

## **Appendix 4      Noise Impact Assessment**

**TASSAL OPERATIONS PTY LTD**

**PROPOSED WEST-OF-WEDGE ISLAND  
MARINE FARMING ZONE**

**NOISE IMPACT ASSESSMENT**

**Environmental Dynamics**

**Project ED5174**

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## **Release notes.**

This document replaces the report issued on 14 June 2016.

Tassal now proposes to locate the four proposed leases 400 m north of the location assumed by the original noise impact assessment study. Figure 2.1 has been altered accordingly, but the change in the lease locations has not changed the distances to the nearest residences, due east of the leases, so the noise level predictions remain the same.

# TASSAL OPERATIONS PTY LTD

## PROPOSED WEST-OF-WEDGE ISLAND MARINE FARMING ZONE

### NOISE IMPACT ASSESSMENT

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## **1.0 INTRODUCTION**

Tassal Operations Pty Ltd (“Tassal”) farms Atlantic Salmon on its Marine Farming Leases 190, 193 and 194 at Creeses Mistake and Badger Cove, about 2 km west of Nubeena on the Tasman Peninsula. Tassal has operated these leases for over 20 years, served by a shore base at Badger Cove, and now proposes to establish a new offshore marine farming zone with four leases, west of Wedge Island, also served by the Badger Cove shore base.

The way Tasmanian marine farms are regulated is under review by the State Government, but Tassal’s marine farming operations are currently regulated by the State Government’s Department of Primary Industries, Parks, Water & Environment (DPIPWE), specifically the Marine Farming Branch of DPIPWE. Technical advice on acoustics is provided by the Environment Protection Authority (EPA).

Tassal has worked hard in recent years to understand noise impact and mitigate noise emissions from its marine leases, and has collaborated with the EPA to develop a method to assess noise levels from on-lease operations. Marine lease 94, the Sheppard lease in the D’Entrecasteaux Channel, has been the focus of much attention, and the Marine Farming Branch of DPIPWE has set noise level limits for the Sheppard lease. In 2012, Tassal engaged Dr Steve Carter of Environmental Dynamics to confirm compliance with the noise level limits, and a second noise level survey has just been completed, providing a good basis for this study, since the leases have similar marine operations.

In May 2016, Tassal engaged Dr Carter to predict the noise impact of the proposed leases west of Wedge Island, and this noise impact assessment report is structured as follows:

- Section 2 describes the proposed zone and its four leases, lease operations, and the noise mitigation measures that are usually applied to such operations.
- Section 3 describes the nature of noise, and the expected noise level limits.
- Section 4 estimates sound power and sound pressure levels due to the farming operations.
- Section 5 sets out the study conclusions and recommendations.

## 2.0 THE PROPOSED FISH FARM

### 2.1 Location of leases and nearest residences

Figure 2.1 shows the location of the four proposed marine leases, west of Wedge Island in Storm Bay. Each lease has a 500 m north-south x 900 m east-west footprint (45 ha), and the leases are contained in a 2.4 km north-south x 3.6 km east west (864 ha) marine farming zone, which is not shown for the sake of clarity since it has no physical presence. Each of the proposed leases will have 16 pen bays.

The nearest land to the four leases is Wedge Island, just over 2 km due east of the eastern boundaries of the two east leases. However, Wedge Island is a conservation area and not occupied, and the next nearest land is the west coast of the Tasman Peninsula, located just over 1 km east of the east side of Wedge Island.

