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1. Introduction

1.1 Background

This report provides a preliminary assessment of the potential noise impacts associated with the construction works and operation of the proposed Guthalungra Prawn Farm. **Figure 1** shows the proposed site location.

1.2 Overview of Operations

The proposed farming operations would primarily include prawns. Other products may include mud crabs, barramundi, mangrove jack etc at a later stage. **Figure 2** shows the proposed farm layout .

Information relating to typical activities being undertaken throughout the farming process was obtained via personal communication with Pacific Reef Fisheries (PRF, 2002). The proposed prawn farming operation would involve progressively filling the ponds from mid August through to the end of October and harvesting from January through to June. At the end of the crop, the ponds are cleaned out over an approximate 2 month period and prepared for the commencement of the next seasons farming.

Biomass in the ponds requires air input and feed, with demand for each increasing throughout the growth period. Pelletised feed is delivered to the ponds via a hopper on the back of a tray top truck. A petrol pump blows feed into the ponds at a controlled rate. Feeding typically commences at 4 times per day during the beginning of the growth season, increasing to 5 times per day prior to harvest. The first feed commences at 6 am and the last feed finishes at 10 pm.

Aeration of the ponds is achieved through the use of paddle wheel aerators. Initially, each pond would typically required 4 paddle wheel aerators, potentially operating continuously 24 hours per day. This could increase to around 6 paddle wheel aerators and 4 air injectors (which drive air below the surface of the ponds) towards the end of the crop growth period.

The paddle wheel aerators are driven by submersible electric motors, with the only noise contributions being splashing sounds from the paddles. The air injectors also have submersible motors, which suck air through a surface intake and bubble it out near the bottom of the water column.

Sea water will also be circulated through the ponds via a series of inlet pipelines and channels. An intake pump facility would be constructed within the beach dunes to the north of the site. The concept design for the intake pump is based on a multi-pump wet-well system, involving submersible pumps. A similar pump station will be located on the farm to pump excess exchange and release water to Abbot Bay. A number of re-lift and re-use pumps would also be installed on-site, at ground level.

Figure 1

(Refer to Appendix B)

Figure 2

(Refer to Appendix B)

Routine maintenance, involving oxygen testing of the water, feed status and the like, would be undertaken using 4WD motorbikes. A maximum of approximately 30 bikes would be required for the whole farm, not all of which will be operating at once. A grader and excavator would also be used as part of routine maintenance on the drains throughout the farming period.

Harvesting of the crop is undertaken between 6 am – 4 pm during the months from January to May. Harvesting typically involves the use of 4 wheel drive motor bikes or utilities travelling back and forth between the processing area and the ponds. The animals are captured by draining the ponds with a net over the outlet and are transported immediately to the processing area. Some prawns are transported fresh from the site and others are cooked, frozen and packaged prior to transport. Transport of product from the site is restricted to a few hours per day, during the middle of the day, and would be via refrigerated trucks.

The processing area operates between the hours of around 6 am – 10 pm, however refrigeration and freezing plant is maintained 24 hours per day. Site operations during night-time hours would be restricted to the use of surface aerators and the associated water reticulation system. No processing, maintenance or feeding would be scheduled during night-time hours.

Other activities on-site include offices, machinery sheds, food storages and transfer stations for receiving feed deliveries and the like. These operations would not occur during night-time hours. Emergency backup diesel generators will also be required on-site, to maintain pond aeration in the event of mains power failure. These generators would operate fortnightly, as part of routine maintenance, for a period of approximately 3-4 hours during the daytime.

Following cropping and drainage of the ponds, the ponds are cleaned during July and August. Uneaten food, dead animals and debris is cleaned from the bottom of the ponds using loaders and trucks. At any one time 4 trucks and 2 loaders would typically be used on-site for this purpose.

2. Existing Environment

2.1 Nearest Sensitive Receivers and Local Setting

The proposed Guthalungra Prawn Farm is situated on the coastal fringe, near the northern banks of the Elliot River, Guthalungra. The site is bordered to the north and east by coastal dunes, heath-land, salt pans and mud flats, adjacent to the Pacific Ocean. The land to the west and south is predominantly coastal vegetation, with some farming and scattered residential dwellings.

The land surrounding the proposed development site is gently undulating, with generally low relief and no significant topographical features.

The residential community nearest to the proposed site is located within the Guthalungra beach community, a shown in **Figure 2**. This community, consisting primarily of holiday beach shacks adjacent to the mouth of the Elliot River, is located over 2 km east of the proposed storage ponds and processing area. An isolated residential dwelling is located approximately 450 m south-east of the proposed processing area.

The direct line of site from the Guthalungra beach community is partially restricted due to the presence of a small vegetated mound immediately to the west of the Elliot River (approximately 3 m RL)

2.2 Ambient Noise Levels and Noise Sources

The existing noise environment within the area adjacent to the proposed site is considered typical of a coastal rural community. The main noise contributions would typically include:

- insects, birds, wind rustling leaves;
- domestic sources;
- wave noise from the nearby ocean; and
- vehicle traffic using the local road network

Given the remote location and the lack of industrial or transport related contributions to the existing noise environment, no ambient noise monitoring has been undertaken as part of this project. Instead, reference has been made to average noise levels listed in AS-1055 (*Description and measurement of environmental noise)* for areas with negligible transportation density and experience gained from previous projects.

