coordinates
- highest/lowest astronomical tide

[4] Beyond the jurisdictional limit of Queensland waters, mid-shelf marine waters extend from the limit of open coastal waters to 24 km offshore and offshore marine waters extend from the limit of mid-shelf waters to 170 km offshore. See GBRMPA guidelines.

- jurisdiction or defined coastal waters limits
- maritime mapping conventions
- plume line—seaward limit of detection of terrestrial impact—chlorophyll-a mapping (GBRMPA 2014)
- surveyed terrestrial and maritime boundaries.

1.6 Matters for amendment

Under section 12 (2) (b) of the EPP (Water), amendments of the following type may be made to this schedule 1 document for the purposes of a replacement document:

- changes to EVs
- changes to management goals
- changes to WQOs
- changes to management intent (level of protection) categories
- changes to water type boundaries/descriptions
- updates to information/data sources, websites and email contact details, agency/departmental names, other institutional names, references.

Environmental values for waters of the Daintree and Mossman River basins and adjacent coastal waters

2 Environmental values

2.1 Environmental values

The EVs for the surface waters and groundwaters of the Daintree and Mossman rivers basins and adjacent coastal waters are listed at tables 1.1 and 1.2, and mapped in the accompanying plans and the GIS datasets.

The EVs were established during stakeholder consultation undertaken by the department and Terrain NRM – see Consultation Report: Environmental Values for Wet Tropics Basins, (Terrain NRM, September 2012).

2.2 Management goals

2.2.1 **Management intent for waters – under the EPP Water**

It is the management intent for waters that the decision to release waste water or contaminants to the waters must ensure the following:

- for high ecological value (HEV) waters—the measures for the indicators for all EVs are maintained
- for slightly disturbed (SD) waters—the measures for the slightly modified physical or chemical indicators are progressively improved to achieve the WQOs for HEV waters
- for moderately disturbed (MD) waters:
    - if the measures for indicators of the EVs achieve the water quality objectives for the water—the measures for the indicators are maintained at levels that achieve the WQOs for the water or
    - if the measures for indicators of the EVs do not achieve the water quality objectives for the water—the measures for indicators of the EVs are improved to achieve the WQOs for the water
- for highly disturbed (HD) waters—the measures for the indicators of all environmental values are progressively improved to achieve the water quality objectives for the water.

The mapping of HEV waters, SD waters and HD waters, mapped in the accompanying plans (or GIS datasets) informs the determination of management intent for particular waters.

Note 1 – All other waters in the accompanying plans are moderately disturbed (MD).

Note 2 – See the Environmental Protection Regulation 2008, section 51.

Note 3 – See the Environmental Protection (Water) Policy 2009, section 14.

2.2.2 **Raw water for treatment for human consumption**

- Minimise the risk that the quality of raw water taken for treatment for human consumption results in adverse human health effects.
- Maintain the palatability rating of water taken for treatment for human consumption at the level of good as set out in the Australian Drinking Water Guidelines (ADWG).
- Minimise the risk that the quality of raw water taken for treatment for human consumption results in the odour of drinking water being offensive to consumers.

2.2.3 **Irrigation water**

The management goal for irrigation water is that the quality of surface water, when used in accordance with the best irrigation and crop management practices and principles of ecologically sustainable development, does not result in crop yield loss or soil degradation.

2.2.4 **Recreational water quality**

The management goal for recreational water quality is to achieve a low risk to human health from water quality threats posed by exposure through ingestion or contact during recreational use of water resources.

Table 1.1 Environmental values for the waters of the Daintree River basin (108) and adjacent coastal waters

Daintree River basin (108)	Environmental values											
	Aquatic ecosystems	Irrigation	Farm supply/use	Stock water	Aquaculture	Human consumer	Primary recreation [4]	Secondary recreation [4]	Visual recreation	Drinking water	Industrial use	Cultural and spiritual values
Surface fresh waters (rivers, creeks, streams) in developed areas (e.g. urban, industrial, rural residential, agriculture, farmlands)												
Daintree River – including Stewart Creek	✓		✓	✓		✓			✓			✓
Bloomfield River	✓	✓		✓		✓	✓	✓	✓	✓		✓
Douglas Northern Coastal fresh waters	✓	✓		✓		✓	✓	✓	✓	✓		✓
Saltwater Creek	✓						✓		✓			✓
Surface fresh waters in undeveloped areas (e.g. National Parks, forest reserves)												
Daintree River – including Stewart Creek	✓								✓	✓		✓
Bloomfield River	✓								✓	✓		✓
Douglas Northern Coastal fresh waters	✓						✓	✓	✓			✓
Saltwater Creek	✓								✓	✓		✓
Groundwaters	✓	✓	✓	✓						✓		✓
Estuaries/bays, coastal and marine waters												
All estuarine waters in Daintree River basin	✓					✓		✓	✓			✓
Daintree coastal waters	✓					✓	✓	✓	✓		✓	✓

Table 1.2 Environmental values for the waters of the Mossman River basin (109) and adjacent coastal waters

Mossman River basin (109)	Environmental values											
	Aquatic ecosystems	Irrigation	Farm supply/use	Stock water	Aquaculture	Human consumer	Primary recreation [4]	Secondary recreation [4]	Visual recreation	Drinking water	Industrial use	Cultural and spiritual values
Surface fresh waters (rivers, creeks, streams) in developed areas (e.g. urban, industrial, rural residential, agriculture, farmlands)												
Mossman River	✓						✓		✓		✓	✓
Packers Creek – including coastal creeks north of Mowbray and east of Mossman River catchments	✓						✓		✓			✓
Mowbray River	✓			✓			✓		✓			✓
Hartleys Creek – including coastal creeks east and south of Mowbray River catchment	✓				✓	✓	✓	✓	✓	✓		✓
Surface fresh waters in undeveloped areas (e.g. National Parks, forest reserves)												
Mossman River	✓						✓		✓	✓		✓
Packers Creek – including coastal creeks north of Mowbray and east of Mossman River catchments	✓								✓	✓		✓
Mowbray River	✓						✓		✓			✓
Hartleys Creek – including coastal creeks east and south of Mowbray River catchment	✓						✓	✓	✓	✓		✓
Groundwaters	✓	✓	✓	✓						✓		✓
Estuaries/bays, coastal and marine waters												
All natural estuarine waters of the Mossman River basin	✓				✓	✓		✓	✓			✓

Mossman River basin (109)	Environmental values											
	Aquatic ecosystems	Irrigation	Farm supply/use	Stock water	Aquaculture	Human consumer	Primary recreation [4]	Secondary recreation [4]	Visual recreation	Drinking water	Industrial use	Cultural and spiritual values
Packers Creek canals, constructed estuaries, marinas and boat harbours	✓				✓	✓	✓	✓	✓		✓	✓
Mossman coastal waters	✓					✓	✓	✓	✓		✓	✓

Notes:

1. ✓ means the EV is selected for protection.
2. Refer to the accompanying maps for the spatial locations of the EVs.
3. Blank indicates that the EV is not chosen for protection.
4. The selection of recreational EVs for waters does not mean that these waters are free of dangerous aquatic organisms, for example venomous organisms (e.g. marine stingers including box jellyfish, irukandji jellyfish), crocodiles, and sharks. Direct contact with dangerous aquatic organisms should be avoided. Refer to EHP CrocWatch, council, www.health.qld.gov.au, www.beachsafe.org.au, www.marinestingers.com.au and other information sources for further details on swimming safety and information on specific waters.

Water quality objectives to protect environmental values

3 Water quality objectives to protect environmental values

This section provides WQOs to protect the EVs for the waters at Section 2.

- Section 3.1 information for reference to the State Planning Policy: state interest – water quality.
- Section 3.2 states the surface waters WQOs to protect the aquatic ecosystem EV.
- Section 3.3 states the surface waters WQOs to protect the human use EVs.
- Section 3.4 states the groundwater WQOs to protect the groundwater EVs.

3.1 State planning policy: state interest – water quality

The State Planning Policy (SPP) defines the Queensland Government's policies about matters of state interest in land use planning and development (a state interest is defined under the *Sustainable Planning Act 2009*).

Water quality is a state interest. The SPP (state interest – water quality) seeks to ensure that 'the environmental values and quality of Queensland waters are protected and enhanced'. It includes provisions relating to planning schemes, acid sulfate soils and water supply buffer areas.

The provisions of the SPP are operationalised through the SPP code – water quality (Appendix 3 of the SPP). The purpose of the code is to 'ensure development is planned, designed, constructed and operated to manage stormwater and wastewater in ways that support the protection of environmental values identified in the Environmental Protection (Water) Policy 2009'. The code contains detailed performance objectives for planning schemes, development and land use activities to implement the code's purpose. These include stormwater management design objectives by climatic region (construction and post-construction phases).

The SPP (state interest – water quality) is supported by the State Planning Policy—state interest guideline – water quality. The SPP (including SPP code) and supporting guideline are available from the DSDIP website.

3.2 Water quality objectives to protect aquatic ecosystems and human use environmental values

This section lists the WQOs for the various water types at the stated levels of protection to protect the aquatic ecosystems environmental values for the surface waters of the Daintree and Mossman rivers basins and adjacent coastal waters at Section 2.

Procedures for the application of WQOs for aquatic ecosystem protection, and compliance assessment protocols can be found in Section 5 and Appendix D of the QWQG. For the comparison of test site monitoring data against WQOs, the median water quality value (e.g. concentration) of a number (preferably five or more) of independent samples at a particular monitoring ('test') site should be compared against the water quality objective of the same indicator, water type and level of aquatic ecosystem protection, as listed in table 2 below. For WQOs based on GBRMPA data, where single value WQOs are given for specified indicators (e.g. particulate N, Secchi depth), these should be compared to annual mean (rather than median) values. Relevant seasonal adjustments can be referenced in GBRMPA (2010) Water quality guidelines for the Great Barrier Reef Marine Park 2010. Also refer to notes after the tables.

WQOs for metals and other toxicants in sediments, in all cases reference is made to the ANZECC guidelines.

WQOs for metals and other toxicants in waters, where not stated in this document, are referred to the ANZECC guidelines. In the case of aluminium, reference is made to a recent peer reviewed study of toxicity of aluminium in marine waters by Golding et al. (2014). This study used ANZECC protocols to derive a marine guideline value of 24 µg/L of aluminium (that applies to the measured concentration in seawater that passes through an 0.45 µm filter) to protect 95% of species that applies to slightly to moderately disturbed waters, and 2.1 µg/L to protect 99% of species which applies to HEV waters. This supersedes the existing low reliability guideline of 0.5 µg/L that was derived using conservative safety margins from limited data.

- Golding, L.A., Angel, B.M., Batley, G.E., Apte, S.C., Krassoi, R. and Doyle, C.J. 2014. Derivation of a water quality guideline for aluminium in marine waters. Environmental Toxicology and Chemistry (Accepted) (DOI: 10.1002/etc.2771).

Water quality objectives for surface waters to protect the aquatic ecosystem environmental values

3.2.1 Surface water quality objectives

Tables 2.1 to 2.5 include the following information for the surface waters of the various catchments and adjacent coastal waters:

- Water quality objectives for physico-chemical, nutrient, algal and water clarity indicators under baseflow conditions—Table 2.1.
- Water quality objectives for nutrients and suspended solids during high flow periods – Table 2.2
- Water quality objectives for specific pesticides and biocides – Table 2.3.
- Water quality objectives for other ions, metals and chemical indicators in surface waters—Table 2.4.
- Freshwater macroinvertebrate objectives for moderately disturbed waters – Table 2.5.

Note: Event flow WQOs are provided in table 2.2. Unless otherwise stated all other WQOs provided are for application only during baseflow conditions.

Table 2.1 Water quality objectives for physico-chemical, nutrient, algal and water clarity indicators to protect the aquatic ecosystems EVs under baseflow conditions

Level of protection	Water type	Water quality objectives													
		Physico-chemical		Nutrients								Algal growth	Water clarity		
		DO	pH	Ammonia N	Oxidised N	Particulate N	Organic N	Total N	FRP	Particulate P	Total P	Chl-a	Turbidity	Secchi	TSS
		% Saturation		µg/L									NTU	m	mg/L
Table Notes		**Water Quality Objectives** shown as 20th, 50th and 80th percentiles (i.e. 3-4-5) or as a single value of median or 80th percentile (i.e. 15). DO and pH may be shown as a range of 20th and 80th percentiles (i.e. 85-105). **Seagrass:** Local seagrass distribution and composition is maintained as measured by extent of seagrass, species diversity and depth limit. Minimum light requirement for seagrass is a PAR two week moving average of greater than 6 mol m^{-2} day^{-1}. This is minimum requirement only for seagrass health and is generally below average harbour conditions. It does not include potential impacts on benthic microalgae and phytoplankton at this light level. Objective based on Chartrand et al. *(2012) Development of a Light-Based Seagrass Management Approach for the Gladstone Western Basin Dredging Program.* **Mangroves:** Objective of no net loss of mangrove area. The Queensland Herbarium conducts biennial mapping of mangrove cover and this could be used as an assessment tool. Mapping is available from EHP. **Wetlands:** for high impact earthworks within Great Barrier Reef wetland protection areas, refer to the guideline 'Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments', and the Queensland wetland buffer planning guideline, available from the department's website. Also refer to Section 3.2.3.													
High ecological value waters/ slightly disturbed waters	Upland fresh water (HEV3001)	90-95-100[1]	6.0-6.5-7.5[1]	3-4-6[1]	10-15-30[1]	nd	75-100-125[1]	90-120-150[1]	3-4-5[1]	nd	5-7-10[1]	0.5[1]	1-2-5[1]	nd	1-2-5[3]
	Lowland fresh water (HEV3001/ HEV3123)	85-120[1]	6.0-8.0[1]	10[1]	30[2]	nd	200[1]	240[1]	4[1]	nd	10[1]	1.5[1]	15[1]	nd	2-5-10[4]
	Fresh water lakes/ reservoirs (HEV3001)	90-120[1]	6.0-8.0[1]	10[1]	17[3]	nd	330[1]	350[1]	5[1]	nd	10[1]	3[1]	2-200[1]	nd	nd
	Wetlands (HEV3001)	90-120[1]	6.0-8.0[1]	10[1]	17[3]	nd	330-1180[1]	350-1200[1]	5-25[1]	nd	10-50[1]	10[1]	2-200[1]	nd	nd
	Mid estuarine and tidal canals, constructed estuaries, marinas and boat harbours (HEV3001)	80-85-105[1]	6.5-7.3-8.4[1]	5-10-15[1]	2-15-30[1]	nd	100-100-200[1]	110-130-250[1]	2-3-5[1]	nd	10-15-20[1]	1-2-3[1]	2-5-10[1]	2-1.5-1[1]	nd
	Enclosed coastal/lower estuary (HEV3001)	85-105[1]	6.5-7.3-8.4[1]	15	10	nd	135[1]	160[1]	5[1]	nd	20[1]	2.0[1]	10[1]	1.0[1]	nd
	Open coastal[2] (HEV3121)	95-100-105[2]	8.1-8.3-8.4[2]	1-3-7[2]	0-0-1[2]	≤20[2]	nd	76-105-140[2]	0-2-3[2]	≤2.8[2]	8-14-22[2]	<0.45[2]	0.6-0.9-1.8[2]	≥10[2]	≤2[2]

