EPBC Act referral

Australian Government
Department of Agriculture, Water and the Environment

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Title of proposal	**2020/8829 - Aquatec Pty Ltd prawn farm redevelopment Cooktown**

Section 1

Summary of your proposed action

1.1 Project industry type Aquaculture

1.2 Provide a detailed description of the proposed action, including all proposed activities

1.2 DESCRIPTION OF THE PROJECT

Summary

Aquatec Pty Ltd proposes to redevelop the Annan River prawn farm near Cooktown as an intensive pond farming system with a hatchery and processing facility. The prawn farm was established in the late 1980's and operated through to 1995. Aquatec Pty Ltd retains a current Queensland Aquaculture License for the property and permits for environmental activities (including pond water discharge) have recently been approved by Local and State Government authorities. Under Planning Regulations 2017, the proposed development required development approval for aquaculture. Cook Shire Council was the assessment manager for the application DA/4158. This proposal provides information about the permits and authorities granted to re-establish a hatchery and pond production area of 34 hectares on the existing developed land using water recirculation methods, and to discharge pond water through 9 hectares of treatment ponds that include bioremediation and sedimentation.

Significant features and design innovations

The new farm to be designed and constructed will incorporate the most recent advances in aquaculture and environmental technologies that have been developed through comprehensive research and development programs for the Australian prawn farming industry. The production pond system will have a 3-stage water treatment system that includes a constructed mangrove wetland as well as recirculation that reduces the amount of water discharged from the farm.

The project is expected to create several new jobs in construction and will require more than 10 staff when in full operation.

Permits and approval issues

- The property Lot 4/RP887249 is 238 hectares of freehold land zoned Rural and designated as Agricultural Land Class A and in Important Agricultural Areas in the 2017 Cook Shire Planning Scheme. Cook Shire records indicate that the farm was established in the 1980's with consent as-of-right use under the relevant Town Plan at the time (Fig. 1.1). The houses and processing/freezer facility were approved in 1987 under the relevant Planning Scheme at the time.
- The site retains Queensland Aquaculture License 2005BC0276 with Department of Agriculture and Fisheries for the use of 23 hectares of production ponds.
- The Annan River Fish Habitat Area abuts the property and extends in the river upstream and downstream on tidal areas of the adjacent land Reserve 68/BS87 (Fig.1.2).
- A portion of the same Reserve land downstream from the prawn farm property is zoned as Estuarine Conservation Zone in Queensland Parks and in the Great Barrier Reef Marine Park. Great Barrier Reef Marine Park zoning in Walker Bay is Habitat Protection Zone. The Annan River National Park extends to the southern bank of the Annan River opposite the south western corner of the prawn farm property (Fig 1.3).
- Vegetation on the property includes remnant vegetation Category B, as well as marine plant vegetation
- Potential acid sulphate soils may exist on the property

Proposed redevelopment

The existing ponds are too large for effective intensive pond management and will be rebuilt in a new configuration of 34 x one hectare production ponds with an upgraded aquaduct and drain canal system that would include a recirculation canal, pump system and bioremediation and reservoir ponds. The new pondage area will be developed within the existing area of ponds and developed land (i.e. the existing development footprint).

The staged development of 34 hectares of prawn farming ponds in a total of 47.4 hectares of pondage would include the establishment of additional treatment ponds and infrastructure (Pondage layout plan Appendix 2):

Production and treatment pondage areas			hectares
Reservoir	volume 71megaL	1.78	
34 growout ponds	average 1.05	35.7	
1 settlement pond		2.24	
7 bioremediation ponds	average 1.02 ha	6.12	
1 constructed mangrove wetland pond			0.94
recirculation aquaducts		0.59	
Treatment total and % to growout area :		9.89ha	27.8%
Total pondage water area constructed			47.4

Environmental management

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The new ponds will be constructed and managed according to internationally accepted Best Management Practice (BMP) guidelines as well as the most advanced environmental technology developments that have come from internationally recognised R&D achieved in the Australian prawn farming industry. This would include plastic lined walls and central sludge removal in all the production ponds, and settlement pond treatment technology that incorporates bioremediation with recirculation of pond water throughout the pond system. Bioremediation ponds will be stocked with milkfish that feed off algae and effectively strip nutrients from the discharge water. The final water treatment component will include a constructed mangrove wetland that will create additional fisheries habitat and contribute to the nutrient stripping process before discharge of pond water to the receiving waters.

Aeration and Pumping

Electric aeration systems will be installed on all production ponds and most of the bioremediation ponds by underground cabling and earth/trip switch boxes pondside. Axial flow or flood-lifter pumps will be used at the intake point for new water pumped on high tides, and on the recirculation pump stations for recycling of pond water from bioremediation.

Hatchery, processing and other buildings

A state-of-the-art new hatchery will be constructed on site using filtered seawater sourced from the Annan River during high tides. Reservoir tanks and recirculation filtration systems will enable biosecure production of post larva stock and fingerlings for ponds and for sale to other farms. The existing eastern farm house will be converted to an office. A processing facility to pack and send harvested product will be established on the north western side of the property. The same building will provide cold storage for packaged product. A feed storage shed will be established for container and cool room storage of feed and a manager's residence will also be constructed at the entrance to the property. Three existing buildings will be utilised in the new project – the existing workshop shed (previously a processing facility) will be used for repairs and maintenance of equipment, and the western cottage will be used for worker accommodation.

Energy Infrastructure

The existing ERGON transformers onsite may be upgraded to larger than 200kVa and be merged with onsite renewable energy generation. Standby generators will be located at various points on the farm electricity network to provide emergency power.

1.3 What is the extent and location of your proposed action?

See Appendix B

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland)

Location and surrounding land uses and sensitive areas

The farm is located 7 klm from Cooktown and adjacent to the Mulligan Highway with sealed road to Cairns. Approximately 50% of the property is partially vegetated by melaleuca scrubland, mangroves and saltpan marine grasses and has had cattle grazing since the 1990's. The existing developed footprint of the pondage and buildings area of approximately 71 hectares is considered disturbed and will be rebuilt.

The farm site is situated on the lower reaches of the Annan River northern shore and is the last downstream private property before the Annan River reaches the sea. Saltwater Creek extends across a portion of the northern side of the property and extends from mangrove and saltpan wetlands up to freshwater wetlands in the north west boundary. The Keatings Lagoon Conservation Park extends further upstream on the western side of the Mulligan Highway in adjacent State land.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

The disturbance footprint will be approximately 71 ha, which is the same existing footprint of land developed previously (as shown in the uploaded file Section 1.3.1). The avoidance footprint or remaining area of land on the property is 167 hectares.

1.7 Proposed action location

Lot - Lot 4 RP887249

1.8 Primary jurisdiction Queensland

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

☐ Yes ☑ No

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1.10 Is the proposed action subject to local government planning approval?

☑ Yes ☐ No

1.10.1 Is there a local government area and council contact for the proposal?

☑ Yes ☐ No

1.10.1.0 Council contact officer details

1.10.1.1 Name of relevant council contact officer	Planning Officer
1.10.1.2 E-mail	mail@cook.qld.gov.au
1.10.1.3 Telephone Number	07 4082 0500

1.11 Provide an estimated start and estimated end date for the proposed action

Start Date	15/12/2021
End Date	24/12/2021

1.12 Provide details of the context, planning framework and state and/or local Government requirements

- The property Lot 4/RP887249 is 238 hectares of freehold land zoned Rural and designated as Agricultural Land Class A and in Important Agricultural Areas in the 2017 Cook Shire Planning Scheme. Cook Shire records indicate that the farm was established in the 1980's with consent as-of-right use under the relevant Town Plan at the time (Fig. 1.1). The houses and processing/freezer facility were approved in 1987 under the relevant Planning Scheme at the time.

Development Approval was granted by Cook Shire Council (DA/4158) 20 May 2020 under the relevant Planning Scheme at the time.