The existing background (L_{A90}) noise levels likely to be experienced at the Guthalungra beach community and at the isolated dwelling south-east of the site, under calm conditions have been assumed to be:

- 40 dB(A) during the daytime (6 am – 6 pm);
- 35 dB(A) during the evening (6 pm – 10 pm); and
- 30 dB(A) during the night-time hours (10 pm – 6 am).

The varying presence of wave noise, wind causing tree leaves to rustle, birds and insects and human influences, noise levels recorded at the site may be slightly higher slightly lower than those stated above. However, for the purposes of this assessment, a conservative assumption of 35 dB(A) during the daytime and evening, and 30 dB(A) during the night-time hours has been made.

3. Noise Legislation and Guidelines

3.1 Overview

The assessment of noise is complex and subjective and the assessment procedure should not be considered in isolation from other social and economic aspects of a development. The following sections refer to relevant Queensland legislation and guidelines for protecting against adverse noise impacts as a result of development. Reasonable project specific noise limits, as determined for the Proposed Guthalungra Prawn Farm, are summarised in **Section 3.3**.

3.2 Environmental Protection Act (1994)

The acoustic environment in Queensland is protected under the *Environmental Protection Act 1994* (EP Act), the objective of which is to allow development that improves the total quality of life using the principles of "Ecologically Sustainable Development". The object of the EP Act is implemented through the *Environmental Protection (Noise) Policy 1997* (EPP Noise), which provides a framework for managing and assessing noise emissions from development proposals and aims to protect and enhance environmental values, namely the wellbeing of the community and individuals.

3.2.1 Environmental Protection (Noise) Policy 1997

The Noise EPP specifies an "acoustic quality objective" of achieving an ambient $L_{Aeq\ (24\ hour)}$ level of 55 dB(A) or less for the majority of Queensland's residential population. The Policy lists issues that the administering authority must consider when making a decision with regard to development applications and setting project specific noise limits. These issues include:

- the characteristics of the noise from the noise-relevant activity;
- other noises ordinarily present at or near the relevant place; and
- any other information or other matter concerning the effect of the noise-relevant activity on the acoustic environment.

The User's Guide for the *Environmental Protection (Noise) Policy 1997* adds that the administering authority should also consider the:

- background level;
- ambient level;
- number of noise events emerging above the background;
- maximum sound pressure level of the events;
- characteristics of the noise emissions; and
- receiving environment.

Development Noise

The Noise EPP does not specify any absolute or relative sound pressure level criteria for developments and it is not correct to interpret the $L_{Aeq\ (24\ hour)}$ 55 dB(A) level as a contributed noise criteria for specific activities or developments. Environmental authority limits have historically been set based on an incremental level above the prevailing background noise level. Noise levels from the operation of a proposed

facility are generally considered reasonable at the noise sensitive receiver locations if the $L_{AMAXadj,\,T}$ does not exceed the background noise level by more than:

- background + 5 dB(A): 7 am - 10 pm;
- background + 3 dB(A): 10 pm - 7 am.

There are no existing contributions from industrial sources in the area adjacent to the proposed development and, as outlined in **Section 2.2**, is dominated by natural and domestic sources. The addition of industrial sources associated with the prawn farm operation may result in a perceived increase in noise levels by the community even though there may not be any detectable increase in actual noise levels.

Using these guidelines, and the conservative estimate of existing background noise levels within the area are 35 dB(A) during the day and evening and 30 dB(A) during the night (refer to **Section 2.2**), the following prawn farm operational noise levels, when measured at nearest sensitive receivers to the site, are considered reasonable:

- $L_{AMAXadj,\,T}$: 40 dB(A), between 7 am - 10 pm; and
- $L_{AMAXadj,\,T}$: 33 dB(A), between 10 pm - 7 am.

Road Traffic Noise

Schedule 1 of the Noise EPP sets planning levels for noise. The planning levels for road traffic noise at sensitive locations are:

- 68 dB(A) for state controlled roads assessed as the $L_{A10\,(18\,hour)}$ level;
- 63 dB(A) for another public road assessed as the $L_{A10\,(18\,hour)}$ level;
- 60 dB(A) assessed as the highest 1 hour equivalent continuous A-weighted sound pressure level between 10.00 p.m. and 6.00 a.m.; and
- 80 dB(A) assessed as a single event maximum sound pressure level.

The L_{A10} indicator is an arithmetic average of 18 hourly L_{A10} levels determined over the consecutive hours between 6 am and 12 midnight on the day. This indicator is widely used to represent road traffic noise exposure.

Such levels apply for the design and construction associated with new or upgraded road corridors. For this project, an estimate of the potential impacts from road traffic noise can be gauged by the relative increase in traffic noise compared to the existing situation.