Level of protection	Water type	Water quality objectives													
		Physico-chemical		Nutrients								Algal growth	Water clarity		
		DO	pH	Ammonia N	Oxidised N	Particulate N	Organic N	Total N	FRP	Particulate P	Total P	Chl-a	Turbidity	Secchi	TSS
		% Saturation		µg/L									NTU	m	mg/L
High ecological value waters/ slightly disturbed waters	Open coastal[2] (HEV3121)	**Total dissolved N**: 57-80-110 µg/L **Total dissolved P**: 4-8-18 µg/L **Silicate**: 90-165-260 µg/L **Temperature**: <1°C increase above long term (20 year) average maximum													
	Offshore waters[2] (HEV3122)	95-105[2]	8.1-8.3-8.4[2]	1-4-10[2]	0-1-2[2]	10-13-17[2]	nd	71-96-122[2]	0-1-3[2]	1.2-1.9-2.6[2]	4-6-9[2]	0.2-0.3-0.5[2]	<1[2]	10-13-16[2]	0.3-0.6-1.1[2]
		Total dissolved N: 54-74-97 µg/L **Total dissolved P**: 2-4-8 µg/L **Silicate**: 28-52-104 µg/L **Temperature**: <1°C increase above long term (20 year) average maximum													
Moderately disturbed waters	Upland fresh water	90-100[1]	6.0-7.5[1]	<6[1]	<30[1]	nd	<125[1]	<150[1]	<5[1]	nd	<10[1]	<0.6[1]	<6[1]	nd	<5[3]
	Lowland fresh water	85-120[1]	6.0-8.0[1]	<10[1]	<30[1]	nd	<200[1]	<240[1]	<4[1]	nd	<10[1]	<1.5[1]	<15[1]	nd	<10[4]
	Freshwater lakes/ reservoirs	90-120[1]	6.0-8.0[1]	<10[1]	<10[1]	nd	<330[1]	<350[1]	<5[1]	nd	<10[1]	<3[1]	2-200[1]	nd	nd
	Wetlands	90-120[1]	6.0-8.0[1]	<10[1]	<10[1]	nd	330-1180[1]	350-1200[1]	5-25[1]	nd	10-50[1]	<10[1]	2-200[1]	nd	nd
	Mid estuarine and tidal canals, constructed estuaries, marinas and boat harbours	80-105[1]	6.5-8.4[1]	<15[1]	<30[1]	nd	<200[1]	<250[1]	<5[1]	nd	<20[1]	<3[1]	<10[1]	>1[1]	nd
	Enclosed coastal/lower estuary	85-105[1]	6.5-8.4[1]	<15[1]	<10[1]	nd	<135[1]	<160[1]	<5[1]	nd	<20[1]	<2[1]	<10[1]	>1[1]	nd
Slightly – moderately disturbed waters	Open coastal[2]	95-105[2]	8.1-8.4[2]	≤3[2]	≤1[2]	≤20[2] (annual mean)	nd	≤105[2]	≤2[2]	≤2.8[2] (annual mean)	≤14[2]	≤0.45[2] (annual mean)	≤1[2]	≥10[2] (annual mean)	≤2[2] (annual mean)
		Total dissolved N: ≤80 µg/L **Total dissolved P**: ≤8 µg/L **Silicate**: ≥165 µg/L **Temperature**: <1°C increase above long term (20 year) average maximum													

Level of protection	Water type	Water quality objectives												
		Physico-chemical		Nutrients								Algal growth	Water clarity		
		DO	pH	Ammonia N	Oxidised N	Particulate N	Organic N	Total N	FRP	Particulate P	Total P	Chl-a	Turbidity	Secchi	TSS
		% Saturation		µg/L									NTU	m	mg/L
Highly disturbed waters		Assess existing water quality at the highly disturbed test site. Initial objective is to ensure no deterioration from this. Long-term objective is to attain the moderately disturbed objective value. Intermediate objectives can be set based on (a) 95%ile of reference values from a slightly disturbed reference site or (b) on references values from another site that is highly disturbed but that is nevertheless in measurably better condition than the test site[1].												

Notes:

- DO: dissolved oxygen, FRP: filterable reactive phosphorus, Chl-a: chlorophyll-a, TSS: total suspended solids. nd: no (or insufficient) data.
- Units % saturation: percent saturation, µg/L: micrograms per litre, NTU: nephelometric turbidity units, m: metres, mg/L: milligrams per litre.

Sources:

1. Queensland Water Quality Guidelines 2009.
2. GBRMPA analysis of Reef Rescue Marine Monitoring Program and/or Long Term Monitoring Program datasets.
3. Analysis of DSITIA water quality monitoring data and Great Barrier Reef Catchment Loads Monitoring Program.

Table 2.2 Water quality objectives for nutrients and suspended solids to protect aquatic ecosystem EVs during high flow periods

Water quality objectives	Ammonia N	Oxidised N	Particulate N	DON	TN	FRP	Particulate P	DOP	TP	TSS
Units	µg/L									mg/L
	WQOs apply to all fresh waters during high flow periods where discharge is above local baseflow. WQO are presented as 20^{th}-50^{th}-80^{th} percentiles.									
	4-8-13	5-66-101	50-153-384	72-106-148	229-370-668	1-3-4	5-10-45	5-5-10	10-20-70	4-20-52

Notes:

1. High flow WQOs are based on measured data from high flow periods at a reference site on the Tully River in Tully Gorge National Park (gauging station 113015A).
2. DON: dissolved organic nitrogen, TN: total nitrogen, FRP: filterable reactive phosphorous, DOP: dissolved organic phosphorous, TP: total phosphorous, TSS: total suspended solids.

Source:

Orr, D., Turner, R.D.R., Huggins, R., Vardy, S., Warne, M. St. J. 2014. Wet Tropics water quality statistics for high and base flow conditions. Great Barrier Reef Catchment Loads Monitoring Program, Department of Science, Information Technology, Innovation and the Arts, Brisbane.

Table 2.3 Water quality objectives for specific pesticides and biocides to protect aquatic ecosystem EVs

Level of aquatic ecosystems protection	Water quality objectives												
	Water type	Pesticides											Biocide
		Diuron	Atrazine	Chlor-pyrifos	Endo-sulfan	Ametryn	Simazine	Hexa-zinone	2,4-D	Tebu-thiuron	MEMC	Diazinon	Tributlyltin (as Sn)
		µg/l											
High ecological value waters	All (HEV3001/ HEV3121/ HEV3122/ HEV3123)	No detection of anthropogenic toxicants											
Slightly disturbed waters	Undeveloped fresh water	nd	0.7	0.00004	0.03	nd	0.2	75	140	0.2	nd	0.00003	nd
	Freshwater lakes/reservoirs	nd	0.7	0.00004	0.03	nd	0.2	75	140	0.2	nd	0.00003	nd
	Wetlands	nd	0.7	0.00004	0.03	nd	0.2	75	140	0.2	nd	0.00003	nd
	Mid estuarine and tidal canals, constructed estuaries, marinas and boat harbours	nd	0.7	0.00004	0.03	nd	0.2	75	140	0.2	nd	0.00003	nd
	Enclosed coastal/lower estuary	0.9	0.6	0.0005	0.005	0.5	0.2	1.2	0.8	0.02	0.002	0.00003	0.0004
	Open coastal	0.9	0.6	0.0005	0.005	0.5	0.2	1.2	0.8	0.02	0.002	0.00003	0.0004
Moderately disturbed and highly disturbed waters	Developed fresh water	nd	13	0.01	0.03	nd	3.2	75	280	2.2	nd	0.01	nd
	Freshwater lakes/reservoirs	nd	13	0.01	0.03	nd	3.2	75	280	2.2	nd	0.01	nd

Level of aquatic ecosystems protection	Water quality objectives												
	Water type	Pesticides											Biocide
		Diuron	Atrazine	Chlor-pyrifos	Endo-sulfan	Ametryn	Simazine	Hexa-zinone	2,4-D	Tebu-thiuron	MEMC	Diazinon	Tributlyltin (as Sn)
		µg/l											
Moderately disturbed and highly disturbed waters	Wetlands	nd	13	0.010	0.03	nd	3.2	75	280	2.2	nd	0.01	nd
	Mid estuarine and tidal canals, constructed estuaries, marinas and boat harbours	nd	13	0.01	0.03	nd	3.2	75	280	2.2	nd	0.01	nd
	Enclosed coastal/lower estuary	1.6	1.4	0.009	0.005	1.0	3.2	1.2	30.8	2	0.002	0.01	0.006
	Open coastal	1.6	1.4	0.009	0.005	1.0	3.2	1.2	30.8	2	0.002	0.01	0.006

Notes:

1. nd = no data
2. For all other contaminants in waters, including **metals** —see ANZECC guidelines. For aluminium, refer to: Golding, L.A., Angel, B.M., Batley, G.E., Apte, S.C., Krassoi, R. and Doyle, C.J. 2014. Derivation of a water quality guideline for aluminium in marine waters. Environmental Toxicology and Chemistry (Accepted) (DOI: 10.1002/etc.2771).
3. Comply with the Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance, ANZECC (Re Tributyltin and Dibutyltin)

Source:

Freshwater and Mid estuarine WQOs derived from ANZECC (2000). Enclosed coastal/Lower estuary and Open coastal WQOs derived from GBRMPA (2010).

Table 2.4 Water quality objectives for other ions, metals and chemical indicators in surface waters

Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		EC	Hardness ($mg \cdot L^{-1}$)	Alkalinity ($mg \cdot L^{-1}$)	SiO_2 ($mg \cdot L^{-1}$)	F ($mg \cdot L^{-1}$)	Fe ($mg \cdot L^{-1}$)	Mn ($mg \cdot L^{-1}$)	Zn ($mg \cdot L^{-1}$)	Cu ($mg \cdot L^{-1}$)	SAR
	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$\mu S \cdot cm^{-1}$									
20th	5	40	2	16	1	17	14	47	6	28	1	2	47	8	11	10.1	0.010	0.010	0.000	0.000	0.00	0.60
50th	7	51	3	22	2	26	25	59	9	36	1	3	72	17	20	14.1	0.060	0.050	0.000	0.010	0.01	0.70
80th	11	66	5	28	4	34	40	68	14	48	2	6	106	29	33	21.1	0.110	0.200	0.010	0.020	0.03	0.95

Note:

1. These values are based on local data collected across the Wet Tropics region. ANZECC guidelines apply for some elements, however these locally observed data are below the guideline values and should be maintained.
2. EC = electrical conductivity; SAR = sodium adsorption ratio.

Source:

Queensland Wet Tropics and Black and Ross catchments: Regional chemistry of the groundwater. Queensland Government (Raymond, M. A. A. and V. H. McNeil, 2013).

3.2.2 Riparian and groundcover water quality objectives

The clearing of native vegetation in Queensland is regulated by the *Vegetation Management Act 1999* the *Sustainable Planning Act 2009* and associated policies and codes. This includes the regulation of clearing in water and drainage lines.

For vegetation management relating to waterways, reference should be made to:

- State Development Assessment Provisions (SDAP) Module 8: Native vegetation clearing. This module includes performance requirements relating to clearing of native vegetation and a table relating to watercourse buffer areas and stream order. To review the SDAP Modules, contact the Department of State Development, Infrastructure and Planning website.
- SDAP Module 11: Wetland protection area.
- relevant self-assessable codes under the *Vegetation Management Act 1999*. These codes are activity based, some applying to different regions, and include performance requirements relating to watercourses and wetlands, aimed at maintaining water quality, bank stability, aquatic and terrestrial habitat. Codes include vegetation clearing controls that vary according to stream order. To review the latest applicable self-assessable code (and other explanatory information), contact the Department of Natural Resources and Mines website.

To review the current vegetation management laws contact the Queensland Government website or Department of Natural Resources and Mines website.

To review the SDAP Modules, contact the Department of State Development, Infrastructure and Planning website.

Local Government Planning schemes under the *Sustainable Planning Act 2009* may also specify riparian buffers (for example under catchment protection or waterway codes). Contact the Department of State Development, Infrastructure and Planning website and local government websites for further information about planning schemes.

The **riparian vegetation** target up to 2018 in the Reef Water Quality Protection Plan (Reef Plan) 2013 is that “The extent of riparian vegetation is increased” and the **groundcover target** is for a “Minimum 70 per cent late dry season groundcover on grazing lands”.

3.2.3 Wetlands water quality objectives

The Environmental Protection Regulation section 81A defines Environmental values for wetlands.

The State assesses impacts from earth works that may have impacts on freshwater wetlands of High Ecological Significance in Great Barrier Reef Catchments against State Development Assessment Provisions (SDAP) Module 11: Wetland protection area.

This module includes performance requirements to ensure:

- adverse effects on hydrology, water quality and ecological processes of a wetland are avoided or minimised
- any significant adverse impacts on matters of state environmental significance and on riparian areas or wildlife corridors in strategic environmental areas are avoided.

Note: refer to the guideline 'Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments', and the Queensland wetland buffer planning guideline, available from the department’s website.