- The site retains a Queensland Aquaculture License with Department of Agriculture and Fisheries for the use of 42.8 hectares of production ponds in an aquaculture area of 47.4 hectares.
- The Annan River Fish Habitat Area abuts the property and extends in the river upstream and downstream on tidal areas of the adjacent land Reserve 68/BS87.
- A portion of the same Reserve land downstream from the prawn farm property is zoned as Estuarine Conservation Zone in Queensland Parks and in the Great Barrier Reef Marine Park. Great Barrier Reef Marine Park zoning in Walker Bay is Habitat Protection Zone. The Annan River National Park extends to the southern bank of the Annan River opposite the south western corner of the prawn farm property.
- Vegetation on the property includes remnant vegetation Category B, as well as marine plant vegetation
- Potential acid sulphate soils may exist on the property

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders

Public Notification of the proposal was undertaken during the DA assessment period for DA/4158. This included public signage on the property and in advertisements in local North Queensland media for a period of 30 days, as required under the QLD SARA Assessment Rules. There were no properly made submissions received by the Assessment Manager (Cook Shire Council).

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project

Environmental impact assessments conducted for the proposal included

1. Geotechnical and potential acid sulfate soils investigation- Douglas Partners, Report 90758.00 October 2018
2. Vegetation Survey Annan River prawn farm (Lot: 4 Plan: RP887249) Cooktown - Botanical North report - September 2018
3. Baseline Water Quality Monitoring in Saltwater Creek and the Annan River - Howley Environmental Consulting report, Jan 2020
4. Water Mixing and Downstream Water Quality Modelling in Saltwater Creek below the Annan Prawn Farm Discharge Outlet Canal using the CORMIX3 Hydrodynamic Model, Howley Environmental Consulting report, Jan 2020
5. Matters of State Environmental Significance report, May 2020

1.15 Is this action part of a staged development (or a component of a larger project)?

☐ Yes ☑ No

1.16 Is the proposed action related to other actions or proposals in the region?

☐ Yes ☑ No

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Section 2

Matters of national environmental significance

2.1 Is the proposed action likely to have any direct or indirect impact on the values of any World Heritage properties?

☐ Yes ☑ No

2.2 Is the proposed action likely to have any direct or indirect impact on the values of any National Heritage places?

☐ Yes ☑ No

2.3 Is the proposed action likely to have any direct or indirect impact on the ecological character of a Ramsar wetland?

☐ Yes ☑ No

2.4 Is the proposed action likely to have any direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

☑ Yes ☐ No

Species or threatened ecological community

Eastern Curlew, Far Eastern Curlew, Numenius madagascariensis

Impact

The Eastern Curlew is a large shore bird inhabiting saline wetland areas in North Queensland. Its breeding habitat is composed of marshy and swampy wetlands and lakeshores. Most individuals winter in coastal Australia, with a few heading to South Korea, Thailand, Philippines and New Zealand, where they stay at estuaries, beaches, and salt marshes. It uses its long, decurved bill to probe for invertebrates in the mud. It may feed in solitary but it generally congregates in large flocks to migrate or roost. The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, whereas the drains and aquaducts not plastic lined could provide feeding habitat for this species as it will provide space for wading birds The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland and migratory wading bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (saline flats and mangroves) will be sufficient distance from the ponds

Species or threatened ecological community

Godwit, Bar-tailed Godwit, Limosa lapponica menzbier, Limosa lapponica bauer

Impact

The bar-tailed godwit (Limosa lapponica) is a large wader which feeds on bristle-worms and shellfish on coastal mudflats and estuaries. It has distinctive red breeding plumage, long legs, and a long upturned bill. Bar-tailed godwits breed on Arctic coasts and tundra from Scandinavia to Alaska, and overwinter on coasts in temperate and tropical regions of Australia and New Zealand. The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, whereas the drains and aquaducts not plastic lined could provide feeding habitat for this species as it will provide space for wading birds. The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland and migratory wading bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing

development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (saline flats and mangroves) will be sufficient distance from the ponds.

Species or threatened ecological community

Calidris canutus, Red Knot, Knot [855]

Impact

The red knot (Calidris canutus) is a medium-sized shorebird which breeds in the northern hemisphere. It is a large member of the Calidris sandpipers, second only to the great knot.Their diet varies according to season; arthropods and larvae are the preferred food items at the breeding grounds, while various hard-shelled molluscs are consumed at other feeding sites at other times. The species winter in Africa, Papua New Guinea, Australia, and New Zealand. This species forms enormous flocks when not breeding and they eat a variety of hard-shelled prey such as bivalves, gastropods and small crabs that are ingested whole and crushed by a muscular stomach. The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, whereas the drains and aquaducts not plastic lined could provide feeding habitat for this species as it will provide space for wading birds. The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland and migratory wading bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (saline flats and mangroves) will be sufficient distance from the ponds.

Species or threatened ecological community

Erythrotriorchis radiatus, Red Goshawk

Impact

The red goshawk is probably the rarest Australian bird of prey. It is found mainly in the savanna woodlands of northern Australia, particularly near watercourses. It takes a broad range of live prey, mostly birds. While the vegetated areas of the property include Melaleuca woodland, the species has not been observed on the property. The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds

Species or threatened ecological community

Psephotus chrysopterygius, Golden-shouldered Parrot, Alwal [720]

Impact

The golden-shouldered parrot (Psephotellus chrysopterygius), also known as the alwal, is a rare bird of southern Cape York Peninsula, in Queensland. The golden-shouldered parrot typically lives in open forested grassland populated by numerous termite mounds. Often these mounds are found every few metres apart. The parrot feeds on the seeds of small grass species and several months of the year, principally those prior to the onset of the wet season, the birds are almost entirely dependent on the small but plentiful seed of firegrass (Schizachyrium fragile). An important habitat requirement is the presence of suitably sized terrestrial termite mounds, in which the birds nest. While the vegetated areas of the property include Melaleuca woodland, the species has not been observed on the property, firegrass was not observed in the Botanical Survey of the property and there are sparse numbers of termite mounds. The vegetated land areas on the property surrounding the prawn farm site will be maintained as natural habitat for bushland bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds.

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Species or threatened ecological community

Rostratula australis, Rostratula benghalensis (sensu lato), Australian Painted-snipe, Australian Painted Snipe [77037]

Impact

The Australian Painted Snipe is small freshwater wader, restricted in distribution to Australia, particularly the Murray Darling Basin, with scattered records across northern Australia. It prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. The species nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds, and forages nocturnally on mud-flats and in shallow water feeding on worms, molluscs, insects and some plant-matter. The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, while the drains and aquaducts not plastic lined would presumeably not provide feeding habitat for this species because it would be saline. The vegetated land areas on the property surrounding the prawn farm site will be maintained as natural habitat for bushland and migratory wading bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds.

Species or threatened ecological community

Tyto novaehollandiae kimberli, Masked Owl (northern) [26048]

Impact

The Australian masked owl is a barn owl of Southern New Guinea and the non-desert areas of Australia. The Australian masked owl inhabits timbered areas, often with a shrub understorey. In Australia they are seldom found more than 300 km inland. They roost and nest in large tree hollows near foraging areas. They are nocturnal and their prey includes rodents, small dasyurids, possums, bandicoots, rabbits, bats, birds, reptiles and insects. Foraging is primarily for terrestrial prey, however some prey is taken from the trees or in flight. The vegetated land areas on the property surrounding the prawn farm site will be maintained as natural habitat for bushland bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds.