Construction Noise

The EPP (Noise) does not outline specific construction noise level guidelines. The Queensland Nuisance Laws, outlined in Section 6 of the *Environmental Protection Regulation 1998 (EPR,1998)*, provide time restrictions for construction, maintenance and building works having the potential to affect residential premises. **Table 3-1** provides a summary of the noise level and time restrictions from these activities.

Table 3-1 Limits to Construction Works affecting Residential Premises

Day of Week	Working Hours	Noise Level Restriction
Monday to Saturday	6:30 am-6:30 pm	Noise Permitted
All Days	6:30pm – 6:30 am	No audible noise permitted
Sundays, public holidays	All hours	No audible noise permitted

Source: Qld EPR, 1998

The nuisance laws are complaint driven, meaning a complaint must be made before a problem will be investigated. Following receipt of a valid complaint, authorised officers have the ability to issue abatement notices, infringement notices or undertake a prosecution for causing unlawful environmental nuisance.

3.3 Noise Criteria Applicable to this Project

Table 3-2 summarises proposed noise level limits for the construction and operation of the proposed development, as determined in accordance with relevant EPA Guidelines and Policies.

n Table 3-2 Project Specific Operational Noise Criteria

Goal	Project Specific Goal	Time period
Operational Noise		
	$L_{AMAXadj,T}$ = 40 dB(A)	7 am-10 pm
	$L_{AMAXadj,T}$ = 33 dB(A)	10 pm – 7 am
Construction Noise	no audible noise at sensitive receiver locations	6:30 pm-6:30 am: Monday to Saturday, all hours: Sundays and Public Holidays

Implementation of these limits will protect the acoustic quality of the environment within the adjacent area to the proposed development and minimise potential impacts resulting from the proposed prawn farm operations.

4. Impact Assessment

4.1 Overview

The main noise issues associated with operations at the proposed site are likely to be the operation of construction equipment during site preparation and pond construction activities, and the operation of water pumps, aeration systems and site activities during times when ambient noise levels are low. The potential issues are discussed in the following sections.

4.2 Construction Phase Impacts

4.2.1 Timing of the Works and Construction Activities

Construction of the proposed ponds and associated drainage infrastructure will be staged, with works being undertaken during the dry season months from approximately April to September over 4 successive years. Construction during the first stage would mainly be centred on the eastern area of the site, including ponds, the water treatment and sedimentation area, the site office, amenity and processing facilities. Construction of the main water supply and discharge pipelines would also occur during the first stage, allowing the operation of the first part of the farm from completion of the first stage of works. During each successive year, additional ponds and drains would be constructed and brought on-line, expanding the size of the operating farm.

In accordance with the *EPR (1998)* construction works undertaken during each stage would be restricted to the hours of 6:30 am-6:30 pm, Monday to Saturday.

Construction activities would typically include:

- bulldozer and chain to clear and stockpile vegetation on-site. Topsoil would also be removed and stockpiled to the north-east of the proposed processing area and sedimentation area 1, for use in rehabilitation of the finished earthworks areas;
- bulk earthmoving, during excavation of the ponds and drainage channels, would be undertaken using scrapers, dozers, excavators rollers and the like. Water trucks would also be used to control dust and to supply water during the compaction of pond bases.
- Concrete trucks would also be required intermittently throughout the construction period for the construction of pipe culverts, pump stations and miscellaneous concrete works. However no major 24 hour concrete pours will be required as part of the works;

The construction equipment used on the site, and the subsequent level of noise emission, would vary, depending on the stage of the works. A discussion of the likely construction traffic noise impacts is provided in **Section 4.2.5**.

4.2.2 Methodology

A detailed construction plan was not available at the time of preparation of this report. Discussions with design engineers determined that a selection of typical items of earthmoving equipment would operate simultaneously at the proposed site during the excavation and bulk earthmoving stage of the works. It has been assumed that the greatest potential for noise impacts at adjacent receivers will be a result of a number of

items will be operating simultaneously in the processing area and adjacent sedimentation area, and stockpiling of fill within the area to the north-east of this.

Sound Power levels for typical activities associated with the construction works have been sourced from *AS2436-1981 Guide to Noise Control on Construction, Demolition and Maintenance Sites* and our own in house database. The sound power levels used to calculate indicative construction noise levels at nearest sensitive receivers to the east of the proposed site include:

- Excavator 116 dB(A)
- Front End Loader 117 dB(A)
- Grader 117 dB(A)
- Dozer 118 dB(A)
- Haul Truck 118 dB(A)
- 10 t Product Truck 105 dB(A)
- Concrete Mixer Truck 118 dB(A)
- Concrete Pump 102 dB(A)
- Vibratory roller 119 dB(A)

Noise attenuation calculations, based on the CONCAWE algorithms, were used to calculate $L_{AMAXadj,\,T}$ construction noise levels at nearest noise sensitive receivers to the proposed site during the earthworks phase. The results of these calculations are outlined in the following section.