3.2.4 Freshwater macroinvertebrate objectives

Locally derived objectives for freshwater macroinvertebrate indices are listed at Table 2.5, based on reference sites shown at figure 1. Aquatic macroinvertebrates are common and widespread throughout many aquatic ecosystems, are easily sampled and can provide an integrated measure of stream condition. Specific sampling protocols have been used and their training and accreditation requirements (see http://ausrivas.ewater.com.au/training-and-accreditation3) mean that sample results from a number of programs can be combined for use in derivation of objective values. In determining macroinvertebrate objectives, 10m of either edge or riffle habitats were sampled with standard protocols. Indices included in these macroinvertebrates objectives:

- SIGNAL index (Stream Invertebrate Grade Number – Average Level) was developed for the bioassessment of water quality in rivers in Australia. A SIGNAL score is calculated by grading each detected macroinvertebrate family based upon its sensitivity to pollutants from 1 (tolerant) to 10 (sensitive) and averaging the grades. These guidelines used SIGNAL version 2.iv (Chessman 2003, available at www.environment.gov.au).
- Taxa richness is the number of different aquatic macroinvertebrate taxa collected in a sample.
- PET taxa richness is the number of aquatic macroinvertebrate families collected from these orders of aquatic insects; Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). These orders are considered to be sensitive to changes in their environment and therefore useful to assess stream condition.
- % sensitive taxa in an index based on the proportion of taxa with ‘sensitive’ SIGNAL grades of 8–10 (SIGNAL version 2.iv).
- % tolerant taxa in an index based on the proportion of taxa with ‘tolerant’ SIGNAL grades of 1–3 (SIGNAL version 2.iv).

Samples for the macroinvertebrate objectives were identified in the laboratory to family level, except Chironimidae (non-biting midges) that are identified to sub-family, and lower Phyla (Porifera, Nematoda, Nemertea, etc.), Oligochaeta (freshwater worms), Acarina (mites), and microcrustacea (Ostracoda, Copepoda, Cladocera) that are not identified further. The taxonomy used to calculate the objective indices are based on those used in SIGNAL version 2.iv.

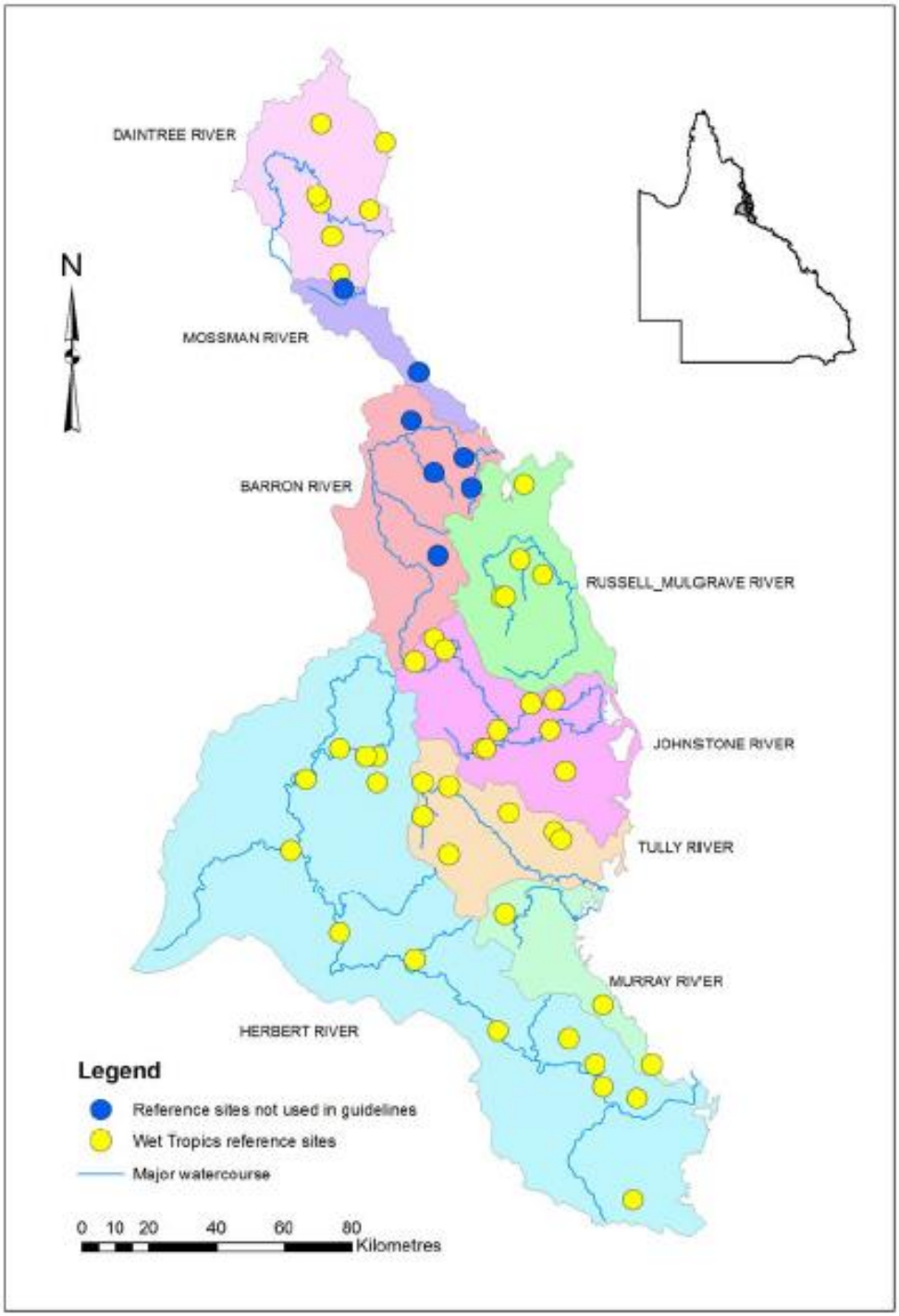

Figure 1 Reference sites (yellow circles) with samples considered or used for development of macroinvertebrate objectives in the Wet Tropics of Queensland

Table 2.5 Freshwater macroinvertebrate objectives for moderately disturbed waters of the Daintree River basin

Index	Edge habitat[1]		Riffle habitat[2]	
	20th percentile	80th percentile	20th percentile	80th percentile
SIGNAL index	4.17	4.94	4.96[3]	5.83[3]
Taxa richness	17	24	20[3]	25[3]
PET taxa richness	4	7	6[3]	9[3]
% sensitive taxa	4.35	11.76	12.5[3]	25[3]
% tolerant taxa	23.53	33.33	17.39[3]	25.00[3]

Notes:

1. Edge Habitat is located along the stream bank.
2. Riffle Habitat is characterised as a reach with relatively steep, shallow (<0.3m), fast flowing (>0.2m/s) and broken water over stony beds.
3. Indicates a limited number of samples were used to develop the guideline value and this should be considered an interim value until further data is available.

Source:

Negus P, Steward A & Blessing J. 2013. Queensland interim biological guidelines for Wet Tropics coastal streams: Aquatic macroinvertebrates, April 2013 – Draft for Comment. Brisbane: Department of Science, Information Technology, Innovation and the Arts, Queensland Government.

Water quality objectives to protect the human use environmental values

3.3 Water quality objectives for human use environmental values

This section outlines the WQOs to protect human use EVs, e.g. recreation, stock watering, aquaculture and crop irrigation. Tables 3.1 to 3.10 list the WQOs to protect the human use EVs for the waters of the Daintree and Mossman rivers basins and adjacent coastal waters.

The WQOs in these tables are based on national water quality guidelines, including ANZECC (2000), the National Health and Medical Research Council Guidelines for managing risks in recreational water, the Food Standards Australia New Zealand and the Australian Drinking Water Guidelines[5].

Where national guidelines are the source for the stated WQOs, reference is necessary to obtain comprehensive listings of all indicators, corresponding WQOs and up-to-date information.

Table 3.1 Water quality objectives to protect human use environmental values

Environmental value	Water type—refer attached pdf mapping or GIS datasets	Water quality objectives to protect the stated EV
Suitability for raw drinking water supply (before treatment)	Fresh waters and groundwaters	WQOs for drinking water supply are at Table 3.2. Note: For water quality after treatment or at point of use refer to legislation and guidelines, including: • *Public Health Act 2005* and Regulations • *Water Supply (Safety and Reliability) Act 2008*, including any approved drinking water quality management plan under the Act • Australian Drinking Water Guidelines 2011—updated December 2013
Protection of the human consumer (oysters, fish, crustaceans)	All fresh, estuarine and coastal waters	WQOs as per ANZECC guidelines and Australia New Zealand Food Standards Code[6], Food Standards Australia New Zealand, 2007 and updates.
Protection of cultural and spiritual values	All waters	Protect or restore indigenous and non-indigenous cultural heritage consistent with any relevant policies and plans.
Suitability for industrial use (includes mining, minerals processing, chemical process industries etc.)	Fresh waters, estuarine and coastal waters	No WQOs are stated for industrial uses of water. Water quality requirements for industry vary within and between industries. Where there are specific intake water quality requirements e.g. power station cooling water, the EV is protected by WQOs for other EVs, such as the aquatic ecosystem requirements.

[5] The AWQG are available on the National Water Quality Management Strategy website.
The ADWG are available on the NHMRC website.

[6] The Australia New Zealand Food Standards Code is available on the Food Standards Australia and New Zealand website.

Environmental value	Water type—refer attached pdf mapping or GIS datasets	Water quality objectives to protect the stated EV
Suitability for aquaculture	Fresh waters, estuarine and coastal waters	WQOs as per: • tables 3.3 to 3.5 • ANZECC guidelines and Australia New Zealand Food Standards Code, Food Standards Australia New Zealand, 2007 and updates.
Suitability for irrigation	Fresh waters and groundwaters	WQOs for pathogens and metals are provided in tables 3.6 and 3.7. For other indicators, such as salinity, sodicity and herbicides, see ANZECC guidelines
Suitability for stock watering	Fresh waters and groundwaters	WQOs as per ANZECC guidelines, including median faecal coliforms <100 organisms per 100 mL. WQOs for total dissolved solids and metals are provided in tables 10 and 11. For other objectives, such as cyanobacteria and pathogens, see ANZECC guidelines.
Suitability for farm supply/use	All fresh waters including groundwaters	WQOs as per ANZECC guidelines
Suitability for primary contact recreation	Fresh waters, estuarine and coastal waters	Objectives as per NHMRC (2008)[7], including: • water free of physical (floating and submerged) hazards • temperature range: 16–34°C • pH range: 6.5–8.5 • DO: >80% • faecal contamination: designated recreational waters are protected against direct contamination with fresh faecal material, particularly of human or domesticated animal origin. Two principal components are required for assessing faecal contamination: − assessment of evidence for the likely influence of faecal material − counts of suitable faecal indicator bacteria (usually *enterococci*) These two components are combined to produce an overall microbial classification of the recreational water body. • intestinal enterococci: 95th percentile ≤ 40 organisms per 100mL (for healthy adults) (NHMRC, 2008; table 5.7) • direct contact with venomous or dangerous aquatic organisms should be avoided. Recreational water bodies should be reasonably free of, or protected from, venomous organisms (e.g. box jellyfish and bluebottles) • waters contaminated with chemicals that are either toxic or irritating to the skin or mucous membranes are unsuitable for recreational purposes.

[7] Guidelines for Managing Risks in Recreational Water are available on the NHMRC website.

Environmental value	Water type—refer attached pdf mapping or GIS datasets	Water quality objectives to protect the stated EV
Suitability for primary contact recreation--continued	Fresh waters	• cyanobacteria / algae: Recreational water bodies should not contain: – level 1[1]: ≥10 µg/L total microcystins; or ≥50 000 cells/mL toxic *Microcystis aeruginosa*; or biovolume equivalent of ≥4 mm^3/L for the combined total of all cyanobacteria where a known toxin producer is dominant in the total biovolume or – level 2[1]: ≥10 mm^3/L for total biovolume of all cyanobacterial material where known toxins are not present or – cyanobacterial scums consistently present. Further details are contained in NHMRC (2008) and table 3.10.
	Estuarine, coastal waters	cyanobacteria / algae: Recreational water bodies should not contain ≥10 cells/mL *Karenia brevis* and/or have *Lyngbya majuscula* and/or *Pfiesteria* present in high numbers[2]. Further details are contained in NHMRC (2008) and table 3.10.
Suitability for secondary contact recreation	Fresh waters, estuarine and coastal waters	Objectives as per NHMRC (2008), including: • intestinal enterococci: 95th percentile ≤40 organisms per 100mL (for healthy adults) (NHMRC, 2008; Table 5.7) • cyanobacteria / algae—refer objectives for primary recreation, NHMRC (2008) and Table 3.10.
Suitability for visual recreation	Fresh waters, estuarine and coastal waters	Objectives as per NHMRC (2008), including: • recreational water bodies should be aesthetically acceptable to recreational users. The water should be free from visible materials that may settle to form objectionable deposits; floating debris, oil, scum and other matter; substances producing objectionable colour, odour, taste or turbidity; and substances and conditions that produce undesirable aquatic life. • Cyanobacteria / algae—refer objectives for primary recreation, NHMRC (2008) and Table t.10.

Notes:

1. Level 1 recognises the probability of adverse health effects from ingestion of known toxins, in this case based on the toxicity of microcystins. Level 2 covers circumstances in which there are very high cell densities of cyanobacterial material, irrespective of the presence of toxicity or known toxins. Increased cyanobacterial densities increase the likelihood of non-specific adverse health outcomes, principally respiratory, irritation and allergy symptoms. (NHMRC, 2008; 8).
2. The NHMRC states that its guidelines are concerned '*only with risks that may be associated with recreational activities in or near coastal and estuarine waters. This includes exposure through dermal contact, inhalation of sea-spray aerosols and possible ingestion of water or algal scums, but does not include dietary exposure to marine algal toxins*.' (NHMRC, 2008; 121).

Sources:

The WQOs were determined from:

- Australian Drinking Water Guidelines (NHMRC, 2011).
- Australia New Zealand Food Standards Code (Australian Government).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000).
- Guidelines for Managing Risks in Recreational Water (NHMRC, 2008).

Table 3.2 Drinking water EV – Water quality objectives for raw drinking water supply in the vicinity of off-takes, including groundwater, before treatment

WQOs for drinking water **before treatment** are derived from the Office of the Water Supply Regulator (Department of Energy and Water Supply) and Queensland Health.

Note: For water quality after treatment or at the point of use, refer to relevant legislation and guidelines, including *Public Health Act 2005* and Regulations, *Water Supply (Safety and Reliability) Act 2008*, including any approved drinking water management plan under the Act, *Water Fluoridation Act 2008*, and the Australian Drinking Water Guidelines (ADWG (2011), 2013 update).