Species or threatened ecological community

Myrmecodia beccarii, Ant Plant [11852]

Impact

The ant plant is an epiphytic plant on Melaleuca trees and others with spongy bark in the wetlands and mangroves of tropical north Queensland, from Cooktown to Mission Beach. The prickly, swollen stems develop natural hollows which are invaded by the golden ant (Iridomyrmex cordatus) in a symbiotic arrangement. The ants patrol the plant, removing leaf-eaters, while their excreta is absorbed by the plant for nutrition.The flowers are white and tubular, to 10 mm, and the fruit is white/translucent containing a single seed. These seeds are transported to other trees by the mistletoebird (Dicaeum hirundinaceum).The Apollo jewel butterfly (Hypochrysops apollo apollo) lays its eggs on the plant, and because they smell like ant's eggs, the ants carry the eggs inside the plant, where they can develop and hatch to the butterfly stage.

Myrmecodia beccarii is listed as vulnerable. This species is eligible for listing as vulnerable under the Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) (EPBC Act) as, prior to the commencement of the EPBC Act, it was listed as vulnerable under Schedule 1 of the Endangered Species Protection Act 1992 (Cwlth). Myrmecodia beccarii is also listed as vulnerable under the Nature Conservation Act 1992 (Queensland). The main threats to M. beccari identified in the EPBC Approved Conservation Advice (2008) are clearing of the lowland paperbark woodlands, localised settlement pressures and the removal or destruction of plants by plant and butterfly collectors.

The vegetation survey conducted on the prawn farm property identified 2 separate populations of the threatened species of ant plant Myrmecodia beccarii occurring in Melaleuca woodlands on the property and others occurring close by. The 2 ant plant populations on the property will not be impacted because the vegetated areas where they occur will be retained (the avoidance footprint not cleared) as natural habitat for bushland species, and do not occur in the development footprint including the pondage area (Category X) and the new buildings area (Category B).

Species or threatened ecological community

Phlegmariurus dalhousieanus, Blue Tassel Fern

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Impact

Huperzia dalhousieana (superseded by Phlegmariurus dalhousieanus) is an hemi-epiphytic fern; growing on another plant but not deriving nourishment from it. It has tufted branches that are erect at first, becoming pendulous and rarely branching, except for the sporogenous zone (the part of the plant bearing spores) which is often once-forked. Huperzia dalhousieana grows on trees in the upper canopy of swampy forests and on rocks in rainforests. It grows in habitat along freshwater creeks. No populations of the Blue Tassell Fern were identified in the vegetation survey conducted on the prawn farm property. The site is included in the species distribution area and vegetation habitats (eg the freshwater swamp areas in the north of the property) may be similar on the site to that of the species but those vegetation areas on the property will not be impacted because they are excluded from the development footprint including the pondage area (Category X) and the new buildings area (Category B).

Species or threatened ecological community

Vappodes phalaenopsis, Cooktown orchid

Impact

This orchid species grows on trees and rocks in rainforest, coastal scrub, near rivers, in swamps and open forest in tropical Queensland, southern New Guinea and a single island in Indonesia. No populations of the Cooktown Orchid were identified in the vegetation survey conducted on the prawn farm property. The site is included in the species distribution area and vegetation habitats may be similar on the site to that of the species but those vegetation areas on the property will not be impacted because they are excluded from the development footprint including the pondage area (Category X) and the new buildings area (Category B).

Species or threatened ecological community

Marine turtle species
Caretta caretta, Loggerhead Turtle
Chelonia mydas, Green Turtle
Dermochelys coriacea, Leatherback Turtle
Eretmochelys imbricata, Hawksbill Turtle
Lepidochelys olivacea, Olive Ridley Turtle
Natator depressus, Flatback Turtle

Impact

Loggerhead sea turtles spend most of their lives in the open ocean and in shallow coastal waters. They rarely come ashore besides the females' brief visits to construct nests and deposit eggs. Juveniles are more frequently found in shallow estuarine habitats with limited ocean access compared to non-nesting adults. Loggerhead sea turtles are classified as vulnerable.

The green sea turtle is mostly herbivorous. The adults usually inhabit shallow lagoons, feeding mostly on various species of seagrasses.

The Leatherback Turtle is widespread around the world and typically inhabits open oceans.

The hawksbill sea turtle is a critically endangered sea turtle. Adult hawksbill sea turtles are primarily found in tropical coral reefs. As a highly migratory species, they inhabit a wide range of habitats, from the open ocean to lagoons and even mangrove swamps in estuaries.

The olive ridley sea turtle is classified as vulnerable and most observations are typically within 15 km of mainland shores in protected, relatively shallow marine waters (22–55 m deep) and are occasionally found in open waters. The species is predominantly carnivorous, especially in immature stages of the life cycle. Animal prey consists of protochordates or invertebrates, which can be caught in shallow marine waters or estuarine habitats. Common prey items include jellyfish, tunicates, sea urchins, bryozoans, bivalves, snails, shrimp, crabs, rock lobsters, and sipunculid worms. Additionally, consumption of jellyfish and both adult fish and fish eggs may be indicative of pelagic (open ocean) feeding.

The flatback sea turtle is listed as vulnerable and is an omnivorous species, but predominantly eats a carnivorous diet. It feeds mostly on the prey found within the shallow waters where it swims and lives in shallow, soft-bottomed tropical and subtropical waters. This turtle sticks to the continental shelf of Australia and can be found in grassy areas, bays, lagoons, estuaries, and any place with a soft-bottomed sea bed. It has been found to feed on soft corals, sea cucumbers, shrimp, jellyfish, mollusks, and other invertebrates. It will also occasionally feed on seagrasses, even though it rarely feeds on vegetation.

The marine turtle species listed above and their habitats may occur in the catchment of Saltwater Creek, Annan River and GBRMP including mangrove and seagrass communities. Potential downstream water quality impacts (direct or indirect) from the development on the ecological communities and marine species habitats of the catchment have been identified to be minimal. The development will not disrupt or impact on any marine species benthic habitat (mangroves, seagrass).

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Species or threatened ecological community

Frogs and Insects
Litoria dayi, Lace Eyed Tree Frog
Litoria rheocola Common Mist Frog

Impact

The common mist frog (Ranoidea rheocola) is a species of tree frog native to north-eastern Queensland and it is listed as Endangered. It inhabits the riparian zone of fast-flowing streams in rainforests and wet sclerophyll forests of eastern tropical North Queensland. Males call from the edge of the streams, between rocks, or in overhanging vegetation to attract mates.

The Australian lace-lid (Ranoidea dayi) is a tree frog endemic to the wet tropics of north-eastern Queensland and it is also listed as Endangered. The species ranges from Paluma to Cooktown. It is associated with fast flowing creeks in montane rainforests of altitudes ranging from 0–1200 m. But can also be found around slower watercourses and rock soaks when ample vegetation is present.

The site is included in the species distribution area and some vegetation habitats on the property may be similar to that of the species, although it is not Wet Tropics rainforest or fast flowing creeks. However those vegetation areas on the property will not be impacted because they are excluded from the development footprint including the pondage area (Category X) and the new buildings area (Category B).

Species or threatened ecological community

Ground terrestrial Mammals
Dasyurus hallucatus, Northern Quoll
Dasyurus maculatus gracilis, Spotted Tail Quoll
Mesembriomys gouldii rattoides, Black-footed Tree-rat
Xeromys myoides, Water Mouse, False Water Rat
Phascolarctos cinereus, Koala

Impact

The northern quoll is the smallest of the four Australian quoll species is currently classified as Endangered. The species is most abundant in rocky ranges and open eucalypt forest. Northern quolls feed primarily on invertebrates, but also consume fleshy fruit (particularly figs), and a wide range of vertebrates, including small mammals, birds, lizards, snakes, and frogs. They also scavenge on roadkills, around campsites, and in garbage tins.

The tiger quoll is found in eastern Australia where more than 600 mm of rain falls per year. Tiger quolls live in a variety of habitats, but seem to prefer wet forests such as rainforests and closed eucalypt forest.