4.2.3 Construction Noise Level predictions

The assessment of construction phase noise impacts is based on a selection of typical items of equipment operating simultaneously. The results of construction noise calculations at distances indicative of the closest sensitive receiver location are shown in **Table 4-1**.

Table 4-1: Calculated Construction Noise Levels

	Approx Distance from Works (m)		L_{A10} Noise Level (dB(A))
Receiver Location	**Stockpiling Area[1]**	**Processing Area and Ponds[2]**	**Resultant $L_{AMAXadj,\,T}$ noise level (dB(A))**
Guthalungra Beach Community	800	2000	35
Isolated Residence (SE)	800	450	45

[1] Sources include: Excavator, loader, grader, dozer, Water Truck

[2] Sources include: Haul Truck, concrete mixer truck, concrete pump, 2 dozers, 2 graders, excavator, loader, vibratory roller

The calculations presented in **Table 4-1** incorporate the effects of air absorption, divergence and distance attenuation between the source and receiver over flat, moderately absorptive ground.

4.2.4 Discussion of Likely Impact

The indicative construction noise calculations presented in **Table 4-1** show that while stockpiling works are being undertaken within a distance of approximately 800 m of the nearest residences, and excavation and earthmoving works are being undertaken at the processing area, construction noise calculations of around 45 dB(A) may be expected at the nearest receiver to the site while some discrete activities occur. During these times, the resultant noise level is approximately 10 dB(A) above the

assumed (conservative) background daytime noise level of 35 dB(A). Given the approximate 6 month construction period, construction noise levels of this order are considered acceptable, provided works are restricted to the hours of 6:30 am – 6:30 pm when they are audible at the receiver location.

It should be noted that construction noise levels will vary throughout the construction period, depending on the level of activity on-site and the type of activity being undertaken, however significant noise impacts are not expected to result from these activities.

4.2.5 Construction Traffic Impacts

The peak traffic generation during construction is expected to occur immediately either side the construction shift, from 7 am – 3 pm. *The Traffic Impact Report* (Lambert and Rehbein, 2002) indicates that approximately 30 workers will travel to the site between 6:30-7:30am and leave the site between 2:30-3:30pm. Access would be along Coventry Road, via the Bruce Highway, which is speed limited to 60 km/hr.

Heavy construction equipment will be transported to the site at the commencement of the construction period and will remain on-site for the duration of the works. Intermittent vehicle movements are likely to occur throughout the daytime hours, however, the majority of movements will occur during the AM and PM peaks. Peak hourly construction traffic forecasts are approximately 47 vehicles per hour, 10 of which are heavy vehicles.

The nearest residence to the proposed construction site is located approximately 400 m from the access route. Given the relatively short duration of the construction period, the restriction to daytime working hours, and the relatively low construction traffic flows indicated in the traffic assessment, noise impacts from construction traffic are not expected to be significant at nearby receivers adjacent to the Bruce Highway and Coventry Road.

4.3 Operational Phase Impacts

4.3.1 Overview

As outlined in **Section 1.2** operations at the site would vary throughout the year. The potential noise impacts from the proposed prawn farming operations have been assessed for two operating scenarios, which are considered to have the greatest potential for noise impacts.

Scenario 1 – Farming Activities:

- the operation of surface paddle wheel aerators;
- drain maintenance equipment (including a grader and excavator);
- site delivery truck;
- operation of relift pumps and re-use pumps; and
- feed and surveillance vehicles

Scenario 2 – Post Harvest Pond Maintenance Operations:

- 3 excavators;
- 3 graders;
- one truck; and
- one 4WD vehicle

4.3.2 Noise Prediction Methodology

In order to assist in the qualification of potential noise impacts from the operation of the proposed prawn farm, the Environmental Noise Model was used to predict noise levels for two scenarios. The operational L_{Aeq} noise levels, at distances representative of the nearest noise sensitive receivers to the site, were calculated and compared with appropriate noise emission limits.

Estimates of the sound power levels for the surface aerators, above ground pump drives and earthmoving machinery were made with reference to the SKM Sound Power Level database, or adjustment made to similar plant items. The octave band sound power levels for relevant items are outlined in **Table 4-2**.

n Table 4-2 Indicative Sound Power Levels – Farming Operations

Source	Assumed No. Units	Lin	Swl dB(A)	31.5	63	125	250	500	1k	2k	4k	8k
Farming Activities												
Feed / Surveillance vehicle	1	101	101	-	81	84	90	92	90	92	96	96
Paddle wheel aerator[1]	84 ponds	86	76	75	79	74	73	76	80	78	76	73
Grader	1	117	111	103	109	111	112	108	106	101	96	83
Excavator	1	119	113	110	112	114	111	111	107	104	96	90
Delivery truck (10t)	1	105	105	60	76	85	96	98	99	101	93	85
Pump motors[2]	7	98	96	85	86	87	89	89	92	89	85	79
Post Harvest Maintenance Activities												
Surveillance vehicle	1	101	101	-	81	84	90	92	90	92	96	
Grader	3	117	111	103	109	111	112	108	106	101	96	83
Excavator	3	119	113	110	112	114	111	111	107	104	96	90
Delivery truck (10t)	1	105	105	60	76	85	96	98	99	101	93	85

Comment: similar to ratchet air gun?