Indicator	Water quality objective
Giardia	0 cysts (Office of Water Supply Regulator) If *Giardia* is detected in drinking water then the health authorities should be notified immediately and an investigation of the likely source of contamination undertaken (ADWG).
Cryptosporidium	0 cysts (Office of Water Supply Regulator) If *Cryptosporidium* is detected in drinking water then the health authorities should be notified immediately and an investigation of the likely source of contamination undertaken (ADWG).
E. coli	<50 cfu/100mL Treatment plants with effective barriers and disinfection are designed to address faecal contamination. *E. coli* or thermotolerant coliforms should not be present in any 100 mL sample of (treated) drinking water (ADWG).
Blue-green algae (cyanobacteria)	<100 cells/mL
Algal toxin	<1 µg/L Microcystin
pH	5.5–8
Total dissolved solids	<600mg/L The concentration of total dissolved solids in treated drinking water should not exceed 600 mg/L (ADWG 2011, based on taste considerations).
Sodium	<180mg/L The concentration of sodium in reticulated drinking water supplies should not exceed 180 mg/L (ADWG, based on threshold at which taste becomes appreciable).
Sulfate	<250mg/L The concentration of sulfate in drinking water should not exceed 250 mg/L (ADWG 2011, based on taste/aesthetic considerations). ADWG 2011 health guideline: <500mg/L
Dissolved oxygen	5.5–7 mg/L

Indicator	Water quality objective
Pesticides	Raw supplies: Below detectable limits. Treated drinking water: Refer to ADWG.
Other indicators (including physico-chemical indicators)	Refer to ADWG.

Table 3.3 Aquaculture EV – Water quality objectives for tropical aquaculture

Water parameter	Recommended range		Water parameter	Recommended range
	Fresh water	Marine		General aquatic
Dissolved oxygen	>4 mg/L	>4 mg/L	**Arsenic**	<0.05 mg/L
Temperature ˚C	21–32	24–33	**Cadmium**	<0.003 mg/L
pH	6.8–9.5	7–9.0	**Calcium/Magnesium**	10–160 mg/L
Ammonia (TAN, total ammonia-nitrogen)	<1.0 mg/L	<1.0 mg/L	**Chromium**	<0.1 mg/L
Ammonia (NH_3, un-ionised form)	<0.1 mg/L	<0.1 mg/L	**Copper**	<0.006 mg/L in soft water
Nitrate (NO_3)	1–100 mg/L	1–100 mg/L	**Cyanide**	<0.005 mg/L
Nitrite (NO_2)	<0.1 mg/L	<1.0 mg/L	**Iron**	<0.5 mg/L
Salinity	0–5 ppt	15–35 ppt	**Lead**	<0.03 mg/L
Hardness	20–450 mg/L		**Manganese**	<0.01 mg/L
Alkalinity	20–400 mg/L	>100mg/L	**Mercury**	<0.00005 mg/L
Turbidity	<80 NTU		**Nickel**	<0.01 mg/L in soft water <0.04 mg/L in hard water
Chlorine	<0.003 mg/L		**Tin**	<0.001 mg/L
Hydrogen sulphide	<0.002 mg/L		**Zinc**	0.03–0.06 mg/L in soft water 1–2 mg/L in hard water

Source: Department of Primary Industries and Fisheries: Water Quality in Aquaculture—DPI Notes April 2004.

Table 3.4 Aquaculture EV – Water quality objectives for optimal growth of freshwater species

Water parameter	Barramundi	Eel	Silver perch	Jade perch	Sleepy cod	Redclaw
Dissolved oxygen	4–9 mg/L	>3 mg/L	>4 mg/L	>3 mg/L	>4.0 mg/L	>4.0 mg/L
Temperature ˚C	26–32	23–28	23–28	23–28	22–31	23–31
pH	7.5–8.5	7.0–8.5	6.5–9	6.5–9	7.0–8.5	7.0–8.5
Ammonia (TAN, Total ammonia-nitrogen)		<1.0 mg/L			<1.0 mg/L	<1.0 mg/L
Ammonia (NH_3, un-ionised form)*pH dependent.	<0.46 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L
Nitrate (NO_3)			<100 mg/L			
Nitrite (NO_2)	<1.5 mg/L	<1.0 mg/L	<0.1 mg/L		<1.0 mg/L	<1.0 mg/L
Salinity (extended periods)	0–35 ppt		<5 ppt	<5 ppt		<4 ppt
Salinity bath	0–35 ppt		5–10 ppt for 1 hour		max. 20 ppt for one hour	
Hardness ($CaCO_3$)			>50 mg/L	>50 mg/L	>40 mg/L	>40 mg/L
Alkalinity	>20 mg/L		100–400 ppm	100–400 ppm	>40 mg/L	>40 mg/L
Chlorine	<0.04 mg/L				<0.04 mg/L	
Hydrogen sulphide	0–0.3 mg/L				0–0.3 mg/L	
Iron	<0.1 mg/L		<0.5 mg/L	<0.5 mg/L	<0.1 mg/L	<0.1 mg/L
Spawning temperature ˚C	Marine		23–28	23–28	>24 for more than three days	

Source: Department of Primary Industries and Fisheries: Water Quality in Aquaculture—DPI Notes April 2004.

Table 3.5 Aquaculture EV – Water quality objectives for optimal growth of particular marine species

Water parameter	Barramundi		Tiger prawn		Kuruma prawn
	Hatchery	Grow out	Hatchery	Grow out	Grow out
Dissolved oxygen	Saturation	>4 mg/L	>4 mg/L	>3.5 mg/L	>4 mg/L
Temperature ˚C	28–30 optimum 25–31 range	28–30 optimum		26–32	24
pH	~8	~8	~8	7.5–8.5	7.5–8.5
Ammonia (TAN, total ammonia-nitrogen)		0.1–0.5 mg/L			
Ammonia (NH_3, un-ionised form)	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L	<0.1 mg/L
Nitrate (NO_3)	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L	<1.0 mg/L
Nitrite (NO_2)	<0.2 mg/L	<1.0 mg/L	<0.2 mg/L	<0.2 mg/L	<0.2 mg/L
Salinity	28–31 ppt	0–35 ppt		10–25 ppt optimum	30–35 ppt optimum
Alkalinity		105–125 mg/L $CaCO_3$			
Clarity				30–40 cm Secchi disk	30–40 cm Secchi disk
Hydrogen sulphide		<0.3 mg/L			
Iron		<0.02 mg/L		<1.0 mg/L	
Spawning temperature ˚C		28–32		27–32	

Source: Department of Primary Industries and Fisheries—Water Quality in Aquaculture—DPI Notes April 2004 (as amended).

Table 3.6 Irrigation EV – Water quality objectives for thermotolerant (faecal) coliforms in irrigation water used for food and non-food crops[1]

Intended use	Median values of thermotolerant coliforms (colony forming units—cfu)[2]
Raw human food crops in direct contact with irrigation water (e.g. via sprays, irrigation of salad vegetables)	<10 cfu/100 mL
Raw human food crops not in direct contact with irrigation water (edible product separated from contact with water, e.g. by peel, use of trickle irrigation); or crops sold to consumers cooked or processed	<1000 cfu/100 mL
Pasture and fodder for dairy animals (without withholding period)	<100 cfu/100 mL
Pasture and fodder for dairy animals (with withholding period of five days)	<1000 cfu/100 mL
Pasture and fodder (for grazing animals except pigs and dairy animals, i.e. cattle, sheep and goats)	<1000 cfu/100 mL
Silviculture, turf, cotton, etc. (restricted public access)	<10 000 cfu/100 mL

Notes:

1. Adapted from ARMCANZ, ANZECC and NHMRC (1999).
2. Refer to Australian Drinking Water Guidelines 2000 (AWQG), Volume 1, Section 4.2.3.3 for advice on testing protocols.

Source: AWQG, Volume 1, Section 4.2.3.3, table 4.2.2.

Table 3.7 Irrigation EV – Water quality objectives for heavy metals and metalloids in agricultural irrigation water[1] – long term trigger value (LTV), short-term trigger value (STV) and soil cumulative contamination loading limit (CCL)

Element	Soil cumulative contaminant loading limit (CCL) (kg/ha)[2]	Long-term trigger value (LTV) in irrigation water (up to 100 years) (mg/L)	Short-term trigger value (STV) in irrigation water (up to 20 years) (mg/L)
Aluminium	ND	5	20
Arsenic	20	0.1	2.0
Beryllium	ND	0.1	0.5
Boron	ND	0.5	Refer to AWQG, Vol 3, table 9.2.18
Cadmium	2	0.01	0.05
Chromium	ND	0.1	1
Cobalt	ND	0.05	0.1
Copper	140	0.2	5
Fluoride	ND	1	2
Iron	ND	0.2	10
Lead	260	2	5
Lithium	ND	2.5 (0.075 for citrus crops)	2.5 (0.075 for citrus crops)
Manganese	ND	0.2	10
Mercury	2	0.002	0.002
Molybdenum	ND	0.01	0.05
Nickel	85	0.2	2
Selenium	10	0.02	0.05
Uranium	ND	0.01	0.1
Vanadium	ND	0.1	0.5
Zinc	300	2	5

Notes:

1. Concentrations in irrigation water should be less than the trigger values. Trigger values should only be used in conjunction with information on each individual element and the potential for off-site transport of contaminants (refer AWQG, Volume 3, Section 9.2.5).
2. ND = Not determined; insufficient background data to calculate CCL.

Source: AWQG, Volume 1, Section 4.2.6, table 4.2.10.

Table 3.8 Stock watering EV – Water quality objectives for tolerances of livestock to total dissolved solids (salinity) in drinking water[1]

Livestock	Total dissolved solids (TDS) (mg/L)		
	No adverse effects on animals expected.	Animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production	Loss of production and decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually
Beef cattle	0–4000	4000–5000	5000–10 000
Dairy cattle	0–2500	2500–4000	4000–7000
Sheep	0–5000	5000–10 000	10 000–13 000[2]
Horses	0–4000	4000–6000	6000–7000
Pigs	0–4000	4000–6000	6000–8000
Poultry	0–2000	2000–3000	3000–4000

Notes:

1. From ANZECC (1992), adapted to incorporate more recent information.
2. Sheep on lush green feed may tolerate up to 13 000 mg/L TDS without loss of condition or production.

Source: AWQG, Volume 1, Section 4.3.3.5, table 4.3.1.

Table 3.9 Stock watering EV – Water quality objectives (low risk trigger values) for heavy metals and metalloids in livestock drinking water

Metal or metalloid	Trigger value (low risk)[1,2] (mg/L)
Aluminium	5
Arsenic	0.5 (up to 5[3])
Beryllium	ND
Boron	5
Cadmium	0.01
Chromium	1
Cobalt	1
Copper	0.4 (sheep), 1 (cattle), 5 (pigs), 5 (poultry)
Fluoride	2
Iron	not sufficiently toxic
Lead	0.1
Manganese	not sufficiently toxic
Mercury	0.002
Molybdenum	0.15
Nickel	1
Selenium	0.02
Uranium	0.2
Vanadium	ND
Zinc	20

Notes:

1. Higher concentrations may be tolerated in some situations (further details provided in AWQG, Volume 3, Section 9.3.5).
2. ND = not determined, insufficient background data to calculate.
3. May be tolerated if not provided as a food additive and natural level in the diet are low.

Source: AWQG, Volume 1, Section 4.3.4, table 4.3.2.

Table 3.10 Recreational waters – Alert levels and corresponding actions for management of cyanobacteria

The water quality objectives for water used for recreational purposes are that the values for cyanobacteria cell counts or biovolume meet the guideline values set out in Chapter 6 of the Guidelines for Managing Risks in Recreational Water.

When cyanobacteria are present in large numbers they can present a significant hazard, particularly to primary contact users of waters. Monitoring/action requirements relative to cyanobacteria 'alert' levels are summarised below the table, and are explained more fully in the Guidelines for Managing Risks in Recreational Water (NHMRC, 2008).

Further details on the process to determine suitability of waters for recreation, relative to historical cyanobacterial levels and susceptibility to cyanobacterial contamination, are contained in sections 6 and 7 of the NHMRC guidelines.

Green level surveillance mode[1]	Amber level alert mode[1]	Red level action mode[1]
Fresh waters		
≥500 to <5000 cells/mL *M. aeruginosa* or biovolume equivalent of >0.04 to <0.4 mm^3/L for the combined total of all cyanobacteria.	≥5000 to <50 000 cells/mL *M. aeruginosa* or biovolume equivalent of ≥0.4 to <4 mm^3/L for the combined total of all cyanobacteria where a known toxin producer is dominant in the total biovolume[2]. or[3] ≥0.4 to <10 mm^3/L for the combined total of all cyanobacteria where known toxin producers are not present.	Level 1 guideline[4]: ≥10 µg/L total microcystins or ≥50 000 cells/mL toxic *M. aeruginosa* or biovolume equivalent of ≥4 mm^3/L for the combined total of all cyanobacteria where a known toxin producer is dominant in the total biovolume. or[3] Level 2 guideline[4]: ≥10 mm^3/L for total biovolume of all cyanobacterial material where known toxins are not present. or cyanobacterial scums are consistently present[5].
Coastal and estuarine waters		
Karenia brevis		
≤ 1 cell/mL	>1– <10 cells/mL	≥10 cells/mL
Lyngbya majuscula, Pfiesteria spp.		
History but no current presence of organism	Present in low numbers	Present in high numbers. (For *Lyngbya majuscula* this involves the relatively widespread visible presence of dislodged algal filaments in the water and washed up onto the beach)
Nodularia spumigena: See NHMRC, Chapter 6 (Cyanobacteria and algae in fresh water) for details.		

Notes:

1. Recommended actions at different alert levels are outlined below (based on NHMRC, 2008, table 6.6—fresh waters. Similar actions are outlined for coastal/estuarine waters in NHMRC table 7.6):
   Green: Regular monitoring. Weekly sampling and cell counts at representative locations in the water body where known toxigenic species are present (i.e. *Microcystis aeruginosa, Anabaena circinalis, Cylindrospermopsis raciborskii, Aphanizomenon ovalisporum, Nodularia spumigena*); or fortnightly for other types including regular visual inspection of water surface for scums.
   Amber: Notify agencies as appropriate. Increase sampling frequency to twice weekly at representative locations in the water body where toxigenic species (above) are dominant within the alert level definition (i.e. total biovolume) to establish population growth and spatial variability in the water body. Monitor weekly or fortnightly where other types are dominant. Make regular visual inspections of water surface for scums. Decide on requirement for toxicity assessment or toxin monitoring.