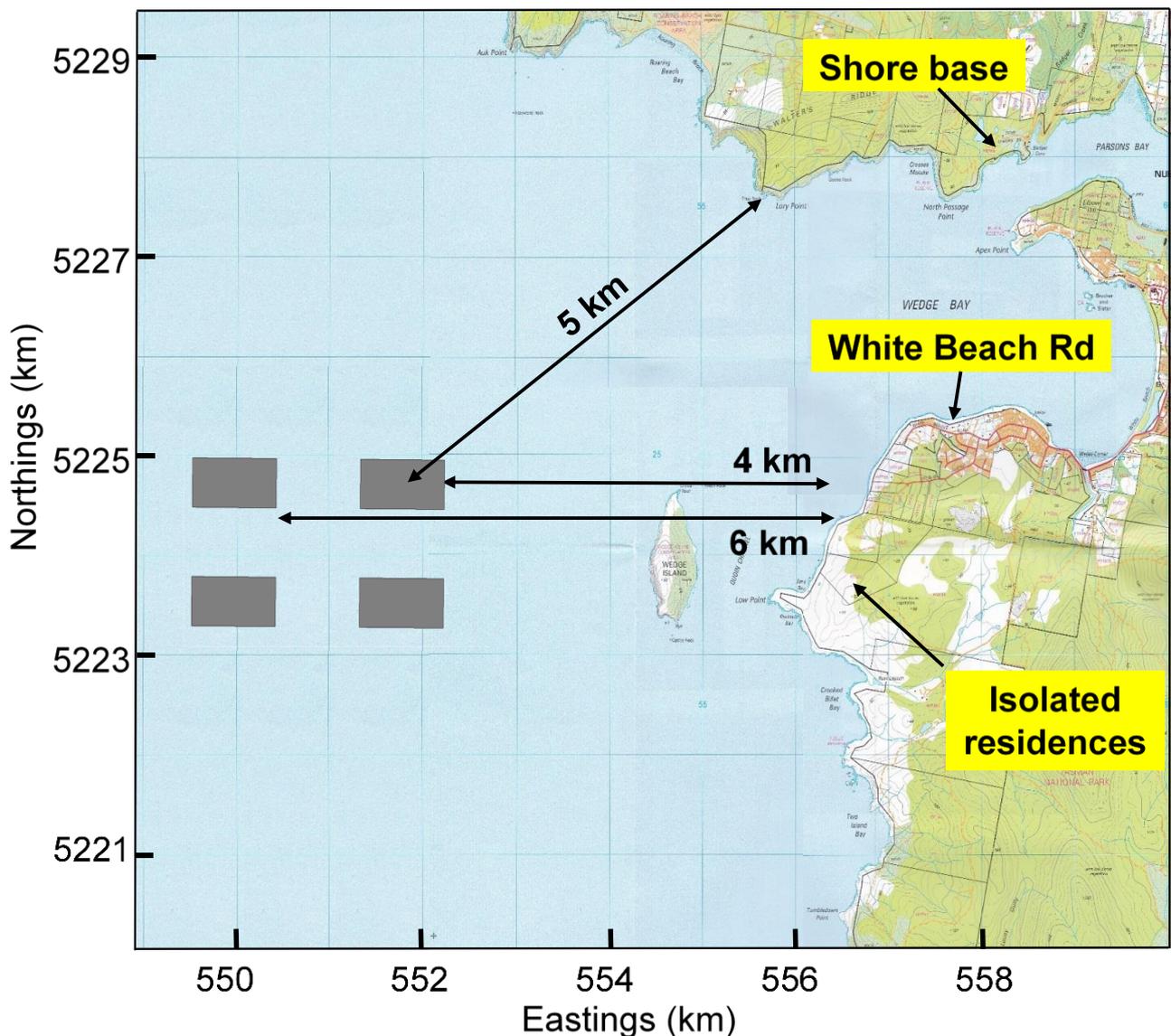


Figure 2.1 Map of the four proposed marine farming leases, west of Wedge Island.

Farming strategy. Tassal expects that only two leases will be operational most of the time, although there will be times when three leases will be needed. However this study conservatively assumes that all four leases will be operated simultaneously, since this is an absolute worst-case situation.

Distances to nearest residences. For the purpose of noise impact prediction, it is conservative to assume that the two western and two eastern leases are 4 km and 6 km from the nearest residences, as shown in Figure 2.1. These distances are measured to the east sides of the leases, although farming operations will all be within the lease areas. Also, there are only a few isolated residences on the coast due east of Wedge Island: they are all set back from the shoreline, and Wedge Island breaks their lines of sight to the leases, either partly or completely. The nearest cluster of residences are at the west end of White Beach Road, where a small new sub-division is planned. The nearest land to the north is Lory Point, about 5 km from the NE lease.

Background noise levels. The nearest residences to the proposed leases are exposed to open ocean coastal conditions, so background noise levels at these residences will not be characterised by the “deep quiet” conditions that occasionally occur in the sheltered waters of the D’Entrecasteaux Channel, where Tassal operates other marine farming leases.

## 2.2 Lease operations

This section lists the marine farming operations that produce noise emissions, and outlines associated noise mitigation measures.