Comment: similar to ratchet air gun?

[1] *Based on modified STP surface aerator spectrum, assuming a minimum of 4 aerators per pond*

[2] *Assumed 160 kW drive, nominal spectral distribution,*

Operation of the main water supply and disposal pumps was not considered as part of the modelling. The proposed pumps will be located below ground level, within an enclosed concrete tank. Noise impacts from the operation of these potential sources are therefore not considered to be significant.

Predictions made on the data listed in **Table 4-2** result in the determination of the $L_{AMAXadj,\ T}$ index and assume that the process units are fully and simultaneously operational and under typical load conditions during the operation. The modelling incorporated the conservative conditions of:

- 3^{o}/100 m temperature inversion; and
- 3 m/s wind blowing in the general direction from source to receiver.

The acoustic model run under these conditions, including indicative early morning temperature and relative humidity information for the site, is considered to represent

the worst case potential impact at the nearest sensitive receivers to the proposed farming operation.

The results of noise modelling for the two main operating scenarios are provided in **Appendices A.1** and **A.2** respectively.

4.3.3 Discussion of Likely Impact

The predicted noise levels at the isolated residence to the south-east of the processing area were approximately 32 dB(A) during farming activities, even under adverse meteorological conditions. The predicted noise levels at the Guthalungra beach community were less than 22 dB(A) during farming activities. The operation of the proposed prawn farming activities were predicted to comply with the night-time project specific noise level objective of 33 dB(A). Given that the existing background daytime and night-time noise levels were assumed to be 35 dB(A) and 30 dB(A) respectively, operational noise levels during farming are not expected to give rise to the loss of acoustical amenity and not likely to generate significant impacts at the nearest receiver and are not likely to be audible for much of the time at the Guthalungra beach community.

During post-harvest pond cleaning and maintenance activities the predicted noise levels at the nearest residence were predicted to be 35 dB(A) and less than 27 dB(A) at the Guthalungra beach hut community under adverse meteorological conditions. At other times noise levels at the nearest residence were predicted to be less than 32 dB(A). Given that the maintenance activities would only be undertaken during the daytime hours for a period of approximately 2 months of the year, noise impacts from the proposed maintenance activities are not expected to be significant.

The noise levels presented above include consideration of temperature inversion conditions and winds blowing in the direction from the source to the receiver. In reality, these conditions are not likely to occur for a significant period of the time throughout the year. The results are therefore considered conservative.

Potential contributions from the operation of the water intake pump have not been incorporated into the modelling. As outlined in **Section 1.2** the proposed intake pump will be located below ground level, within a concrete well structure. Given this, and the remote location of the proposed intake pump, noise impacts from the operation of this pump are not considered to be significant.

Emergency Generator Noise

As outlined in **Section 1.2**, emergency backup diesel generators may also be required periodically, during mains power failure and routine maintenance. Information from Pacific Reef Fisheries indicates that one generator would service aerators for approximately 16 ponds. Due to the fact that these generators would operate fortnightly, as part of routine maintenance, for a period of approximately 3-4 hours during the daytime, the likely noise impacts from such a scenario have also been considered.

Table 4-3 provides indicative sound power level data for the operation of various generator sets, mounted on the ground, without any enclosures. The sound power level data has been sourced from information provided by the likely suppliers of these units.

n Table 4-3 Indicative Sound Power Levels – Emergency Generators

Source	Assumed No. Units	Lin	Swl dB(A)	63	125	250	500	1k	2k	4k	8k
Emergency Generators[1]											
F182	5	113	112	102	95	98	108	107	106	102	
F172	5	106	106	94	91	91	98	101	101	96	91
F173	5	98	96	92	89	87	88	91	90	88	84

Comment: similar to ratchet air gun?

[1] *Cummins Performance Specifications for typical generator sets to be installed on-site*

Given the fact that the requirement for emergency backup power is not predictable, aside from the routine maintenance that would occur during daytime hours, the modelling of potential impacts has been undertaken for daytime hours only.

The predicted noise levels at the isolated residence to the south-east of the processing area were approximately 29 dB(A). When considering the contribution of noise from general farming activities (above) with the emergency generators, a resultant noise level of less than 32 dB(A) would be expected during daytime hours under non-enhancing meteorological conditions. The combined contribution from emergency diesel generators and prawn farming activities at the Guthalungra beach community was predicted to result in noise levels of less than 25 dB(A) during farming activities.

The routine maintenance operations of the emergency diesel generators are therefore not expected to generate nuisance noise impacts at nearest sensitive receiver locations. However, noise from the operation of the emergency generators, in conjunction with the pond aerators may be audible at times at the nearest isolated residence, under adverse meteorological conditions, during night-time hours. It is therefore recommended that no routine maintenance activities be undertaken during night-time hours. Consideration should be given to the appropriate siting of generator units adjacent to the processing area to maximise shielding to nearest residences.