Red: Continue monitoring as for (amber) alert mode. Immediately notify health authorities for advice on health risk. ('In action mode the local authority and health authorities warn the public of the existence of potential health risks; for example, through the media and the erection of signs by the local authority.' NHMRC, 2008; 114). Make toxicity assessment or toxin measurement of water if this has not already been done. Health authorities warn of risk to public health (i.e. the authorities make a health risk assessment considering toxin monitoring data, sample type and variability).

2. The definition of 'dominant' is where the known toxin producer comprises 75 per cent or more of the total biovolume of cyanobacteria in a representative sample.
3. This applies where high cell densities or scums of 'non toxic' cyanobacteria are present i.e. where the cyanobacterial population has been tested and shown not to contain known toxins (mycrocystins, nodularian, cylindrospermopsin or saxitoxin).
4. Health risks and levels: Level 1 is developed to protect against short-term health effects of exposure to cyanobacterial toxins ingested during recreational activity, whereas the Level 2 applies to the circumstance where there is a probability of increased likelihood of non-specific adverse health outcomes, principally respiratory, irritation and allergy symptoms, from exposure to very high cell densities of cyanobacterial material irrespective of the presence of toxicity or known toxins (NHMRC, 2008;114).
5. This refers to the situation where scums occur at the recreation site each day when conditions are calm, particularly in the morning. Note that it is not likely that scums are always present and visible when there is a high population as the cells may mix down with wind and turbulence and then reform later when conditions become stable.

Source: Based on NHMRC (2008) Guideline for Managing Risks in Recreational Water (tables 6.2, 6.6, 7.3).

Water quality objectives to protect groundwater environmental values

3.4 Water quality objectives to protect groundwater environmental values

This section lists WQOs for the various groundwater types to protect the aquatic ecosystems environmental values stated for the groundwaters of the Daintree and Mossman rivers basins at Section 2.

WQOs are provided according to their chemistry zone and depth category in tables 4.1 to 4.6.

Where groundwaters interact with surface waters, groundwater quality should not compromise identified EVs and WQOs for those waters.

The AWQG recommends that the highest level of protection should be provided to underground aquatic ecosystems, given their high conservation value.

Where groundwaters are in good condition the intent is to maintain existing water quality (20th, 50th and 80th percentiles).

3.4.1 **Wet Tropics groundwater chemistry groups**

The Groundwater Chemistry Zones in the Daintree River and Mossman River basins are shown at Plan WQ1083.

The major groups include:

Wet tropical alluvial:

- ID No. 19 – Daintree Nth Barron uplands and slopes (Table 4.1).

Sodic:

- ID No. 10 – Granitic uplands and slopes (Table 4.2)
- ID No. 14 – Daintree delta (Table 4.3).

Coastal and floodplain:

- ID No. 9 – Low salinity coastal floodplains (Table 4.4).

High salinity alluvial deposits:

- ID No. 6 – Cooya Wonga (Table 4.5).

High calcium:

- ID No. 15 – Sth Craiglie (Table 4.6).

Table 4.1 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – Wet Tropical Alluvial – 19 Daintree-Nth Barron uplands and slopes

Depth	Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		NO_3		EC	Hardness	pH	Alkalinity	SiO_2	F	Fe	Mn	Zn	Cu	SAR	RAH	eH
		mg·L^{-1}	%	mg·L^{-1}	%	mg·L^{-1}	%	mg·L^{-1}	%	mg·L^{-1}	%	mg·L^{-1}	%	mg·L^{-1}	%	µS·cm^{-1}	(mg·L^{-1})		(mg·L^{-1})	(mg·L^{-1})	(mg·L^{-1})	(mg·L^{-1})	(mg·L^{-1})	(mg·L^{-1})	(mg·L^{-1})		(meqL^{-1})	(mV)
shallow	20th	7	56	1	5	1	13	10	17	10	39	-	-	-	-	64	9	6.0	10	13.0	0.000	0.000	0.000	0.010	0.01	1.33	0.00	-
	50th	16	66	2	9	3	22	20	32	20	57	-	0	3	4	115	17	6.7	16	18.0	0.080	0.000	0.000	0.050	0.01	1.60	0.00	-
	80th	28	77	4	24	5	27	41	52	31	71	3	6	10	13	167	26	7.3	34	33.5	0.263	0.019	0.010	0.080	0.02	2.40	0.19	-
moderate	20th	15	57	2	8	3	17	18	25	18	38	-	-	-	-	120	17	6.4	14	19.0	0.100	0.000	0.000	0.011	0.00	1.41	0.00	-
	50th	19	64	4	14	4	22	35	39	28	57	0	0	1	1	145	26	7.1	29	27.0	0.195	0.000	0.000	0.030	0.00	1.80	0.05	-
	80th	25	69	6	24	5	25	49	55	34	64	2	4	3	5	189	34	7.6	40	37.5	0.356	0.010	0.000	0.048	0.01	1.90	0.57	-
deep	20th	8	41	4	27	3	14	31	52	13	16	2	2	-	-	95	23	6.9	25	14.4	0.130	0.000	0.000	0.030	0.00	0.73	0.08	-
	50th	29	46	7	32	4	17	53	61	15	30	4	4	-	-	225	31	7.4	43	46.0	0.200	0.000	0.000	0.030	0.01	1.10	0.29	-
	80th	33	51	36	44	8	24	178	79	37	38	5	7	1	1	341	120	7.6	147	51.6	0.990	0.015	0.075	0.030	0.02	1.57	0.85	-
v deep		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
artesian	20th	20	60	2	9	4	22	24	29	31	52	-	-	-	-	153	23	6.3	20	8.8	0.000	-	-	0.000	0.00	1.63	-	-
	50th	22	65	3	11	4	24	27	32	33	67	-	-	-	-	160	24	6.6	22	13.5	0.150	-	-	0.000	0.00	1.80	-	-
	80th	23	69	4	12	6	29	51	47	34	70	-	-	-	-	195	32	7.3	42	23.1	0.720	-	-	0.000	0.00	2.04	-	-

Table 4.2 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – Sodic – 10 Granitic uplands and slopes

Depth	Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		NO_3		EC	Hardness ($mg \cdot L^{-1}$)	pH	Alkalinity ($mg \cdot L^{-1}$)	SiO_2 ($mg \cdot L^{-1}$)	F ($mg \cdot L^{-1}$)	Fe ($mg \cdot L^{-1}$)	Mn ($mg \cdot L^{-1}$)	Zn ($mg \cdot L^{-1}$)	Cu ($mg \cdot L^{-1}$)	SAR	RAH ($meq L^{-1}$)	eH (mV)
		$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$\mu S \cdot cm^{-1}$												
shallow	20th	16	46	10	9	3	8	68	33	13	26	1	1	0	0	158	38	6.9	56	30.6	0.100	0.000	0.000	0.010	0.00	1.10	0.13	-
	50th	109	55	16	21	7	15	194	45	125	52	5	2	2	0	800	72	7.6	161	70.0	0.200	0.020	0.010	0.030	0.02	3.15	1.07	-
	80th	168	84	45	33	21	24	254	66	175	59	12	8	7	7	997	195	7.9	208	101.1	0.550	0.422	0.037	0.054	0.02	8.47	2.04	-
moderate	20th	64	46	9	8	5	7	135	33	47	27	2	1	0	0	440	46	7.3	113	82.0	0.270	0.000	0.000	0.005	0.01	2.00	0.30	-
	50th	102	63	21	20	10	17	200	50	103	41	4	1	1	0	772	95	7.7	165	96.0	0.375	0.010	0.010	0.020	0.05	4.25	1.67	-
	80th	160	85	46	30	24	23	280	67	210	62	12	3	3	1	1,003	210	8.2	230	110.0	0.500	0.020	0.020	0.023	0.05	8.40	2.70	-
deep	20th	27	41	12	16	5	13	118	66	20	20	1	1	-	0	257	53	6.7	97	79.0	0.280	0.003	0.004	0.007	0.01	1.30	0.43	-
	50th	32	49	18	31	7	20	147	74	26	23	2	1	0	0	300	76	7.0	120	93.0	0.360	0.020	0.010	0.020	0.05	1.60	0.72	-
	80th	113	72	24	35	10	24	219	79	54	31	16	5	1	0	572	99	7.8	182	107.0	0.600	0.100	0.050	0.050	0.05	5.81	2.16	-

Table 4.3 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – Sodic – 14 Daintree delta

Depth	Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		NO_3		EC	Hardness ($mg \cdot L^{-1}$)	pH	Alkalinity ($mg \cdot L^{-1}$)	SiO_2 ($mg \cdot L^{-1}$)	F ($mg \cdot L^{-1}$)	Fe ($mg \cdot L^{-1}$)	Mn ($mg \cdot L^{-1}$)	Zn ($mg \cdot L^{-1}$)	Cu ($mg \cdot L^{-1}$)	SAR	RAH ($meq L^{-1}$)	eH (mV)
		$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$\mu S \cdot cm^{-1}$												
shallow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
moderate	20th	10	45	3	9	2	13	26	40	14	34	2	4	0	0	99	19	6.6	21	24.5	0.005	0.010	0.010	0.000	0.00	0.84	0.05	-
	50th	17	56	6	16	4	25	56	55	22	38	3	5	1	1	155	26	7.2	46	31.0	0.100	0.010	0.010	0.000	0.00	1.30	0.20	-
	80th	76	73	10	30	5	31	110	61	66	49	13	7	2	3	408	45	7.7	91	82.5	8.450	0.983	0.143	0.000	0.00	6.41	1.04	-

Table 4.4 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – Coastal and Floodplain – 9 Low salinity coastal floodplains

Depth	Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		NO_3		EC	Hardness ($mg{\cdot}L^{-1}$)	pH	Alkalinity ($mg{\cdot}L^{-1}$)	SiO_2 ($mg{\cdot}L^{-1}$)	F ($mg{\cdot}L^{-1}$)	Fe ($mg{\cdot}L^{-1}$)	Mn ($mg{\cdot}L^{-1}$)	Zn ($mg{\cdot}L^{-1}$)	Cu ($mg{\cdot}L^{-1}$)	SAR	RAH ($meqL^{-1}$)	eH (mV)
		$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$\mu S{\cdot}cm^{-1}$												
shallow	20th	6	57	1	6	1	10	7	18	8	39	-	-	-	-	51	7	5.8	6	9.0	0.000	0.000	0.000	0.010	0.00	1.00	0.00	-
	50th	13	67	2	11	2	18	18	32	17	54	2	4	1	2	96	14	6.6	15	19.5	0.050	0.008	0.018	0.020	0.01	1.50	0.02	-
	80th	24	81	5	21	4	27	41	52	28	70	6	11	4	8	156	26	7.3	34	30.0	0.150	0.040	0.094	0.075	0.02	2.90	0.28	-
moderate	20th	6	50	1	6	1	14	6	12	8	32	-	-	1	0	64	8	6.0	5	11.1	0.000	0.000	0.000	0.010	0.00	0.70	0.00	-
	50th	10	67	2	12	2	21	14	27	12	46	1	2	7	12	85	15	6.5	12	18.0	0.020	0.000	0.010	0.020	0.01	1.20	0.00	-
	80th	25	75	7	22	4	28	62	50	28	64	5	10	13	29	199	34	7.2	52	27.0	0.200	0.020	0.040	0.039	0.02	2.10	0.22	-
deep	20th	6	53	1	8	1	12	6	19	8	22	-	-	-	0	59	6	5.5	5	11.0	0.000	0.000	0.000	0.005	0.00	0.90	0.00	-
	50th	9	65	2	14	2	18	16	35	10	43	1	2	3	5	82	12	6.5	14	17.0	0.050	0.002	0.010	0.010	0.01	1.30	0.10	-
	80th	18	76	6	25	3	24	64	68	15	65	4	5	9	22	163	34	7.2	52	35.0	0.180	0.030	0.060	0.030	0.02	1.65	0.49	-
very deep	20th	7	54	1	10	1	10	13	21	7	20	1	2	1	0	64	9	6.1	11	16.0	0.010	0.000	0.000	0.000	0.00	0.70	0.00	-
	50th	9	59	3	15	3	16	29	46	9	39	1	4	4	9	95	19	6.9	24	23.0	0.100	0.005	0.005	0.010	0.02	1.30	0.13	-
	80th	78	74	18	26	8	25	103	65	65	60	16	8	8	16	511	67	7.5	85	43.7	0.610	0.020	0.020	0.030	0.02	5.25	1.47	-

Table 4.5 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – High Salinity – 6 Cooya Wonga

Depth	Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		NO_3		EC	Hardness	pH	Alkalinity	SiO_2	F	Fe	Mn	Zn	Cu	SAR	RAH	eH
		$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$mg{\cdot}L^{-1}$	%	$\mu S{\cdot}cm^{-1}$	$mg{\cdot}L^{-1}$		$mg{\cdot}L^{-1}$	$mg{\cdot}L^{-1}$	$mg{\cdot}L^{-1}$	$mg{\cdot}L^{-1}$	$mg{\cdot}L^{-1}$	$mg{\cdot}L^{-1}$	$mg{\cdot}L^{-1}$		$meqL^{-1}$	mV
shallow	20th	19	63	3	3	2	9	18	5	24	52	3	3	-	-	166	20	6.7	14	11.0	0.000	0.000	0.000	0.010	0.00	1.66	0.00	-
	50th	41	77	5	6	8	17	43	15	59	70	8	6	0	0	310	51	7.1	36	19.0	0.175	0.010	0.000	0.010	0.01	4.00	0.06	-
	80th	853	86	45	12	83	23	94	44	1,568	88	243	9	2	1	5,296	456	7.8	77	27.0	0.397	0.030	0.020	0.015	0.01	15.02	0.26	-
moderate	20th	14	68	3	6	3	16	2	0	27	65	6	7	-	-	149	20	5.1	2	14.0	0.000	0.000	0.010	0.037	0.00	1.94	0.00	-
	50th	736	76	48	7	91	18	11	0	1,332	89	187	9	2	0	3,595	496	6.5	9	16.0	0.045	0.010	0.160	0.140	0.01	14.10	0.00	-
	80th	3,563	77	283	12	483	19	20	9	6,762	91	972	10	8	1	17,667	2,713	7.2	18	19.3	0.109	0.222	1.896	1.098	0.02	29.73	0.00	-
deep	20th	67	60	6	12	5	17	21	0	64	71	4	1	-	-	323	34	6.5	17	23.0	0.088	0.000	0.000	-	-	3.06	0.00	-
	50th	3,705	69	593	13	498	18	34	7	7,490	87	992	8	-	0	12,540	3,575	6.9	28	27.5	0.100	0.015	5.370	-	-	24.55	0.00	-
	80th	7,407	70	1,243	21	1,006	19	71	21	15,067	91	2,104	9	4	0	37,900	7,261	7.4	58	39.0	0.520	0.160	5.926	-	-	38.03	0.21	-