### **Night-time noise: no pen lighting or venturation**

Night time noise emissions from a typical marine lease are due to one or more gen-sets operating to provide power for pen lighting systems, and due to compressors used for pen venturation. However, the fish pens in the four new leases will not require either pen lighting or venturation. The proposed leases will only be day-time (7 am to 6pm) noise sources, apart from a night-watch vessel making its rounds at slow speed, which will clearly cause no noise impact at the nearest residences, located several kilometres from the vessel.

### **Fish bathing**

Fish need to be regularly bathed in fresh water, to minimise amoebic gill disease. One fish bathing operation per day will take place on most week days during the summer months, and less frequently during the winter months. A bathing operation usually starts at 7 am, and finishes by 3 pm. One or two small barges are central to the operation. A compressor is used to pump fish from their normal pen into a pen containing freshwater held in a plastic liner, which is oxygenated to ensure survival of the fish. Once the fish have had sufficient time in the fresh water, the plastic liner is pulled out, allowing the pen to once again fill with sea water.

Noise mitigation. Selection of a quiet compressor. Using a custom-designed acoustic box to house the ventilation engine and pump, with special attention to reduce noise emissions from the ventilation and exhaust openings.

### **Net washing**

Nets need to be cleaned regularly to ensure they do not become fouled with algae and shellfish. A high-frequency low-output cleaning regime will be followed, which means net washing is expected to be a daily operation in suitable weather conditions, done by a remotely controlled Marine Inspector Cleaner (MIC), operated from a custom-built new vessel that will be similar to the vessel *Dynamic II* that operates on the Sheppard lease, a lease that is subject to strict noise level limits. The new vessel's noise specifications will enable it to operate at other leases that are much closer to residences than the proposed leases west of Wedge Island.

Noise mitigation. High performance and well installed acoustic insulation is needed to line the engine room, and any engine room ventilation ducts need to prevent noise breakout. The engines require good anti-vibration mounts, and it is important to select quiet on-deck pumps and cranes.

### **Feed Barges**

Each of the four new leases will be served by a dedicated feed barge that stores and distributes fish feed. The barges will be the same design as the *Evolution* barge that was commissioned a year ago, and stationed at the Creeses Mistake. The barge has two 300 kVA diesel gen-sets mounted inside the barge, which power the fish feeding systems. The barge's noise emissions are principally associated with the noise of the fish pellet blowers and pellets moving through the plastic pipes to the pens; and the gen set exhaust stacks, which are located side by side above the barge control room. The exhausts have backward directed discharges, so their noise emissions are highest aft of the barge.

Noise mitigation. The *Evolution* barge is quite quiet, but Tassal has experience of applying a range of noise mitigation measures to its older and noisier feed barges, including installed sound-absorbing tiles, acoustic shields around engine rooms, generators and compressors, acoustic insulation of ventilation ducts and feed pipes, and replacement of noisy equipment with quieter equipment.

### **Harvesting**

Tassal's harvest vessel, *Tassal 1*, is based at Dover. Harvesting at the leases west of Wedge Island will be carried out in December. A harvesting operation usually takes only a few hours between 7 am and 6 pm, although occasionally it may not be completed until a little later.

Noise mitigation. *Tassal 1* used to be a major source of noise emissions, but the Can-a-Vac vacuum system is now electric, and mufflers have been fitted to all the fish stunners. Harvesting is now a fairly quiet operation which is carried out at many other sites, some very close to residential dwellings.

### **Vessels**

The vessels serving the proposed lease will be based at the existing shore base in Badger Cove, west of Nubeena. It is expected that eight vessels will regularly operate on the new leases, although there will be occasional need for specialist vessels, for example if heavy lift capacity is needed for mooring management. Noise emissions from on-lease vessels are taken into account when assessing a fish farm's noise impact, but noise emissions from vessels outside the lease are not taken into account.

Noise mitigation. For vessels operating on a lease, respecting the speed limit for the lease is the best way to reduce vessel noise emissions, because noise emissions from a vessel operating at half power or two-thirds power are significantly less than noise emissions from a vessel operating at full power. Also, considering noise emission reduction when designing a new vessel is important, for example using good engine anti-vibration mounts, providing high performance and well applied engine room acoustic insulation, and ensuring use of exhaust mufflers.