No consideration of emergency generators in conjunction with post harvest pond cleaning and maintenance activities has been undertaken, due to the fact that the majority of ponds will not be under aeration during this time.

Impacts on Migratory Birds

A review of relevant research wildlife response to noise from compressor and motor-type noise suggests that whilst some impacts do occur within very close proximity to the noise source, the effects will depend on the intensity of the noise, the species of bird and the proximity to the source. Some birds exhibit avoidance of high noise areas, while other species, with seemingly higher tolerance levels, tend to take advantage of the reduced competition within these areas and increase their habitation. The overall conclusions in literature indicate that impacts are typically of short radius and are temporal, with animals tending to adapt to the change in their environment with time.

4.3.4 Operational Traffic

The proposed prawn farm will result in an increase in traffic travelling to the site, along Coventry Road from the Bruce Highway.

The peak traffic generation during operation of the proposal was identified by Lambert and Rehbein (2002) as the AM peak (6:30-7:30am) and PM peak (2:30-3:30pm) periods, with staff travelling to and from the site, deliveries to the site and transport of produce from the site. The development is expected to generate 24 additional vehicles along Coventry road during the AM peak hour flow, 7 of which would be heavy vehicles. Additional workers would be required during the processing and harvesting period, extending the working hours to around 10pm.

An increase of 212 vehicles per day is expected as a result of the proposal, which averages to less than 15 vehicles per hour between the hours of 6:30am-10:30 pm. Compared with the existing traffic flows on the Bruce Highway, an increase of this order is likely to generate an increase in the long-term road traffic noise level of less than 0.3 dB(A). Along Coventry road, the lower background flows will necessarily result in a larger increase in road traffic noise compared to the existing situation. However, given the low flows involved, and the fact that the majority of vehicles will be travelling to and from the site during the daytime, the potential road traffic noise impacts resulting from the proposal are not likely to be significant.

5. Environmental Management and Monitoring

5.1 Construction

Although construction noise impacts were not considered to be significant, it is prudent to implement all practical controls for minimising noise emission from the site. The following general mitigation measures should be incorporated into the construction environmental management plan for the proposed works.

- All construction equipment shall be regularly maintained to minimise this risk of operation of noisy equipment;
- Machinery should be operated within the permitted construction hours of 6:30 am – 6:30 pm on weekdays and Saturdays, with no works on Sundays and Public Holidays; and
- A community consultation program should be established with adjacent landowners, informing them of the proposed construction schedule and proposed timing of the works.

5.2 Operation

For the operation of the proposed prawn farm, noise impacts are not expected to be significant and as such, no specific control measures are recommended for minimising noise impacts at nearest residential receivers. Design of the processing facilities, including refrigeration and cooling plant and the location of emergency diesel generators, should, however, consider appropriate siting and enclosures to minimise outbreak noise from this source and potential night-time impacts on the nearest residence to the south-east of the site.

6. Conclusions

This report provides a preliminary investigation into the potential noise impacts associated with the construction and operation of the proposed prawn farm at Guthalungra. It outlines appropriate noise level objectives for the project and investigates the likely noise levels experienced at nearest off-site sensitive receivers adjacent to the proposed site.

The construction works associated with the proposal would be staged for approximately 6 months of the year over 3-4 years. Indicative construction noise level calculations for the proposed works were undertaken to determine the likely level of impact at nearest sensitive locations, approximately 2000 m east of the proposed processing area and 800 m east of the proposed stockpiling area. The predictions showed that construction works are not likely to generate significant acoustic impacts at nearby sensitive receiver locations, providing the recommended daytime working hours are adhered to. Construction works, may however, be audible for part of the works.

A noise model for the operation of the proposed Guthalungra Prawn farm was established to estimate the likely noise levels during general farming activities and during the post-harvest maintenance activities. The predicted noise levels showed that operation of the proposed facility is not likely to generate noticeable noise levels at the nearest sensitive receiver, located approximately 2000 m east of the proposed processing area and the nearest pond.

The project is expected to comply with the day and evening operational noise level objective of 40 dB(A) and the night-time noise level objective of 33 dB(A) at the nearest sensitive receiver, located approximately 2000 m to the east of the proposed processing area of the site.

7. References

Lambert & Rehbein, 2002. *Traffic Impact Report*. Prepared for Pacific Reef Fisheries, June 2002.

PRF, 2002 *John Moloney, Pers comm*: Basic overview of likely site operations.