Table 4.6 Water quality objectives to protect aquatic ecosystem EVs for Groundwater Chemistry Group (refer to Plan WQ1083) – High Calcium – 15 Sth Craiglie

Depth	Percentile	Na		Ca		Mg		HCO_3		Cl		SO_4		NO_3		EC	Hardness ($mg \cdot L^{-1}$)	pH	Alkalinity ($mg \cdot L^{-1}$)	SiO_2 ($mg \cdot L^{-1}$)	F ($mg \cdot L^{-1}$)	Fe ($mg \cdot L^{-1}$)	Mn ($mg \cdot L^{-1}$)	Zn ($mg \cdot L^{-1}$)	Cu ($mg \cdot L^{-1}$)	SAR	RAH ($meqL^{-1}$)	eH (mV)
		$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$mg \cdot L^{-1}$	%	$\mu S \cdot cm^{-1}$												
shallow	20th	15	65	2	5	2	12	16	9	19	37	2	4	-	0	97	11	6.5	13	13.8	0.000	0.000	0.000	0.010	0.01	1.83	0.00	-
	50th	34	73	7	9	5	16	76	30	34	58	4	5	1	3	246	40	7.0	63	22.0	0.230	0.000	0.000	0.015	0.01	2.45	0.04	-
	80th	3,802	80	240	17	423	17	201	55	6,831	84	568	8	10	5	18,643	2,340	7.7	166	27.9	0.619	0.023	0.147	0.020	0.01	29.85	0.63	-
moderate	20th	44	44	6	4	3	6	45	7	48	38	3	1	-	-	320	31	6.9	38	21.0	0.079	0.000	0.000	0.000	0.00	2.00	0.00	-
	50th	96	68	19	16	7	17	99	23	123	67	7	3	1	0	577	76	7.4	82	33.0	0.220	0.010	0.000	0.010	0.01	5.05	0.93	-
	80th	227	88	60	21	54	25	184	56	522	88	48	7	2	1	1,639	371	7.9	152	38.0	0.601	0.102	0.160	0.030	0.02	13.91	2.13	-
deep	20th	43	43	34	20	7	12	216	51	35	21	2	1	-	-	447	127	7.6	177		0.500	0.000	0.000	0.000	0.00	1.63	0.52	-
	50th	50	47	39	40	7	13	220	77	36	22	2	1	-	-	460	131	7.6	181		0.500	0.000	0.000	0.000	0.00	1.90	1.00	-
	80th	109	53	41	45	30	27	279	77	166	48	4	1	1	0	928	209	8.3	236		0.680	0.009	0.198	0.000	0.00	3.25	1.02	-

Notes:

1. Refer to Plan WQ1083 to locate relevant groundwater chemistry zones.
2. Within each chemistry zone, groundwater quality values are provided for different depths (Shallow: <15m, Moderate: 15–40m, Deep: 40–65m, Very deep: >65m, Artesian: all artesian).
3. The management intent is to maintain 20th, 50th and 80th percentile values. Values are provided for each of these percentiles.
4. Abbreviations: EC: Electrical conductivity, $CaCO_3$: Calcium carbonate, Ca: Calcium, Mg: Magnesium, Na: Sodium, Cl: Chloride, SO_4: Sulfate, HCO_3: Bicarbonate, NO_3: Nitrate, SiO_2: Silica, F: Fluoride, Fe: Iron, Mn: Manganese, Zn: Zinc, Cu: Copper, SAR: Sodium adsorption ratio, RAH: Residual alkali hazard, EH: Redox (oxidation/reduction) potential, '-': insufficient data to perform statistical summaries, or the parameter was not tested.

Source: Queensland Wet Tropics and Black and Ross catchments: Regional chemistry of the groundwater. Queensland Government (Raymond, M. A. A. and V. H. McNeil, 2013).

Ways to improve water quality

4 Ways to improve water quality

The following documents are relevant in considering ways to improve water quality in the Daintree and Mossman basins.

Regional plans

- Wet Tropics Water Quality Improvement Plan, Terrain NRM 2015, in publication. See Terrain website.

Queensland and Australian Government plans

- Reef Water Quality Protection Plan 2013
- Reef 2050 Long-Term Sustainability Plan
- Reef Program–The Australian Government Reef Program will be delivered as a component of the National Landcare Program and will build on the success of the first phase of Reef Rescue. More about the Australian Government Reef Program

Appendix 9A

Intake and Sediment Pond WQ

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Mark Hober	Manager	Jon Dicker
Client	DAINTREE SALTWATER BARRAMUNDI	Laboratory	SGS Cairns Environmental
Address	LOT 3 VIXIES ROAD WONGA QLD 4873	Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	61 7 4098 7259	Telephone	+61 07 4035 5111
Facsimile	(Not specified)	Facsimile	+61 07 4035 5122
Email	dswbarra@bigpond.com	Email	AU.Environmental.Cairns@sgs.com
Project	**Water Quality - 16/08/2016**	SGS Reference	**CE122606 R0**
Order Number	**COD**	Date Received	22 Aug 2016
Samples	2	Date Reported	29 Aug 2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(3146)

SIGNATORIES

Anthony Nilsson
Operations Manager

Leanne Orsmond
Quality & Microbiology Coordinator

Parameter	Units	LOR	Sample Number: CE122606.001 Sample Matrix: Water Sample Date: 16 Aug 2016 Sample Name: Inlet Drain	Sample Number: CE122606.002 Sample Matrix: Water Sample Date: 16 Aug 2016 Sample Name: Sediment Pond
pH in water Method: AN101 Tested: 22/8/2016				
pH**	pH Units	0.1	7.4	7.4
Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 23/8/2016				
Total Suspended Solids Dried at 103-105°C	mg/L	5	9	7
Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 25/8/2016				
Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.048	0.018
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 24/8/2016				
Total Kjeldahl Nitrogen	mg/L	0.05	0.31	2.3
Total Nitrogen (calc)	mg/L	0.05	0.36	2.3
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293 Tested: 24/8/2016				
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.02	<0.02	0.42

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser **Method: ME-(AU)-[ENV]AN248**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate/Nitrite Nitrogen, NOx as N	LB038893	mg/L	0.005	<0.005	3%	99 - 101%

pH in water **Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH**	LB038858	pH Units	0.1	5.7	0 - 1%	NA

TKN Kjeldahl Digestion by Discrete Analyser **Method: ME-(AU)-[ENV]AN281**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB038924	mg/L	0.05	<0.05	1 - 4%	85 - 97%

Total and Volatile Suspended Solids (TSS / VSS) **Method: ME-(AU)-[ENV]AN114**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Suspended Solids Dried at 103-105°C	LB038888	mg/L	5	<5	0 - 9%	97 - 98%	94 - 101%

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion)	LB038924	mg/L	0.02	<0.02	0 - 3%	98 - 101%

METHOD SUMMARY

CE122606 R0

METHOD	METHODOLOGY SUMMARY
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN248	Nitrate / Nitrite by Auto Analyser: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Reference APHA 4500-NO3- F.
AN279/AN293	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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Appendix 9B

South Arm Background WQ

PRELIMINARY REPORT

CLIENT DETAILS		LABORATORY DETAILS	
Contact	MARK HOBER	Manager	Jon Dicker
Client	DAINTREE SALTWATER BARRAMUNDI	Laboratory	SGS Cairns Environmental
Address	LOT 3 VIXIES ROAD WONGA BEACH QLD 4873	Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	61 7 40987259	Telephone	+61 07 4035 5111
Facsimile	(Not specified)	Facsimile	+61 07 4035 5122
Email	dswbarra@bigpond.com	Email	AU.Environmental.Cairns@sgs.com
Project	**Background WaterQuality for S Daintree R**	SGS Reference	**CE128068 R0**
Order Number	(Not specified)	Date Received	26 Jun 2017
Samples	10	Date Reported	

COMMENTS

This is an interim report. Final QC checks are yet to be completed.

SIGNATORIES

Alyson Bergamo
Senior Laboratory Technician

Anthony Nilsson
Operations Manager

Jon Dicker
Manager Northern QLD

Leanne Orsmond
Quality & Microbiology Coordinator

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	CE128068.001 Water 20 Jun 2017 SADR 1	CE128068.002 Water 20 Jun 2017 SADR 2	CE128068.003 Water 20 Jun 2017 SADR 3	CE128068.004 Water 20 Jun 2017 SADR 4
Turbidity Method: AN119 Tested: 26/6/2017							
Turbidity	NTU	0.5		**2.1**	**1.9**	**5.1**	**2.3**
Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 28/6/2017							
Total Suspended Solids Dried at 103-105°C	mg/L	1		**4**	**2**	**26**	**6**
Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 3/7/2017							
Ammonia Nitrogen, NH3 as N	mg/L	0.005		**0.016**	**0.015**	**0.015**	**0.015**
Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 27/6/2017							
Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005		**0.036**	**0.012**	<0.005	<0.005
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 26/6/2017							
Total Kjeldahl Nitrogen	mg/L	0.05		-	-	-	-
Total Nitrogen (calc)	mg/L	0.05		-	-	-	-
Particulate (insoluble) Kjeldahl Nitrogen (calc)*	mg/L	0.05		-	NVL	NVL	NVL
Soluble Kjeldahl Nitrogen (TKN) Digestion by Discrete Analyser Method: AN281 Tested: 26/6/2017							
Soluble Kjeldahl Nitrogen	mg/L	0.05		-	NVL	NVL	NVL
Total Soluble Nitrogen (calc)	mg/L	0.05		-	NVL	NVL	NVL

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE128068.001 Water 20 Jun 2017 SADR 1	CE128068.002 Water 20 Jun 2017 SADR 2	CE128068.003 Water 20 Jun 2017 SADR 3	CE128068.004 Water 20 Jun 2017 SADR 4
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 26/6/2017						
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.01	-	-	-	-
Particulate (Insoluble) Total Phosphorus*	mg/L	0.01	-	NVL	NVL	NVL
Filterable Reactive Phosphorus (FRP) Method: AN278 Tested: 29/6/2017						
Filterable Reactive Phosphorus	mg/L	0.005	**0.007**	**0.008**	**0.022**	**0.007**
Total Soluble Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 26/6/2017						
Total Soluble Phosphorus (Kjeldahl Digestion)	mg/L	0.02	-	NVL	NVL	NVL
Spectrometric Determination of Chlorophyll Method: AN738 Tested: 26/6/2017						
Chlorophyll a	mg/L	0.002	**0.002**	<0.002	**0.005**	**0.003**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE128068.005 Water 20 Jun 2017 SADR 5	CE128068.006 Water 21 Jun 2017 SADR 1	CE128068.007 Water 21 Jun 2017 SADR 2	CE128068.008 Water 21 Jun 2017 SADR 3
Turbidity Method: AN119 Tested: 26/6/2017						
Turbidity	NTU	0.5	**2.8**	**2.7**	**2.4**	**2.9**
Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 28/6/2017						
Total Suspended Solids Dried at 103-105°C	mg/L	1	**5**	**6**	**3**	**10**
Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 3/7/2017						
Ammonia Nitrogen, NH3 as N	mg/L	0.005	**0.009**	**0.023**	**0.013**	**0.011**
Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 27/6/2017						
Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005	**0.014**	**0.009**	<0.005
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 26/6/2017						
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	-	-
Total Nitrogen (calc)	mg/L	0.05	-	-	-	-
Particulate (insoluble) Kjeldahl Nitrogen (calc)*	mg/L	0.05	NVL	NVL	NVL	NVL
Soluble Kjeldahl Nitrogen (TKN) Digestion by Discrete Analyser Method: AN281 Tested: 26/6/2017						
Soluble Kjeldahl Nitrogen	mg/L	0.05	NVL	NVL	NVL	NVL
Total Soluble Nitrogen (calc)	mg/L	0.05	NVL	NVL	NVL	NVL

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE128068.005 Water 20 Jun 2017 SADR 5	CE128068.006 Water 21 Jun 2017 SADR 1	CE128068.007 Water 21 Jun 2017 SADR 2	CE128068.008 Water 21 Jun 2017 SADR 3
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 26/6/2017						
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.01	-	-	-	-
Particulate (Insoluble) Total Phosphorus*	mg/L	0.01	NVL	NVL	NVL	NVL
Filterable Reactive Phosphorus (FRP) Method: AN278 Tested: 29/6/2017						
Filterable Reactive Phosphorus	mg/L	0.005	**0.007**	**0.010**	**0.007**	**0.007**
Total Soluble Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 26/6/2017						
Total Soluble Phosphorus (Kjeldahl Digestion)	mg/L	0.02	NVL	NVL	NVL	NVL
Spectrometric Determination of Chlorophyll Method: AN738 Tested: 26/6/2017						
Chlorophyll a	mg/L	0.002	**0.003**	<0.002	<0.002	**0.004**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name CE128068.009 Water 21 Jun 2017 SADR 4	CE128068.010 Water 21 Jun 2017 SADR 5
Turbidity Method: AN119 Tested: 26/6/2017				
Turbidity	NTU	0.5	**2.1**	**2.5**
Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 28/6/2017				
Total Suspended Solids Dried at 103-105°C	mg/L	1	**6**	**4**
Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 3/7/2017				
Ammonia Nitrogen, NH3 as N	mg/L	0.005	**0.012**	**0.011**
Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 27/6/2017				
Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005	<0.005
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 26/6/2017				
Total Kjeldahl Nitrogen	mg/L	0.05	-	-
Total Nitrogen (calc)	mg/L	0.05	-	-
Particulate (insoluble) Kjeldahl Nitrogen (calc)*	mg/L	0.05	NVL	NVL
Soluble Kjeldahl Nitrogen (TKN) Digestion by Discrete Analyser Method: AN281 Tested: 26/6/2017				
Soluble Kjeldahl Nitrogen	mg/L	0.05	NVL	NVL
Total Soluble Nitrogen (calc)	mg/L	0.05	NVL	NVL