The black-footed tree-rat is one of two endemic arboreal rat species from the genus Mesembriomys found in the northern regions of Australia and has a range extending from the savannahs of Cape York Peninsula in Queensland westward to the Kimberley region of Western Australia. Habitats such as tropical woodlands or open forest are suitable for the tree rat. It is a folivore and frugivore and its diet may be supplemented by invertebrates such as termites and molluscs.

The False Water Rat is a species of rodent native to waterways of Australia and Papua New Guinea. The distribution was believed to be restricted to Southeast Queensland and the Northern Territory, however the false water rat has subsequently been found in the central and southern parts of Queensland, North Stradbroke Island off the coast of Southeast Queensland, Melville Island, and southwest Western Province, Papua New Guinea, with no confirmation that it occurs in the Cooktown area.

The koala's geographic range extends throughout eastern and southeastern Australia, encompassing northeastern, central and southeastern Queensland, eastern New South Wales, Victoria, and southeastern South Australia. The population on Magnetic Island represents the northern limit of its range so it is not expected to occur in the Cooktown region.

The site is included in the distribution area of most of the species described above and vegetation habitats may be similar on the site to that of the species listed but those vegetation areas on the property will not be impacted because they are excluded from the development footprint including the pondage area (Category X) and the new buildings area (Category B). The vegetated land areas on the property surrounding the prawn farm site will be maintained as natural habitat for bushland species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for these species. Indirect impacts from noise and light will be minimal as the possible natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds.

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Species or threatened ecological community

Pristis pristis, Largetooth Sawfish
Pristis zijsron, Green Sawfish

Impact

The largetooth sawfish (Pristis pristis, syn. P. microdon and P. perotteti) is a species of sawfish, family Pristidae. It is found worldwide in tropical and subtropical coastal regions, The Green sawfish (Pristis zijsron) ranges from Shark Bay, along the northern part of the country, and south to Jervis Bay on the eastern coast. Both species are mainly found in coastal marine, mangrove and estuarine habitats, even in very shallow but also enter freshwater. Both species have declined drastically and are considered critically endangered. The main threats to both species is overfishing, but also habitat loss. They are likely typically born in salt or brackish water near river mouths, but move into freshwater where the young spend the first 3–5 years of their life. Sawfish are predators that feed on fish, molluscs and crustaceans.The "saw" can be used both to stir up the bottom to find prey and to slash at groups of fish.

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The species and their habitats may occur in the catchment of Saltwater Creek, Annan River and GBRMP including mangrove and seagrass communities. Potential downstream water quality impacts (direct or indirect) from the development on the ecological communities and marine species habitats of the catchment have been identified to be minimal. The development will not disrupt or impact on any marine species benthic habitat (mangroves, seagrass).

Species or threatened ecological community

Trisyntopa scatophaga, Ant Bed Parrot Moth

Impact

The Ant Bed Parrot Moth habitat is associated with the Golden-shouldered Parrot (described above) with their pupae hatching in nests inside termite mounds. As described for the Golden Shouldered Parrot there are sparse numbers of termite mounds on the property. The vegetated land areas on the property surrounding the prawn farm site will be maintained as natural habitat for bushland species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds.

Species or threatened ecological community

Hipposideros semoni, Semon's Leaf-nosed Bat
Macroderma gigas, Ghost Bat
Pteropus conspicillatus, Spectacled Flying Fox
Rhinolophus robertsi, Large-eared Horseshoe Bat
Saccolaimus saccolaimus, Bare-rumped Sheath-tailed Bat
Petauroides volans, Greater Glider

Impact

Semon's leaf-nosed bat is a species of bat in the family Hipposideridae. It is found in Papua New Guinea and Australia, mostly in the north eastern part of Cape York, and it is listed as vulnerable under the Environment Protection and Biodiversity Conservation Act 1999. It is nocturnal, roosting in sheltered places during the day such as abandoned mines, caves, hollow trees, and rock fissures. It will roost singly or in small colonies. It is insectivorous, preying on arthropods such as spiders, beetles, and moths. While foraging, it flies close to the ground, at heights less than 2 m.

The ghost bat (Macroderma gigas) is a flying mammal found in northern Australia. The species is the only Australian bat that preys on large vertebrates – birds, reptiles and other mammals – which they detect using acute sight and hearing, combined with echolocation, while waiting in ambush at a perch. The ghost bat was once widely distributed throughout Australia, and has now became restricted to a sparser population across northern regions.

The spectacled flying fox is a megabat that lives in Australia's north-eastern regions of Queensland. It is also found in New Guinea. The spectacled flying fox was listed as a threatened species under the Environment Protection and Biodiversity Conservation Act 1999. They were considered vulnerable due to a significant decline in numbers as a result of loss of their prime feeding habitat and secluded camp sites. Spectacled flying foxes are forest dwellers and rainforests are their preferred habitat. They prefer to roost in the middle and upper canopy strata in the full sun. Colonies of the spectacled flying fox can be found in rain forests, mangroves, and paperbark and eucalypt forests. There is evidence of increasing urbanisation.

Large-eared Horseshoe Bats are distributed around most of Northern Australia and are listed as Vulnerable. They roost in caves and old mines that are warm and humid and eat moths and other insects. They fly close to the ground in thick forest

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and catch their prey on or close to the ground.

The Bare-rumped Sheath-tailed Bat roosts in hollow trees and rock crevices and sometimes houses in colonies varying from a few individuals to a few hundred. Roosting bats maintain individual spacing.It is found in Australia including the eastern coast of Cape York and most of SE Asia.

The greater gliders are found in eucalypt forests from Mossman, Queensland, to Daylesford, Victoria and are nocturnal and solitary herbivores feeding almost exclusively on Eucalyptus leaves and buds. The greater gliders choose habitat based on several factors, the dominant factor being the presence of specific species of eucalypt. Distribution levels are higher in regions of montane forest containing manna gum (E. viminalis) and mountain gum (E. dalrympleana, E. obliqua). Furthermore, the presence of E. cypellocarpa appears to improve the quality of habitat for the greater gliders in forests dominated by E. obliqua. Another factor determining population density is elevation. Optimal levels are 845 m above sea level.[17] Within a forest of suitable habitat, they prefer overstorey basal areas in old-growth tree stands.

The site is included in the distribution area of most of the species described above and vegetation habitats may be similar on the site to that of the species listed but those vegetation areas on the property will not be impacted because they are excluded from the development footprint including the pondage area (Category X) and the new buildings area (Category B). The vegetated land areas on the property surrounding the prawn farm site will be maintained as natural habitat for bushland species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for these species. Indirect impacts from noise and light will be minimal as the possible natural habitat areas for this species on the property (Melaleuca woodland) will be sufficient distance from the ponds.

2.4.2 Do you consider this impact to be significant?

☐ Yes ☑ No

2.5 Is the proposed action likely to have any direct or indirect impact on the members of any listed migratory species or their habitat?

☑ Yes ☐ No

Migratory species

Calidris canutus, Red Knot, Knot [855]

Impact

The red knot (Calidris canutus) is a medium-sized shorebird which breeds in the northern hemisphere. It is a large member of the Calidris sandpipers, second only to the great knot.Their diet varies according to season; arthropods and larvae are the preferred food items at the breeding grounds, while various hard-shelled molluscs are consumed at other feeding sites at other times. The species winter in Africa, Papua New Guinea, Australia, and New Zealand. This species forms enormous flocks when not breeding and they eat a variety of hard-shelled prey such as bivalves, gastropods and small crabs that are ingested whole and crushed by a muscular stomach. The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, whereas the drains and aquaducts not plastic lined could provide feeding habitat for this species as it will provide space for wading birds. The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland and migratory wading bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (saline flats and mangroves) will be sufficient distance from the ponds.