Appendix A Noise Modelling Output Files

A.1 Farm Operations

OUTPUT FOR (.rnk) Guthalungra Prawn Farm operational Noise Temp Inversion

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 3450.0 Y= 862.5 Z= 1.5

SOURCE	TITLE	dB(A)
87	Excavator	18.0
86	Grader	15.9
88	Delivery Truck	8.5
89	re-lift / re-use Pump	2.0
85	Feed distribution Vehicle	.1
84	Pond 84	-6.4
72	Pond 72	-6.4
60	Pond 60	-6.5
48	Pond 48	-6.6
36	Pond 36	-6.8
71	Pond 71	-7.2
24	Pond 24	-7.2
83	Pond 83	-7.2
59	Pond 59	-7.3
12	Pond 12	-7.5
47	Pond 47	-7.5
35	Pond 35	-7.6
70	Pond 70	-7.9
82	Pond 82	-7.9
23	Pond 23	-7.9
58	Pond 58	-8.0
11	Pond 11	-8.2
46	Pond 46	-8.2
34	Pond 34	-8.3
22	Pond 22	-8.6
69	Pond 69	-8.7
81	Pond 81	-8.7
10	Pond 10	-8.8
57	Pond 57	-8.8
45	Pond 45	-8.9
33	Pond 33	-9.1
21	Pond 21	-9.3
80	Pond 80	-9.4
68	Pond 68	-9.4
56	Pond 56	-9.5
9	Pond 9	-9.5
44	Pond 44	-9.6
32	Pond 32	-9.7
20	Pond 20	-9.9
8	Pond 8	-10.1

79 Pond 79	-10.1
67 Pond 67	-10.1
55 Pond 55	-10.2
43 Pond 43	-10.3
31 Pond 31	-10.4
19 Pond 19	-10.6
78 Pond 78	-10.7
66 Pond 66	-10.7
54 Pond 54	-10.8
7 Pond 7	-10.8
42 Pond 42	-10.9
30 Pond 30	-11.0
18 Pond 18	-11.2
65 Pond 65	-11.4
6 Pond 6	-11.4
77 Pond 77	-11.4
53 Pond 53	-11.5
41 Pond 41	-11.6
29 Pond 29	-11.7
17 Pond 17	-11.8
5 Pond 5	-12.0
52 Pond 52	-12.0
76 Pond 76	-12.0
64 Pond 64	-12.0
40 Pond 40	-12.1
28 Pond 28	-12.2
16 Pond 16	-12.4
4 Pond 4	-12.5
63 Pond 63	-12.6
75 Pond 75	-12.6
51 Pond 51	-12.7
27 Pond 27	-12.8
39 Pond 39	-12.8
15 Pond 15	-13.0
3 Pond 3	-13.1
50 Pond 50	-13.2
62 Pond 62	-13.2
74 Pond 74	-13.2
38 Pond 38	-13.3
26 Pond 26	-13.4
14 Pond 14	-13.5
2 Pond 2	-13.6
49 Pond 49	-13.8
73 Pond 73	-13.8
61 Pond 61	-13.8
25 Pond 25	-13.9
37 Pond 37	-13.9
13 Pond 13	-14.1
1 Pond 1	-14.2
TOTAL	20.8

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 3450.0 Y= 1425.0 Z= 1.5

SOURCE	TITLE	dB(A)
87	Excavator	17.4
86	Grader	15.3
88	Delivery Truck	5.8
89	re-lift / re-use Pump	2.2
85	Feed distribution Vehicle	-1.4
84	Pond 84	-7.0
72	Pond 72	-7.3
60	Pond 60	-7.6
83	Pond 83	-7.8
48	Pond 48	-8.0
71	Pond 71	-8.0
59	Pond 59	-8.3
82	Pond 82	-8.4
36	Pond 36	-8.4
47	Pond 47	-8.7
70	Pond 70	-8.7
24	Pond 24	-8.9
58	Pond 58	-9.0
35	Pond 35	-9.1
81	Pond 81	-9.2
46	Pond 46	-9.3
12	Pond 12	-9.4
69	Pond 69	-9.4
34	Pond 34	-9.6
23	Pond 23	-9.6
57	Pond 57	-9.7
80	Pond 80	-9.8
68	Pond 68	-10.0
45	Pond 45	-10.0
11	Pond 11	-10.0
22	Pond 22	-10.1
56	Pond 56	-10.2
33	Pond 33	-10.3
10	Pond 10	-10.5
79	Pond 79	-10.5
44	Pond 44	-10.6
21	Pond 21	-10.7
67	Pond 67	-10.7
32	Pond 32	-10.8
55	Pond 55	-10.9
9	Pond 9	-11.0
78	Pond 78	-11.1
43	Pond 43	-11.2

20	Pond 20	-11.2
66	Pond 66	-11.3
31	Pond 31	-11.4
54	Pond 54	-11.5
8	Pond 8	-11.6
42	Pond 42	-11.7
77	Pond 77	-11.7
19	Pond 19	-11.8
65	Pond 65	-11.9
30	Pond 30	-12.0
7	Pond 7	-12.1
53	Pond 53	-12.1
18	Pond 18	-12.3
76	Pond 76	-12.3
41	Pond 41	-12.3
64	Pond 64	-12.4
6	Pond 6	-12.6
52	Pond 52	-12.6
29	Pond 29	-12.6
40	Pond 40	-12.8
17	Pond 17	-12.9
75	Pond 75	-12.9
63	Pond 63	-13.0
28	Pond 28	-13.1
5	Pond 5	-13.1
51	Pond 51	-13.2
39	Pond 39	-13.4
16	Pond 16	-13.4
74	Pond 74	-13.4
62	Pond 62	-13.5
4	Pond 4	-13.6
27	Pond 27	-13.6
50	Pond 50	-13.7
15	Pond 15	-13.9
38	Pond 38	-13.9
73	Pond 73	-14.0
26	Pond 26	-14.1
61	Pond 61	-14.1
3	Pond 3	-14.1
49	Pond 49	-14.3
14	Pond 14	-14.4
37	Pond 37	-14.4
2	Pond 2	-14.6
25	Pond 25	-14.6
13	Pond 13	-14.9
1	Pond 1	-15.1
	TOTAL	20.1