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	CE128068.009 Water 21 Jun 2017 SADR 4	CE128068.010 Water 21 Jun 2017 SADR 5
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 26/6/2017					
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.01		-	-
Particulate (Insoluble) Total Phosphorus*	mg/L	0.01		NVL	NVL
Filterable Reactive Phosphorus (FRP) Method: AN278 Tested: 29/6/2017					
Filterable Reactive Phosphorus	mg/L	0.005		**0.007**	**0.006**
Total Soluble Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 26/6/2017					
Total Soluble Phosphorus (Kjeldahl Digestion)	mg/L	0.02		NVL	NVL
Spectrometric Determination of Chlorophyll Method: AN738 Tested: 26/6/2017					
Chlorophyll a	mg/L	0.002		**0.003**	**0.004**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN280

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Ammonia Nitrogen, NH3 as N	LB047420	mg/L	0.005	<0.005	0 - 5%	94 - 106%

Filterable Reactive Phosphorus (FRP) Method: ME-(AU)-[ENV]AN278

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Filterable Reactive Phosphorus	LB047377	mg/L	0.005	<0.005	7%	97%

Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: ME-(AU)-[ENV]AN248

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate/Nitrite Nitrogen, NOx as N	LB047296	mg/L	0.005	<0.005	0%	93%

Soluble Kjeldahl Nitrogen (TKN) Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Soluble Kjeldahl Nitrogen	LB047285	mg/L	0.05	NVL	NVL	NVL

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB047284	mg/L	0.05	NVL	NVL	NVL

Total and Volatile Suspended Solids (TSS / VSS) Method: ME-(AU)-[ENV]AN114

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Suspended Solids Dried at 103-105°C	LB047341	mg/L	1	<1	0 - 7%	95%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion)	LB047284	mg/L	0.01	NVL	NVL	NVL

Total Soluble Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Soluble Phosphorus (Kjeldahl Digestion)	LB047285	mg/L	0.02	NVL	NVL	NVL

Turbidity **Method: ME-(AU)-[ENV]AN119**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD
Turbidity	LB047287	NTU	0.5	<0.5	0%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN119	Turbidity by Nepholometry: Small particles in a light beam scatter light at a range of angles. A turbidimeter measures this scatter and reports results compared to turbidity standards, in NTU. This procedure is not suitable for very dark coloured liquids or samples with high solids because light absorption causes artificially low light scatter and low turbidity. Reference APHA 2130B.
AN248	Nitrate / Nitrite by Auto Analyser: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Reference APHA 4500-NO3- F.
AN278	Filterable Reactive Phosphorus by DA (determined on filtered sample): Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F
AN279/293(Sydney)	The filtered sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN280	A filtered water sample containing ammonia (NH3) or ammonium cations (NH4+) is reacted with alkaline phenol and hypochlorite in a buffered solution to form the blue indophenol colour. The absorbance is measured at 630nm and compared with calibration standards to obtain the concentration of ammonia in the sample.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN738	A known volume (up to 1 litre) of sample is filtered onto a glass fibre filter (Whatman GFC 4mm) and the filter is then macerated and extracted in a 90% aqueous acetone solution to recover the phytoplankton pigments. The sample is then left refrigerated (4oC) for a minimum of 2 hours (usually overnight), centrifuged and the extract read directly at 664, 647, 630 and 750nm. The extract is acidified and re-read at 665 and 750nm. Absorbances are read directly and the chlorophyll forms calculated from these results.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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Appendix 10

Treatment Wetland Modelling

Modeling nutrient discharge from a proposed Free Surface Water Wetland Daintree Saltwater Barramundi

Dr Trevor Anderson
Grofish Australia Pty Ltd.

29 March, 2018

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Executive Summary

Scope

Daintree Saltwater Barramundi currently operate a barramundi farming enterprise at Vixies Road, Wonga and are intending to apply for an Environmental Authority, which permits discharge from the farm to allow expansion of the farm.

The lead consultant Ecosustainability has sought advice regarding the design and effectiveness of a wetland to treat the pond discharge in order to return the water to the environment with acceptable environmental impacts.

This report addresses that request.

Key findings

The results of the modeling undertaken indicate that:

- The area of the proposed wetland is much greater than those generally used for treating low nutrient level aquaculture discharge waters. On the basis of dividing the total area of wetland into 10 sequential smaller areas to bring Hydraulic Loading Rate into the range covered by published studies,
- Utilising pond discharge water quality parameters based on industry standard good practice, namely Total Kjeldahl Nitrogen of 2.3 $mg.L^{-1}$, Total Kjeldahl Phosphorus of 0.45 $mg.L^{-1}$, Total Suspended Solids of 20 $mg.L^{-1}$ and exchange rates of 3%.day^{-1},
- **The wetland as proposed by Daintree Saltwater Barramundi as part of their expanded farming activity will satisfactorily achieve the level of processing required to allow discharge water quality to match receiving water quality.**
- Noting that water quality parameters of the proposed receiving waters at Daintree Saltwater Barramundi have 80^{th} percentile measured values of 9.0 $mg.L^{-1}$ for Total Suspended Solids, 0.35 $mg.L^{-1}$ Total Kjeldahl Nitrogen and 0.01 $mg.L^{-1}$ for Total Kjeldahl Phosphorus and normal exchange rates in barramundi farms operated with good practice are around 3%.day^{-1},
- The proposed wetland will be able to process exchange rates of up to 3.85%.day^{-1} and 1.33x the reasonable expected concentration of TP in the pond discharge. Further, the wetland will be able to process concentrations of TSS and TN up to 10x reasonable concentration in the pond discharge and discharge rates up to 36%.day^{-1} for TN or 60%.day^{-1} for TSS before reaching the levels measured in the receiving waters.
- Under expected usual operating conditions, the wetland will process discharge water such that each of the nutrients will be below the level of sensitivity of the analyses for Total Kjeldahl Nitrogen (0.05 $mg.L^{-1}$), Total Kjeldahl Phosphorus (0.02 $mg.L^{-1}$), and Total Suspended Solids (5 $mg.L^{-1}$).

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Background

Constructed wetlands are widely used for water treatment of municipal waste, urban rainwater runoff, intensive agriculture waste and aquaculture discharge (Brown et al., 1999; Lin et al., 2003; Kynkaanniemi et al, 2013; Liang et al., 2017a,b).

Processes influencing water quality in wetlands are complex. The wetland's inputs as nutrient loads and hydrologic regime and background parameters such as the level of organic matter, soil type and chemistry and the types of plants present affect the activity of particular processes occurring in the wetland and the efficiency of a particular wetland in achieving specific outcomes.

A joint study by the CRCs for Catchment Hydrology and Freshwater Ecology (Wong et al., 1999) identified a complex array of processes occurring in wetlands, including:

- biological uptake of nutrients and metals by aquatic vegetation
- formation of chemical complexes of nutrients and metals in the sediments
- coagulation of small particles
- filtration and surface adhesion of small particles by vegetation
- enhanced sedimentation of smaller particles in vegetation
- direct sedimentation of larger particles
- decomposition of accumulated organic matter
- gas losses through chemical and microbial processes (ammonia, nitrogen, methane, hydrogen sulphide)
- microbial UV disinfection by exposure to sunlight

Wong et al (1999) identified three significant types of processes as:

- biological and chemical processes involving soluble materials (e.g. uptake of nutrients by epiphytes, adsorption and desorption of phosphorus onto and from particles, nitrification and denitrification)
- coagulation and filtration of small, colloidal particles (e.g. adhesion of colloids and particles on the surface of aquatic vegetation. These particles are in a size-density range that makes them too small to settle under all but the most quiescent conditions.)
- physical sedimentation of particles (e.g. sedimentation in wetlands due to decreased water velocity. Large plants (macrophytes) such as reeds and rushes enhance this process by further reducing turbulence and water velocity.)

Constructed wetlands incorporate the same biological nutrient flows as normally occur in other aquatic or riparian environments. Soluble nutrients are turned over through uptake by phytoplankton, which multiplies, senesces and decays. Upon decay, nutrients contained in phytoplankton are released back into the water column as soluble nutrients. Much of the nutrients in decaying phytoplankton, however, is deposited as particulate organic matter. Particulate matter remains as a deposit and is incorporated into the sediment if it is not resuspended and carried through the wetland by turbulence. In an effective constructed wetland, macrophytes provide physical filtration by stems and roots of particulate matter in addition to simple sedimentation and nutrient absorption by the sediment such as would occur in a settlement pond. The macrophytes also absorb nutrients from the

water column. The simple and efficient removal of nutrients from the wetland and hence the waste stream is achieved by regularly removing a portion of the macrophytes from the wetland.

Each process occurring in the wetland has a physical rate limitation. The rate at which the process can proceed is affected by the time of exposure of the nutrients to that process, related to the flow rate of the water through the wetland, the path of that flow and the physical characteristics of the flow path.

Wetland structure

Two types of constructed wetlands have received attention from investigators. Sub-surface flow wetlands involve a porous substrate over-planted with macrophytes. An important feature of ensuring the efficiency of sub-surface flow wetlands is to ensure that flow rates are limited such that the water does not overfill the wetland and short-circuit across the top of the media. These wetlands incorporate a significant amount of physical filtration and are subject to clogging in a similar way as a sand-filter or any other physical filter is subject to clogging. Overcoming a clogged sub-surface flow wetland requires some form of backwashing leading to a filter effluent, which must be again treated, or to physical reconstruction. This is not a practical process for operating in an aquaculture enterprise of any size.

The alternative structure is a free surface water wetland (FSW). These wetlands rely on some physical settlement and filtration of particulates by plant stems and nutrient absorption by macrophytes. While some clogging occurs as a result of settlement of organic and inorganic particulate matter, removal of this material is a relatively simple process of physical removal by scraping and if conducted while the wetland has limited water present, follows a similar regime to that of cleaning a normal aquaculture pond. A FSW wetland also incorporates nutrient removal from the root zone, achieved by water exchange through the soil, but they do not rely on water flow through the soil as a form of particulate filtration and consequently clogging issues are not a problem.

The wetland to be constructed by Daintree Saltwater Barramundi is a FSW wetland.

Objective of the wetland

The proposed wetland is intended to reduce the concentration of suspended solids, nitrogen and phosphorus in water discharged to the environment such that the quality of the water meets the discharge requirements of an Environmental Authority. Each of these three components behaves differently in wetlands, although there are significant interactions.

Suspended solids are comprised of organic and inorganic particles, some of which are phytoplankton in various stages of the nutrient cycle. In general, removal of suspended solids is achieved through settlement or filtration.

Nitrogen is either bound to organic particles including being contained within phytoplankton, or present as dissolved inorganic nitrogen as ammonia, nitrate or nitrite. Removal of nitrogen involves both conversion of inorganic dissolved nitrogen into macrophytes or particulate forms and settlement and filtration of particulates.

Phosphorus is present again as inorganic or organic particulate or dissolved fractions, but the process of removal differs from nitrogen in that binding to soil constitutes an important process of removal from the effluent stream.

Clearly successful removal of particulates facilitates successful removal of nitrogen and phosphorus. Increased water or soil bound phosphorus increases phytoplankton and macrophyte growth thereby facilitating conversion of soluble nitrogen to plant bound nitrogen.

Delineating, enumerating and modeling each process is complex. It is also unnecessary in evaluating the likely performance of a wetland in removing nutrients as data has been generated that can be used to model the process as a whole.

Choice of model

Nutrient removal in constructed wetlands can be estimated using a first-order plug flow model (Turcios et al., 2014; Lin et al., 2004; Lin et al., 2005).

This model is given as:

$$\frac{C_e}{C_i} = \exp(-\frac{k\varepsilon h_w}{HLR})$$

(Equation 1)

Where: C_e = effluent nutrient concentration (mg.L^{-1}), C_i = influent nutrient concentration (mg.L^{-1}), k = first order removal rate constant (day^{-1}), ε = porosity of wetland, h_w = water depth of the wetland (m) and *HLR* = hydraulic loading rate (m.day^{-1}).

Hydraulic loading rate is defined as:

$$HLR = \frac{Q}{A_w}$$

(Equation 2)

Where Q = Flow rate through the wetland (m^3.day) and A_w = Area of the wetland.

The model can be re-written to allow estimation of the effluent discharge concentration as:

$$C_e = C_i \exp(-\frac{k\varepsilon h_w}{HLR})$$

(Equation 3)

Values for C_i, h_w, ε and *HLR* are determined by the design or operation of the farming system and wetland.

To satisfactorily determine predicted C_e, it is necessary to obtain meaningful estimates of k. from the literature.

Selection of available data on which to base models

The complexity of the processes occurring in wetlands and the interactions that occur mean that any prediction of performance requires the use of models derived from relevant environments. Many processes are temperature dependent or are affected by salinity. Much of the work undertaken to understand wetland efficiency has been performed in fresh water systems or in cold or temperate environments and there is limited data upon which to base modeling of tropical saltwater systems.

The processes involving nutrient accretion in wetlands are also concentration dependent. Many studies investigate the efficacy of wetlands for processing municipal waste or urban run-off streams, which have nutrient and sediment loads far in excess (10-100 fold) of aquaculture effluent. Data obtained from wetlands processing these waste streams derive models for which nutrient loads from aquaculture occur at the lower periphery and hence the highest levels of uncertainty making such models unreliable for predictions.

The problem of scale

When using models to predict the outcome of complex processes, it is advisable to remain within the boundaries of the parameters used to derive the models. To not do so is to invite unknown influences to confound the models and lead to erroneous conclusions. In the present study, the size of the proposed wetland is such that the hydraulic loading rate is very low and outside of any previously published system. The proposed wetland is in the order of 116% of the production area, approximately 4 to 5 times the area usually applied to processing pond discharge in farms engaging in world's best practice.