Migratory species

Eastern Curlew, Far Eastern Curlew, Numenius madagascariensis

Impact

The Eastern Curlew is a large shore bird inhabiting saline wetland areas in North Queensland. Its breeding habitat is composed of marshy and swampy wetlands and lakeshores. Most individuals winter in coastal Australia, with a few heading to South Korea, Thailand, Philippines and New Zealand, where they stay at estuaries, beaches, and salt marshes. It uses its long, decurved bill to probe for invertebrates in the mud. It may feed in solitary but it generally congregates in large flocks to migrate or roost. The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, whereas the drains and aquaducts not plastic lined could provide feeding habitat for this species as it will provide space for wading birds The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland and migratory wading bird species, including

the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (saline flats and mangroves) will be sufficient distance from the ponds.

Migratory species

Calidris ferruginea, Curlew Sandpiper [856]

Impact

The curlew sandpiper (Calidris ferruginea) is a small wader that breeds on the tundra of Arctic Siberia. It is strongly migratory, wintering mainly in Africa, but also in south and southeast Asia and in Australia and New Zealand. It is a vagrant to North America. It forages in soft mud on marshes and the coast, mainly picking up food by sight. It mostly eats insects and other small invertebrates.

The water edge of constructed prawn ponds would not provide feeding habitat for this species because the ponds will be plastic lined, whereas the drains and aquaducts not plastic lined could provide feeding habitat for this species as it will provide space for wading birds. The vegetated land areas on the property surrounding the prawn farm site will be maintained (the avoidance footprint not cleared) as natural habitat for bushland and migratory wading bird species, including the tidal salt pan and mangrove vegetation areas inside the property (north east corner) and adjacent (east side), as well as the dry bushlands on the north and western sides of the prawn farm. Given that the development will only disturb the existing development footprint, there will be no impact or loss of habitat for this species. Indirect impacts from noise and light will be minimal as the natural habitat areas for this species on the property (saline flats and mangroves) will be sufficient distance from the pond.

2.5.2 Do you consider this impact to be significant?

☐ Yes ☑ No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

☑ Yes ☐ No

2.6.1 Is the proposed action likely to have any direct or indirect impact on the Commonwealth marine environment?

☑ Yes ☐ No

2.6.2 Describe the nature and extent of the likely impact on the whole of the environment

Significance and relevance of R&D on prawn farm impacts

Pond water discharges flowing into Saltwater Creek will flow into the Annan River Estuarine Conservation Zone and the Great Barrier Reef Marine Park. The ambient water quality survey of Saltwater Creek has shown it to have a diverse water ecology and chemistry typical of Queensland tropical mangrove estuarine systems. The wide ranges in the parameters of pH and dissolved oxygen that both decreased in average value upstream from the mouth, appears typical to that observed in other North Queensland mangrove creek systems (Boto and Bunt 1981). Nutrients in effluent discharging from prawn ponds have been found to be predominantly in particulate form (80-90% for nitrogen (N), 60-80% for phosphorus (P), 50-70% for carbon (Trott and Alongi 2003). Research by Burford et al 2003 examined the impacts of pond water discharging out of a North Queensland farm on water quality and sediments at various points downstream from the farm. The ponds were determined to have a net nitrogen discharge rate of 1.18 kg/hectare of pond/day and the water quality parameters downstream were found to reach ambient concentrations in less than 2 kilometres downstream. Mangroves and algae were found to be assimilating nutrients discharged from the farm, in that the water column ecological processes (denitrification, photosynthesis, plankton grazing etc) were found to be predominant over sedimentary processes. In the first 2 kilometres of creeks receiving prawn pond water there was a higher rate of production of phytoplankton and bacteria, with subsequent grazing up the food chain by microplankton, zooplankton and filter-feeding juvenile fish. This suggests that the activity of these organisms was an important control of dissolved nutrient concentrations – i.e. bioremediation of organic nutrient loadings.The Cooktown farm will have significantly greater environmental mitigation in its design and operations. The various mitigation components described below will be in addition to conventional settlement ponds to be built, and will include new innovation in recirculation and bioremediation methods that will effectively add another layer of treatment capacity to further reduce the downstream nutrient loadings and the volume of discharge.

Potential hydrology changes in the Annan River

The redeveloped pump station will be used for the intake of saltwater from the Annan River to supply the farm reservoir pond. Potential impacts on hydrology in the Annan River by the taking of surface waters will be minimal with an expectation that there will be no discernible change in natural flow levels or water level of the Annan River. The proposed volume of water to be pumped is described in Table 7.1 with a daily maximum of 12,815 m3/day or 0.148 m3/sec, with and average daily maximum of 25,630 m3/day or 0.297 m3/sec. For a typical 2 m spring tide over a 6 hour period for a river channel section 150 m wide and 2000 m long, 600,000 m3 (600 ML) would be exchanged at an average rate of 27.7 m3/sec. Pumping rates of

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0.297 m3/sec would only be 1.1% of this exchange rate. For a typical 0.5 m neap tide over a 6 hour period for a river channel section 150 m wide and 2000 m long, 300,000 m3 (300 ML) would be exchanged at an average rate of 6.9 m3/sec. Pumping rates of 0.297 m3/sec would only be 4.3% of this exchange rate. Note that dry-season tidal conditions will be the extreme case, with greater water exchange during combined flood and tide conditions.

Expected quantity of discharge volumes (average, maximum and wet weather events)

The average effluent water discharge rate at the drain discharge at Saltwater Creek was determined from estimates of the prawn farm's annual average daily discharge (Table 7.1) of 12,815 m3/day (0.148 m3/sec or 148 L/s) following 50% recirculation of 34 hectares of total pond area. An annual average daily maximum water discharge was estimated to be 25,630 m3/day (0.297 m3/sec or 297 L/s), under the scenario of no water recirculation from 34 ha of ponds. Instantaneous daily maximum water discharges (10% of total pond volume) were estimated to be 44,000 m3/day (0.509 m3/sec or 509 L/s) for 22 ponds (in the event of only 22 ponds stocked), or 66,000 m3/day (0.763 m3/sec or 763 L/s) for 34 ponds. These maximum instantaneous conditions are expected only after major rainfall events. These flow rates were used for different CORMIX3 model runs of effluent water discharge in the Saltwater Creek mixing zone (Shellberg 2019).

- Average daily = 12,815 m3/day or 0.148 m3/sec
  - 50% recirculation of 34 ha ponds
- Average daily maximum = 25,630 m3/day or 0.297 m3/sec
  - No recirculation of 34 ha ponds
- Instantaneous maximum = 44,000 m3/day or 0.509 m3/sec
  - 10% pond volume, 22 ponds (wet weather event)
- Instantaneous maximum = 66,000 m3/day or 0.763 m3/sec
  - 10% pond volume, 34 ponds (wet weather event)

2.6.3 Do you consider this impact to be significant?

☐ Yes ☑ No

2.7 Is the proposed action likely to be taken on or near Commonwealth land?

☐ Yes ☑ No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

☐ Yes ☑ No

2.9 Is the proposed action likely to have any direct or indirect impact on a water resource from coal seam gas or large coal mining development?

☐ Yes ☑ No

2.10 Is the proposed action a nuclear action?

☐ Yes ☑ No

2.11 Is the proposed action to be taken by a Commonwealth agency?

☐ Yes ☑ No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage place overseas?

☐ Yes ☑ No

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2.13 Is the proposed action likely to have any direct or indirect impact on any part of the environment in the Commonwealth marine area?