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 2250.0 Y= -225.0 Z= 1.5

SOURCE	TITLE	dB(A)
88	Delivery Truck	30.5
87	Excavator	24.0
86	Grader	22.0
85	Feed distribution Vehicle	10.1
89	re-lift / re-use Pump	5.5
12	Pond 12	4.5
24	Pond 24	3.9
11	Pond 11	3.1
36	Pond 36	2.8
23	Pond 23	2.6
48	Pond 48	1.9
10	Pond 10	1.9
35	Pond 35	1.6
22	Pond 22	1.4
47	Pond 47	.8
60	Pond 60	.7
9	Pond 9	.7
34	Pond 34	.6
21	Pond 21	.3
46	Pond 46	-.1
59	Pond 59	-.2
33	Pond 33	-.4
8	Pond 8	-.4
72	Pond 72	-.5
20	Pond 20	-.7
58	Pond 58	-1.0
45	Pond 45	-1.1
71	Pond 71	-1.2
32	Pond 32	-1.4
7	Pond 7	-1.5
84	Pond 84	-1.6
19	Pond 19	-1.8
70	Pond 70	-1.9
57	Pond 57	-1.9
44	Pond 44	-1.9
83	Pond 83	-2.3
31	Pond 31	-2.4
6	Pond 6	-2.5
56	Pond 56	-2.7
69	Pond 69	-2.7
18	Pond 18	-2.7
82	Pond 82	-2.9
43	Pond 43	-2.9
30	Pond 30	-3.2

68 Pond 68	-3.4
5 Pond 5	-3.5
55 Pond 55	-3.5
81 Pond 81	-3.6
17 Pond 17	-3.7
42 Pond 42	-3.7
67 Pond 67	-4.2
29 Pond 29	-4.2
80 Pond 80	-4.2
4 Pond 4	-4.3
54 Pond 54	-4.3
16 Pond 16	-4.6
41 Pond 41	-4.6
66 Pond 66	-4.9
79 Pond 79	-4.9
28 Pond 28	-5.0
53 Pond 53	-5.1
3 Pond 3	-5.3
40 Pond 40	-5.3
15 Pond 15	-5.5
78 Pond 78	-5.6
65 Pond 65	-5.7
27 Pond 27	-5.8
52 Pond 52	-5.8
2 Pond 2	-6.0
14 Pond 14	-6.2
39 Pond 39	-6.2
64 Pond 64	-6.3
77 Pond 77	-6.3
51 Pond 51	-6.6
26 Pond 26	-6.6
1 Pond 1	-6.9
76 Pond 76	-6.9
38 Pond 38	-6.9
63 Pond 63	-7.1
13 Pond 13	-7.1
50 Pond 50	-7.3
25 Pond 25	-7.4
75 Pond 75	-7.6
62 Pond 62	-7.7
37 Pond 37	-7.7
49 Pond 49	-8.0
74 Pond 74	-8.2
61 Pond 61	-8.4
73 Pond 73	-8.9
TOTAL	32.0

A.2 Pond Maintenance and Clean out

OUTPUT FOR (.rnk) Guthalungra Prawn Farm Maintenance Noise (Cleanup) Temp inversion

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 3450.0 Y= 862.5 Z= 1.5

SOURCE	TITLE	dB(A)
3	Excavator	20.9
2	Excavator	20.8
4	Grader	18.4
1	Grader	18.2
7	Excavator	18.0
6	Grader	15.9
8	Delivery Truck	8.5
5	Feed distribution Vehicle	.1
	TOTAL	26.9

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 3450.0 Y= 1425.0 Z= 1.5

SOURCE	TITLE	dB(A)
3	Excavator	20.1
2	Excavator	19.8
4	Grader	17.9
7	Excavator	17.4
1	Grader	16.9
6	Grader	15.3
8	Delivery Truck	5.8
5	Feed distribution Vehicle	-1.4
	TOTAL	26.0

PROGRAM ENM SOURCE RANKING
SINGLE POINT CALCULATION

X= 2250.0 Y= -225.0 Z= 1.5

SOURCE TITLE	dB(A)
8 Delivery Truck	30.5
2 Excavator	27.8
3 Excavator	26.7
1 Grader	26.4
7 Excavator	24.0
4 Grader	23.1
6 Grader	22.0
5 Feed distribution Vehicle	10.1
TOTAL	35.1