The very low hydraulic loading rate (HLR) of the total wetland has created a problem in using models based on currently available HLR ranges to predict the outcome of the processes occurring in the wetland. To allow a supportable conclusion, the system has been modeled treating it as 10 separate and sequential wetlands, with the discharge of one leading directly into the intake of the next. This can be achieved in practice by dividing the wetland into 10 separate areas with bunds, or barriers such as fences of plastic sheeting, which would result in less impact on existing plants, to separate the sequential water bodies. The consequent higher HLR of each wetland area allows the use of currently available published data to derive the parameters required for the models, notably the value of *k*.

Literature estimates of *k*

A literature search was undertaken to identify studies that were conducted:

- Utilising FSW wetlands, and where possible, the component of FSW wetland was isolated from the total study.
- In a tropical saline environment.
- Using aquaculture effluent.

Values of *k* determined for each of total suspended solids, nitrogen and phosphorus are shown in Table 1. Efficiency of removal of nitrogen and phosphorus has been shown to be significantly affected by HLR (Lin et al., 2002). Consequently, to account

for variations in flow rate of wetlands in literature studies, relationships were derived between measured k and HLR. These relationships are significant for nitrogen (r^2 = 0.983) and phosphorus (r^2 = 0.676) and were applied to develop the values of *k* used in the modeling of wetland efficiency shown in Table 4 and Table 5. No meaningful relationship could be derived between *k* and *HLR* for TSS and so an average value was applied in the model producing the data shown in Table 4 and Table 5.

Table 1*. k values calculated from performance of Free Surface Water Wetlands processing aquaculture effluent in tropical, saline environments.*

Nutrient	*HLR* (m/day)	*k* (d^{-1})	Source
TN	0.036	-0.025	Lin et al, 2002
	0.046	0.124	Lin et al, 2002
	0.068	0.197	Lin et al, 2002
	0.136	0.462	Lin et al, 2002
	0.270	0.620	Lin et al, 2002
	Derived relationship	$k = 0.3142\ln(HLR)+1.0547$ $r^2=0.983$	
TP	0.177	0.038	Tilley et al, 2002
	1.182	0.613	Tilley et al, 2002
	0.300	0.479	Lin et al, 2003
	0.036	-0.013	Lin et al, 2002
	0.046	0.018	Lin et al, 2002
	0.068	0.014	Lin et al, 2002
	0.136	0.038	Lin et al, 2002
	0.270	0.051	Lin et al, 2002
	Derived relationship	$k = 0.1758\ln(HLR)+0.4881$ $r^2=0.676$	
TSS	3.558	1.065	Lin et al, 2005
	4.492	1.024	Lin et al, 2005
	0.177	0.126	Tilley et al, 2002
	1.182	1.059	Tilley et al, 2002
	0.300	1.685	Lin et al, 2003
No meaningful derived relationship			Average *k* value = 0.992

TN = Total Nitrogen, TP = Total Phosphorus, TSS = Total Suspended solids, *HL*R = Hydraulic Loading Rate and *k* = first order removal constant.

Source data for the models

In the absence of actual values for nutrient levels in the pond water discharge at Daintree Saltwater Barramundi, reasonable values for successful commercial production of barramundi in similar systems in North Queensland wet tropics were derived from author's industry sources.

To provide context to the predicted outcomes from the modeling, the results were compared to the 80th percentile of measured values in sites in the creek system

adjacent to Daintree Saltwater Barramundi and comprising a cross-section of intake and receiving waters sampled on two consecutive days. The original data are available from Ecosustainabilty.

***Table 2**. Source of data used for base parameters applied to the Equation 3 to determine the efficiency of the Free Surface Water wetland proposed by Daintree Saltwater Barramundi and the nature of sensitivities tested.*

Parameter	Source of Baseline Parameters	Sensitivity tested
C_i	Reasonable industry standard data derived from author's industry sources	Maximum value supported by the model to provide acceptable level in discharge to the environment
k	Derived from relationships described in Table 1	
ε	Value taken from Lin et al, 2005, for FSW wetlands	Extended to a value of 1.0 implying no sub-surface water flow to lowest reasonable value implying very low surface flow
h	Assumed value of the depth of the wetland as proposed to be constructed and managed	
HLR	Reasonable industry standard data derived from author's industry sources	Modeled up to 20x proposed discharge volume (60% exchange) and maximum volume to remain within current discharge limits

***Table 3**. 80th Percentile Values for nutrients subject to modeling of the effect of the Free Surface Water wetland as measured in samples from 6 sites in the creek system adjacent to Daintree Saltwater Barramundi and comprising a cross-section of intake and receiving waters sampled on two consecutive days.*

Nutrient	*C* (mg/L)
TSS	**9.00**
TN	**0.35**
TP	**0.01**

TN = Total Kjeldahl Nitrogen, TP = Total Kjeldahl Phosphorus, TSS = Total Suspended solids, C_e = effluent nutrient concentration Q = Flow rate of discharge through the wetland, BDL = Below Detectable Limit as determined by SGS Method AN114 (TSS) AN281 (TN) AN279/AN293 (TP).

Results of Modeling

Proposed average discharge conditions

The concentration of C_e under various flow rates determined by the model in Equation 3 using the baseline parameters listed in Table 2 is shown in Table 4. The wetland area proposed by Daintree Saltwater Barramundi and treating the water being discharged from the barramundi ponds at an exchange rate of 3% will have a concentration of Total Suspended Solids (TSS) below the detectable limit of the methods defined by Australian Standards, a concentration of Total Nitrogen (TN) below the detectable limit of the methods defined by Australian Standards and a concentration of Total Phosphorus (TP) below the detectable limit of the methods defined by Australian Standards.

Under the same conditions, the amount of nutrient being discharged per day will be 0 kg of TSS, 0 kg of TN and 0 kg of TP (Table 5).

Sensitivity to increased flow

To assess the sensitivity of the model outcomes to alternative scenarios, *k*, concentrations of the nutrients in the wetland effluent, and total amounts of nutrients discharged were calculated under increased flow rates (Table 4). The flow rates used were i) an increase of 100% in discharge rate or twice the proposed rate of discharge and ii) the maximum discharge that would result in the nutrient levels in the discharge water matching the nutrient levels in the receiving waters. For TSS and TN, discharging twice the proposed volume of aquaculture effluent through the wetland will produce wetland discharge effluent below the detectable limits of the methods defined by Australian Standards. For TP, a discharge volume 28% greater than proposed discharge volumes would just reach the detectable limits of the analytical method.

The maximum discharge volume able to be processed by the proposed wetland is predicted to be 20X the proposed discharge for TSS and 12X the proposed discharge volume for TN (Table 4).

Sensitivity to increased nutrient

In order to test the sensitivity of the wetland discharge water quality to higher than average nutrient levels, a very high value for each nutrient was input to the model. These values were 10X reasonable concentrations for TSS and TN and 1.33X average concentration of TP (Table 4). Again, even with aquaculture discharge nutrient concentrations at this level, the wetland effluent discharge would have concentrations of nutrients at or below the detectable limit of the methods defined by Australian Standards (Table 4).

Sensitivity to wetland porosity

Free surface water wetland porosity is affected by the amount of water passing over the surface in comparison to the wetted soil volume and the porosity of the wetted soil or sub-surface wetland. This is easily calculated in a newly constructed wetland and depends on the particle size of the soil and hence the spaces between the

particles. In a newly constructed wetland, soil of known particle size can be incorporated into the construction and the porosity defined. However, after even a short period of operation, pores are filled with organic matter and over longer periods, particles are broken down and settling occurs thus decreasing the porosity. With decreased porosity, channeling occurs, with further impacts on porosity.

An initial porosity of 0.85 was assumed for the baseline model after Lin et al (2005) and the impact on the nutrient retention by the wetland was tested. The data is shown in Table 6.

The sensitivity of the efficiency of the wetland was tested with a porosity of 1.0, which is effectively completely surface water flow, and the minimum porosity that would result in total nutrient load matching the current discharge. Minimum porosity values of 0.045 and 0.16 for TSS and TN were found to be required to match the current rate of discharge. A porosity value of 0.78, was the lowest that could be sensibly applied for calculation of TP removal and at that level, TP discharged from the wetland is still predicted to be lower than current levels of discharge. The values imply that the subsurface portion of the wetland can be effectively removed for processing nutrients and the wetlands will still function in such a way as to satisfactorily meet the original objectives of the wetland. In practice, this means that cleaning of the wetland can be performed with a view to ensuring even flow rather than requiring regular reconstruction of the subsurface component of the wetland.

Limitation of the Wetland

The wetland is limited by the expected capacity to process Total P, with the capacity of the proposed wetland to process Total N or Total Suspended Solids being far in excess of requirement.

Any additional treatment processes or modifications to farming practices should consider addressing the Total P component of the discharge water. Examples of modifications to practices might include using low P or highly bioavailable P diets in the farming practice.

***Table 4**. The concentration of nutrients in the wetland discharge effluent calculated using Equation 3 and data obtained as described in Table 2 at different flow rates and average and maximum nutrient concentrations in the aquaculture discharge effluent.*

Nutrient	*Ce* (mg/L)	*Ci* (mg/L)	*k*	*Q* (m3/d)	*HLR* (m/d)	*t* (d)	Comment
TSS	BDL	20	0.992	3000	0.259	16.42	Planned discharge volume (PDV)
	BDL	20	0.992	6000	0.518	8.21	PDV x 2
	8.9	20	0.992	60000	5.177	0.82	PDV x 20
	BDL	200	0.992	3000	0.259	16.42	PDV + 10x base concentration of TSS
TN	BDL	2.3	0.630	3000	0.259	16.42	Planned discharge volume (PDV)
	BDL	2.3	0.848	6000	0.518	8.21	PDV x 2
	0.334	2.3	1.411	36000	3.106	1.37	PDV x 12
	BDL	23	0.630	3000	0.259	16.42	PDV + 10x concentration of N
TP	BDL	0.45	0.251	3000	0.259	16.42	Planned discharge volume (PDV)
	0.010	0.45	0.294	3850	0.332	12.79	PDV x 1.28
	0.021	0.45	0.372	6000	0.518	8.21	PDV x 2
	BDL	0.6	0.251	3000	0.259	16.42	PDV + 2.78x base concentration of TP

TN = Total Kjeldahl Nitrogen, TP = Total Kjeldahl Phosphorus, TSS = Total Suspended solids, C_e = effluent nutrient concentration, C_i = influent nutrient concentration, *k* = first order removal constant, *Q* = Flow rate of discharge through the wetland, *HLR* = hydraulic loading rate, *t* = retention time in the wetland, BDL = Below Detectable Limit as determined by SGS Method AN114 (TSS) AN281 (TN) AN279/AN293 (TP).

***Table 5**. The total amount of nutrients discharged from the wetlands under the various conditions modeled in Table 3.*

Nutrient	*Ce* (mg/L)	*Q* (m3/day)	Discharge (kg)	Discharge (kg/Ha/d)
TSS	**BDL**	**3000**	**0.0**	**0.00**
	BDL	6000	0.0	0.00
	8.9	**60000**	**531.5**	**53.36**
TN	**BDL**	**3000**	**0.00**	**0.00**
	BDL	6000	0.01	0.00
	0.334	**36000**	**12.01**	1.21
TP	**BDL**	**3000**	**0.02**	**0.00**
	0.010	3850	0.04	0.00
	0.021	**6000**	**0.13**	0.01

TN = Total Kjeldahl Nitrogen, TP = Total Kjeldahl Phosphorus, TSS = Total Suspended solids, C_e = effluent nutrient concentration *Q* = Flow rate of discharge through the wetland, BDL = Below Detectable Limit as determined by SGS Method AN114 (TSS) AN281 (TN) AN279/AN293 (TP).

***Table 6**. The concentration of nutrients in the wetland discharge effluent calculated using Equation 3 and data obtained as described in Table 2 at different porosity values for the Free Surface Water Wetland.*

Nutrient	*Ce* (mg/L)	*Ci* (mg/L)	*k*	*Q* (m3/d)	*HLR* (m/d)	*t* (d)	ε
TSS	BDL	20	0.992	3000	0.026	16.42	0.85
	BDL	20	0.992	3000	0.026	19.32	1
	8.4	20	0.992	3000	0.026	0.87	0.045
TN	BDL	2.3	0.630	3000	0.026	16.42	0.85
	BDL	2.3	0.630	3000	0.026	19.32	1
	0.328	2.3	0.630	3000	0.026	3.09	0.16
TP	BDL	0.45	0.251	3000	0.026	16.42	0.85
	BDL	0.45	0.251	3000	0.026	19.32	1
	0.010	0.45	0.251	3000	0.026	15.07	0.78

TN = Total Kjeldahl Nitrogen, TP = Total Kjeldahl Phosphorus, TSS = Total Suspended solids, C_e = effluent nutrient concentration, C_i = influent nutrient concentration, *k* = first order removal constant, *Q* = Flow rate of discharge through the wetland, *HLR* = hydraulic loading rate, *t* = retention time in the wetland, ε = porosity of the wetland, BDL = Below Detectable Limit as determined by SGS Method AN114 (TSS) AN281 (TN) AN279/AN293 (TP).

***Table 7**. The total amount of nutrients discharged from the wetlands under the various conditions modeled in Table 5.*

Nutrient	*Ce* (mg/L)	*Q* (m3/day)	Discharge (kg)	Discharge (kg/Ha/d)
TSS	**BDL**	**3000**	**0.0**	**0.00**
	BDL	3000	0.0	0.00
	8.4	**3000**	**25.3**	**2.54**
TN	**BDL**	**3000**	**0.00**	**0.00**
	BDL	3000	0.00	0.00
	0.328	**3000**	**0.98**	0.10
TP	**BDL**	**3000**	**0.02**	**0.00**
	BDL	3000	0.01	0.00
	0.010	**3000**	**0.03**	0.00

TN = Total Kjeldahl Nitrogen, TP = Total Kjeldahl Phosphorus, TSS = Total Suspended solids, C_e = effluent nutrient concentration *Q* = Flow rate of discharge through the wetland, BDL = Below Detectable Limit as determined by SGS Method AN114 (TSS) AN281 (TN) AN279/AN293 (TP).

Conclusion

The results of the modeling undertaken indicate that the wetland as proposed by Daintree Saltwater Barramundi as part of their expanded farming activity will satisfactorily achieve the level of processing required to maintain discharge nutrient levels not different to those of the receiving waters. Further, the wetland will allow Daintree Saltwater Barramundi to meet such conditions with discharge volumes up to 1.28X the volume proposed under good industry practice and with nutrient loads up to 1.33X reasonable concentrations in pond discharge.

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