☑ Yes ☐ No

2.13.1 Describe the nature and extent of the likely impact on the whole of the environment

Significance and relevance of R&D on prawn farm impacts

Pond water discharges flowing into Saltwater Creek will flow into the Annan River Estuarine Conservation Zone and the Great Barrier Reef Marine Park. The ambient water quality survey of Saltwater Creek has shown it to have a diverse water ecology and chemistry typical of Queensland tropical mangrove estuarine systems. The wide ranges in the parameters of pH and dissolved oxygen that both decreased in average value upstream from the mouth, appears typical to that observed in other North Queensland mangrove creek systems (Boto and Bunt 1981). Nutrients in effluent discharging from prawn ponds have been found to be predominantly in particulate form (80-90% for nitrogen (N), 60-80% for phosphorus (P), 50-70% for carbon (Trott and Alongi 2003). Research by Burford et al 2003 examined the impacts of pond water discharging out of a North Queensland farm on water quality and sediments at various points downstream from the farm. The ponds were determined to have a net nitrogen discharge rate of 1.18 kg/hectare of pond/day and the water quality parameters downstream were found to reach ambient concentrations in less than 2 kilometres downstream. Mangroves and algae were found to be assimilating nutrients discharged from the farm, in that the water column ecological processes (denitrification, photosynthesis, plankton grazing etc) were found to be predominant over sedimentary processes. In the first 2 kilometres of creeks receiving prawn pond water there was a higher rate of production of phytoplankton and bacteria, with subsequent grazing up the food chain by microplankton, zooplankton and filter-feeding juvenile fish. This suggests that the activity of these organisms was an important control of dissolved nutrient concentrations – i.e. bioremediation of organic nutrient loadings.The Cooktown farm will have significantly greater environmental mitigation in its design and operations. The various mitigation components described below will be in addition to conventional settlement ponds to be built, and will include new innovation in recirculation and bioremediation methods that will effectively add another layer of treatment capacity to further reduce the downstream nutrient loadings and the volume of discharge.

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  - 10% pond volume, 22 ponds (wet weather event)
- Instantaneous maximum = 66,000 m3/day or 0.763 m3/sec
  - 10% pond volume, 34 ponds (wet weather event)

2.13.2 Do you consider this impact to be significant?

☐ Yes ☑ No

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Section 3

Description of the project area

3.1 Describe the flora and fauna relevant to the project area

Terrestrial and marine vegetation mapping

A vegetation survey of the site and surrounds was completed in September 2018 by Botanical North. The survey provided information and data on the terrestrial and marine vegetation on the 238 hectare property in the areas proposed for development, including the existing pondage footprint, the proposed roadway, as well as an appropriate buffer zone around the entire site.

A Vegetation Management Property Report (DNRM) listed 12 vegetation communities mapped in the area. Two of the communities are considered 'Of concern' VMA status, 9 are 'Least concern' and 1 is 'None' as the 71 ha of non-remnant vegetation (existing pondage footprint).

The survey identified 71+ species from 28 families that can be grouped into several separate vegetation communities including mangrove wetlands and Melaleuca forest. The two 'Of concern' communities listed in the VMPR were not found in the field work, because the species observed did not correspond with the dominant species described for these areas.

One EVNT species was identified in the survey, the ant plant Myrmecodia beccarii listed as vulnerable. Three separate populations were observed on the property and adjacent buffer area:

1. In SE corner of the property with most of the ant plants occurring outside the property and buffer.
2. In the NE corner with small densities of ant plants around the boundary
3. In the NW corner of the property with high densities of ant plants occurring in a 'hot spot' in the Melaleuca forest, in an area of the property that will not be developed or cleared. The populations are grouped in various parts of the property (ie. do not occur in other parts) and a proposed farm road path will avoid the high density areas.

In the proposed development area of existing ponds 32 species of plants were identified with sparse to non-existent densities of shrubs, weeds and some mangroves. Four species of mangroves were found in the northern part of 8 ponds in the eastern end and nine species of mangroves were identified in high densities along the existing drain to be redeveloped.

3.2 Describe the hydrology relevant to the project area (including water flows)

The proposed discharge outlet in Saltwater Creek is a typical mangrove estuary system that extends further upstream into freshwater wetlands and downstream to a junction with the Annan River and the Pacific Ocean. Keatings Lagoon is a freshwater pool and parkland upstream of the Kennedy Highway that has been heavily impacted in the past by feral pigs (Howley, C. 2012). The catchment of Saltwater Creek includes cattle grazing and residential housing in rural allotments on the northern slope adjacent to the prawn farm property.

3.3 Describe the soil and vegetation characteristics relevant to the project area

Vegetation characteristics of the area are described in Section 3.1. A geotechnical survey was conducted on the site during August 2018 by Douglas Partners to describe the soils and clays in the proposed development area for pond construction suitability. The survey also tested for any potential acid sulphate soils (PASS) and actual acid sulfate soil (AASS) conditions that would require treatment and management during construction and operation of the farm.

The survey identified extensive sodic soils with several different profiles found over 20+ bore samples, ranging from silty thick clay to sand with silt. The extent of %clay and suitable sandy clay/clayey sand available shows that pond construction can be achieved with cut&fill earthworks and sufficient wetting and compaction. Laboratory testing found that tested cohesive soils will be highly susceptible to dispersive-type erosion where water flows occur, such as along drains and channels, indicating a need for plastic lining or widening of channels and drains.

Testing for acid sulfate soils was undertaken on 147 samples collected from the 19 bore pits. A total of 24 of the 147 samples recorded pHFOX values of less than 3, indicating that PASS may be present in 10 of the bore pits that were mostly in the lower eastern end of the pondage area. Based on the survey results it is considered that both AASS and PASS are present at the site, and an Acid Sulfate Soil Management Plan (ASSMP) was prepared to manage its disturbance. The treatment of groundwater dewatering should also be addressed in the ASSMP.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area

There are no relevant outstanding natural features and/or and other important or unique values relevant to the project area.

3.5 Describe the status of native vegetation relevant to the project area

Approximately 70% of the property is partially vegetated by melaleuca scrubland, mangroves and saltpan marine grasses and has had cattle grazing since the 1990's. The existing developed footprint of the pondage and buildings area of approximately 71 hectares is considered disturbed (Category X vegetation) and will be rebuilt. A vegetation survey of the site and surrounds was completed in September 2018 by Botanical North and is described in Section 3.1. The survey provided information and data on the terrestrial and marine vegetation on the 238 hectare property in the areas proposed for development, including the existing pondage footprint, the proposed roadway, as well as an appropriate buffer zone around the entire site.

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3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area

The terrain on the property is primarily flat, with less than 1% slope over the 71 hectare development area

3.7 Describe the current condition of the environment relevant to the project area

Approximately 70% of the property is partially vegetated by melaleuca scrubland, mangroves and saltpan marine grasses and has had cattle grazing since the 1990's. The existing developed footprint of the pondage and buildings area of approximately 71 hectares is considered disturbed and will be rebuilt.

The farm site is situated on the lower reaches of the Annan River northern shore and is the last downstream private property before the Annan River reaches the sea. Saltwater Creek extends across a portion of the northern side of the property and extends from mangrove and saltpan wetlands up to freshwater wetlands in the north west boundary area that will not be developed. The Keatings Lagoon Conservation Park extends further upstream on the western side of the Mulligan Highway in adjacent State land.

3.8 Describe any Commonwealth Heritage places or other places recognised as having heritage values relevant to the project

Great Barrier Reef Marine Park

3.9 Describe any Indigenous heritage values relevant to the project area

Annan River National Park (Yuku Baja-Muliku) is to the south of the property on the southern side of the Annan River.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area

Lot 4 RP887249 is Freehold

3.11 Describe any existing or any proposed uses relevant to the project area

Current use is unused Aquaculture farm and accommodation in two houses onsite.

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Section 4

Measures to avoid or reduce impacts

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action

Australian prawn farming technology has developed over more than 30 years and the industry's environmental management is considered world best practice. The Cooktown prawn farm design and operations will utilize the latest Australian methodology and the environmental management will be conducted within the framework of the Environmental Code of Practice for Australian Prawn Farmers and the Operational Policy for Marine Prawn Aquaculture (DEHP).

Recirculation design and operation

The production ponds will be managed according to the conventional prawn farming methods used in Australian prawn farms (Robertson 2006). A recycling pump system in the last bioremediation pond will pump water back up to the reservoir. The recycled water will mix with new intake water from the Annan River in the intake reservoir for supply to the production ponds.The use of recirculation technology in the production ponds will significantly reduce the nutrient discharge loads released from the farm. Robertson et al (2003) found that recirculation ponds had a much lower mean discharge rate of total nitrogen (0.53 kg TN/ha/day) than flow-through ponds (0.92 kgTN/ha/day). While these estimates of averages are based on only one discharge event, they do illustrate the improvements in environmental performance that can be provided with recirculation methods.

Plastic lined pond walls

All of the production ponds will have plastic lined walls. Pond wall liners have been identified as important in reducing erosion along prawn pond earthen walls, that is mostly caused by aerator systems that circulate the water. Burford et al (2001) determined that plastic lined pond walls in a north Queensland prawn farm reduced sediment erosion and suspended solids in discharge by up to 70%.

Sludge removal

A sludge removal system will be incorporated into the design of each production pond, to enable regular capture of excessive nutrient loadings in the pond and improve water quality for prawn production. Each production pond will have a central circle of plastic liner where sludge will accumulate because of the aerator current pattern in the pond. A benthic vacuum cleaner (creepy crawly) or similar device will be connected to a small diameter underground pipe from the pond centre to the outside drain. The water overflowing from the filter collection pit will flow with pond discharge water down the stepped drain to the settlement pond.

Settlement pond

One 1.0 hectare settlement pond will be constructed downstream from all the production ponds and will be the first stage in the treatment system. The settlement pond will be constructed with plastic curtains as a long winding channel to maximise settlement time and capture solids. The top of pond walls will be established at or above Q100. The settlement pond water will overflow into the bioremediation ponds.

Bioremediation design

The four bioremediation ponds 1.02 hectare each will be designed and constructed with the same shape and profile as settlement ponds as used in most Queensland prawn farms. The pond walls and screened outlet systems will be constructed at or above Q100. The discharge water from all of the production ponds will drain flow through the settlement pond and then flow consecutively through the bioremediation ponds in series (from one to the next). Milkfish, Chanos chanos, will be stocked in the bioremediation ponds as fingerlings produced in the on-farm hatchery from local endemic broodstock. The milkfish will feed on the microalgae and zooplankton and effectively reduce the dissolved organics and nutrient loading in the pond discharge water. Water reaching the last bioremediation pond can then be distributed in 2 ways:

a. overflow through a screened outlet monk into the constructed mangrove wetland (CMW) and released from the farm to Saltwater Creek (discharge),

b. or flow back via the recirculation aquaduct to be pumped into the reservoir as recycled water.

Overflow pipes will be designed to enable water to flow in series through each of the bioremediation ponds. Each bioremediation pond could be isolated for harvest of fish by netting. The three components of the treatment system - the settlement ponds, the bioremediation ponds and the CMW will effectively increase the treatment efficiency greater than that achieved by the same area of conventional settlement ponds. Discharge water flowing in series through the 9.89 hectares of ponds will have a reduced loading of nutrients and suspended solids when it is discharged from the farm. A significant proportion of the pond water will be recirculated from the last bioremediation pond back to the reservoir pond.

Constructed mangrove wetland

A 0.94 hectare constructed mangrove wetland (CMW) will be established as a final treatment pond for discharge water that will be released to receiving waters. The CMW will be a component of the nutrient reduction system in that it will act as the last stage in the treatment pond system.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved

The majority of the property's vegetated area is located to the north of the area to be developed and will not be disturbed. Various species and habitats in the vegetated area will not be impacted, including the identified ant plant populations. The areas of proposed development (disturbance footprint) and the associated existing road have previously been disturbed during

earlier prawn farming activities and are currently vacant. The proposed development will not result in clearing of any vegetation of National, State or local significance. Furthermore, additional revegetation is proposed (constructed mangrove wetland) which will enhance the current environmental values of the Site. Some additional habitat may be created for wading birds and estuarine fisheries species (in the constructed mangrove wetland). The ecological communities downstream in Saltwater Creek and Annan River will not be impacted.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 5

Conclusion on the likelihood of significant impacts

5.1 You indicated the below ticked items to be of significant impact and therefore you consider the action to be a controlled action

- ☐ World Heritage properties
- ☐ National Heritage places
- ☐ Wetlands of international importance (declared Ramsar wetlands)
- ☐ Listed threatened species or any threatened ecological community
- ☐ Listed migratory species
- ☐ Marine environment outside Commonwealth marine areas
- ☐ Protection of the environment from actions involving Commonwealth land
- ☐ Great Barrier Reef Marine Park
- ☐ A water resource, in relation to coal seam gas development and large coal mining development
- ☐ Protection of the environment from nuclear actions
- ☐ Protection of the environment from Commonwealth actions
- ☐ Commonwealth Heritage places overseas
- ☐ Commonwealth marine areas

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action

The proposed action is not considered to be a (significant impact) controlled action as it is unlikely to have an adverse impact on MNES, namely downstream ecological communities in Saltwater Creek and the GBRMP, wading and migratory birds, the ant plant and various marine species identified in the Protected Matters Report. The assessment outcomes presented in this referral, provides an assessment of the significant impact criteria against current DAWE guidelines:

1. lead to a long-term decrease in the size of a population - the development will not cause any loss of habitat for the terrestrial, marine or migratory species listed. Vegetation to be cleared in the development footprint area is previously disturbed (Category X) and not recognised as native habitat for the species listed. Marine benthic habitat will not be impacted in Saltwater Creek , Annan River or GBRMP so no long-term decrease in the size of populations are expected to occur. Additional habitat space will be created in the development for wading and migratory birds (saltwater pond and drain water edge wading) and marine estuarine species (constructed mangrove wetland).

2.reduce the area of occupancy of the species - the development will not cause any loss of habitat for the terrestrial, marine or migratory species listed. Vegetation to be cleared in the development footprint area is previously disturbed (Category X) and not recognised as native habitat for the species listed. Marine benthic habitat will not be impacted in Saltwater Creek , Annan River or GBRMP so no long-term decrease in the size of populations are expected to occur. Additional habitat space will be created in the development for wading and migratory birds (saltwater pond and drain water edge wading) and marine estuarine species (constructed mangrove wetland).

3. fragment an existing population into two or more populations - the development will not cause any fragmentation or break up of any habitat area that already exists on the property. The existing terrestrial vegetation areas on the property identified as potential habitat for the listed species will not be cleared. Mangroves to be cleared in the redevelopment of the existing drain to Saltwater Creek will not result in population fragmentation due to its tidal influence and proximity to tidal saltpan areas.

4. adversely affect habitat critical to the survival of a species - no existing native species habitats on the property will be adversely affected by the development

5. disrupt the breeding cycle of a population - breeding cycles of terrestrial, marine flora and fauna will not be disrupted because there will be no significant disruption or disturbance to existing natural habitats, populations or environmental conditions on the property. Some breeding cycles may be enhanced by the creation of additional habitat space with the construction of saltwater ponds and a constructed mangrove wetland.

6. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline - no existing native species habitats on the property will be adversely affected by the development

7. result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat - potential for invasive species on the property is minimal due to the management and operations of the prawn farm stocked with native species (Peneaus monodon and Chanos chanos), significant screening and water filtration systems on intake water supply, and strict implementation of farm management plans (Containment, Health Management and Biosecurity).

8. introduce disease that may cause the species to decline - potential for disease introduction on the property is minimal due to the biosecurity and health management operations of the prawn farm stocked with native species (Peneaus monodon and Chanos chanos), significant screening and water filtration systems on intake water supply, and strict implementation of farm management plans (Containment, Health Management and Biosecurity).

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 6

Environmental record of the person proposing to take the action

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Explain in further detail

Aquatec Pty Ltd is the owner of the property and proponent of the prawn farm redevelopment. Aquatec has retained an Queensland Aquaculture License for the property since 1995 and has received full statutory approvals and permits for the redevelopment to the satisfaction of the relevant State environmental agencies.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application

There are no past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

☐ Yes ☑ No

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

☐ Yes ☑ No

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 7

Information sources

Reference source

Environmental Code of Practice for Australian Prawn Farmers

Reliability

Public document published by the industry organisation (APFA) with the assistance of government involved in development and R&D for the Australian aquaculture industry. Code of practice endorsed by government.

Uncertainties

Some data and information included in the references may be out of date.

Reference source

Operational Policy for Marine Prawn Aquaculture Queensland (DEHP).

Reliability

Public document published by the Queensland Government (QLD Environment and Heritage) in partnership with aquaculture R&D agencies (CSIRO, DAFF, Griffith University) and the Australian industry organisation (APFA), used as policy framework for environmental licensing of Queensland prawn farm developments.

Uncertainties

Some data and information included in the references may be out of date.

Reference source

Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)

Reliability

Administered by Commonwealth government

Uncertainties

Some data and information included in the references may be out of date.

Reference source

State Planning Policy 2/02: Planning and managing development involving acid sulfate soils
SDAP Code 17 Aquaculture

Reliability

Public document published by the Queensland Government (State Development, DAFF, QLD Environment and Heritage) in partnership with R&D agencies (CSIRO, DAFF, Griffith University) and the Australian industry organisation (APFA) . Used as policy framework for environmental licensing of Queensland prawn farm developments.

Uncertainties

Some data and information included in the references may be out of date.

Reference source

DAF Guidelines for constructing and maintaining aquaculture containment structures

Reliability

Public document published by the Queensland Government (State Development, DAFF, QLD Environment and Heritage) in partnership with R&D agencies (CSIRO, DAFF, Griffith University) and the Australian industry organisation (APFA) . Used as policy framework for environmental licensing of Queensland prawn farm developments.

Uncertainties

Some data and information included in the references may be out of date.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Reference source

DAF Aquaculture Policy : Management arrangements for potentially high-risk activities in the context of ecologically sustainable development (ESD) for aquaculture facilities, FAMOP001

Reliability

Public document published by the Queensland Government (State Development, DAFF, QLD Environment and Heritage) in partnership with R&D agencies (CSIRO, DAFF, Griffith University) and the Australian industry organisation (APFA) . Used as policy framework for environmental licensing of Queensland prawn farm developments.

Uncertainties

Some data and information included in the references may be out of date.

Reference source

The Australian Prawn Farming Manual – Health Management for Profit. ACIAR Publications, Canberra

Reliability

Public document available online published by the Australian Centre for International Agricultural Research (ACIAR) in partnership with Queensland Government, R&D agencies and the Australian industry organisation (APFA). Used as a training and development document for prawn farm work force.

Uncertainties

Some data and information included in the references may be out of date.

Reference source

Draft environmental values and water quality objectives for eastern Cape York waters – Draft for consultation" of the Environmental Protection (Water) Policy (EHP, 2017).

Reliability

Public document published by the Queensland Government (QLD Environment and Heritage) in partnership with R&D and natural resource agencies and community organisations. Used as policy framework for catchment and environmental management of Queensland natural resources.

Uncertainties

Some data and information included in the references may be out of date.

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 8

Proposed alternatives

Do you have any feasible alternatives to taking the proposed action?

Yes ☑ No

Australian Government
Department of Agriculture, Water and the Environment

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Section 9

Person proposing the action

9.1.1 Is the person proposing the action a member of an organisation?

☑ Yes ☐ No

Organisation

Organisation name	AQUATEC PTY. LTD.
Business name	
ABN	41038996131
ACN	
Business address	PO Box 14097, Mount Sheridan, 4868, QLD, Australia
Postal address	
Main Phone number	0420 693022
Fax	
Primary email address	wayneby51@gmail.com
Secondary email address	

9.1.2 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

☑ Small business
☐ Not applicable

9.1.2.1 You must provide the date/income year that you became a small business entity:

01/11/1999

9.1.2.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations *

☐ Yes ☑ No

9.1.3 Contact

First name	Wayne
Last name	Bishop
Job title	Owner
Phone	0420 693022
Mobile	
Fax	
Email	wayneby51@gmail.com
Primary address	PO Box 14097, Mount Sheridan, 4868, QLD, Australia
Address	

Declaration: Person proposing the action

I, WAYNE BISHOP, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity.

Signature: ..... Date: 26-11-2020

I, WAYNE BISHOP, the person proposing the action, consent to the designation of WAYNE BISHOP as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: ..... Date: 26-11-2020

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small business entity and confirm that I qualify for a small business exemption.

Signature: ..... Date: 26-11-2020

Australian Government
Department of Agriculture, Water and the Environment

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Proposed designated proponent

9.2.1 Is the proposed designated proponent a member of an organisation?

☑ Yes ☐ No

Organisation

Organisation name	AQUATEC PTY. LTD.
Business name	
ABN	41038996131
ACN	
Business address	PO Box 14097, Mount Sheridan, 4868, QLD, Australia
Postal address	
Main Phone number	+10420693022
Fax	
Primary email address	wayneby51@gmail.com
Secondary email address	

9.2.2 Contact

First name	Wayne
Last name	Bishop
Job title	Owner
Phone	0420 693022
Mobile	
Fax	
Email	wayneby51@gmail.com
Primary address	PO Box 14097, Mount Sheridan, 4868, QLD, Australia
Address	

Declaration: Proposed Designated Proponent

* I, WAYNE BISHOP, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: ..... Date: 26-11-2020

Australian Government
Department of Agriculture, Water and the Environment

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Referring party (person preparing the information)

9.3.1 Is the referring party (person preparing the information) a member of an organisation?

☑ Yes ☐ No

Organisation

Organisation name	3SCIENCESOLUTIONS PTY LTD
Business name	
ABN	36135170286
ACN	
Business address	The Boulders Road, Babinda, 4861, QLD, Australia
Postal address	
Main Phone number	0428671689
Fax	
Primary email address	chris@3ss.com.au
Secondary email address	

9.3.2 Contact

First name	Chris
Last name	Robertson
Job title	Manager
Phone	0428671689
Mobile	
Fax	
Email	chris@3ss.com.au
Primary address	The Boulders Rd, Babinda, 4861, QLD, Australia
Address	

Declaration: Referring party (person preparing the information)

I, CHRIS ROBERTSON **, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.**

Signature: ..... **Date:** 14/11/20

Note: PDF may contain fields not relevant to your application. These fields will appear blank or unticked. Please disregard these fields.

Appendix A

Attachment

Document Type	File Name
govt_approval_conditions	~~DA4158 - Decision Notice - MCU - Aquaculture Prawn Farm2~~.pdf (duplicate - not published)
govt_approval_conditions	EA Aquatec 34 ha Mk2 .pdf
localgov_approval_consent	DA4158 - Decision Notice - MCU - Aquaculture Prawn Farm.pdf
supporting_tech_reports	Saltwater Creek Baseline water quality survey Aquatec PL V13a.pdf
supporting_tech_reports	Modelling of downstream water quality and mixing CORMIX3.pdf
flora_fauna_investigation	Vegetation Survey_final copy.pdf
hydro_investigation_files	~~Saltwater Creek Baseline water quality survey Aquatec PL V13b~~.pdf (duplicate - not published)
hydro_investigation_files	~~Modelling of downstream water quality and mixing CORMIX3b~~.pdf (duplicate - not published)

Appendix B

Coordinates

Area 1
-15.512557552612,145.2316811677
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-15.518842963648,145.2327540513
-15.518987691252,145.23273259363
-15.518967015886,145.23247510157
-15.5187809375,145.23247510157
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-15.512557552612,145.2316811677