### **Other work**

Towing pens of fresh water to fish farms in southern Tasmania has triggered some noise nuisance complaints from residents, because the elevated noise levels are exacerbated by the length of time it takes to tow a pen past a residence. However, Tassal expects to run a freshwater pipe from the shore out to the new marine zone, which will avoid the need to consider noise from pen tow operations.

Occasional other noise emissions from the fish farm include maintenance work using power tools, fish feed resupply, and wildlife management vessels that may use acoustic devices to deter seals. Such occasional noises will only happen during the day, and case-by-case noise mitigation measures can be applied if need be.

### 3.0 THE NATURE AND REGULATION OF NOISE

**Sound pressure levels.** Sound travels through air as pressure waves, such that at a given location the effect of a sound wave is to compress and then rarefy the air, compress and then rarefy the air, and so on. Noise is perceived by people as variations in sound pressure levels, and the phrase “noise level” really means “sound pressure level”, measured in Pascals (Pa).

The human ear can respond to a very wide range of sound pressure levels, so it is common to measure sound pressure using a logarithmic scale, in decibels (dB). A decibel is defined as the logarithm of a *ratio of a number to a reference number*,  $10 \log_{10}(\text{ratio})$ , and the reference number of the decibel scale for sound pressure is 20  $\mu\text{Pa}$ , which is the threshold of human hearing. For example, a noise level of 130 dB written in full is a sound pressure level of 130 dB re 20  $\mu\text{Pa}$ ; a noise level of 0 dB means a sound pressure level of 20  $\mu\text{Pa}$ ; and a negative noise level denotes a sound pressure level too low to be audible by humans.

**Sound power levels.** Noise emissions from a source are often defined in terms of its sound power level, measured in Watts (W). Sound power is a fundamental attribute of a noise source, and sound pressure levels can be calculated from the sound power level of a source by using an appropriate model. For example, an isotropic hemispheric spreading model assumes the sound emissions to be the same in all directions, and assumes the noise source is close to the ground. Sound power levels, like sound pressure levels, are often measured on a logarithmic scale, in decibels (dB). The reference number of the sound power level decibel scale is  $10^{-12}$  W, or 1 pW. In other words a sound power level of 0 dB is the same as a sound power level of 1 pW. And, written in full, a sound power level is, for example, 30 dB re 1 pW.

**A-Weighting.** Humans have difficulty hearing sound at very low, and very high, frequencies. Sound power and sound pressure levels are often weighted to reflect the response of the human ear to sound at various frequencies, and values thus weighted are denoted as dBA, rather than dB. Some authors use dB(A) instead of dBA. Unweighted noise levels are denoted dB linear, or dB flat.

**Noise parameters.** A number of parameters are commonly used to provide information on noise in the environment:

- The  $L_N$  sound pressure level, which is the sound pressure level equalled or exceeded for N% of the measurement period. For example,  $L_{10}$  is the sound pressure level equalled or exceeded for 10% of the measurement period.
- The equivalent sound pressure level ( $L_{eq}$ ), which is the constant sound pressure level that has the same energy as the time-varying sound pressure level measured over some period.

- The maximum and minimum sound pressure levels ( $L_{\max}$  and  $L_{\min}$ ), which are the absolute maximum and minimum sound pressure level measurements measured over some period.

**Frequency-specific information.** Sound waves occur over a wide range of frequencies, triggering the need for the A-weighted decibel scale described above. Frequency-specific noise measurements can be made using a sound level meter with a frequency analyser, to assess noise that contains certain intrusive characteristics, such as tonality or modulation. The noise measurements are usually made at one-third octave band frequencies, and narrow-band measurements can also be made in which noise levels are measured at small frequency intervals, often 1 Hz intervals, enabling spikes in the noise spectrum to be precisely identified.

Penalty adjustments up to a total of 10 dB are applied to measured noise levels if the noise contains one or more intrusive characteristics, following procedures set out in the State Government's *Noise Measurement Procedures Manual*, which in turn follows AS 1055: *Acoustics - Description and Measurement of Environmental Noise*. The *NSW Industrial Noise Policy (2000)* also sets out clear criteria for assessing intrusive noise and applying penalty adjustments (see Tables 4.1 and 4.2 of the policy).

**Expected noise level limits.** In recent years, the Marine Farming branch of DPIPW has worked in consultation with the EPA to determine appropriate noise permit conditions for marine farming leases. From the point of view of regulating noise emissions, there is little difference between a marine farming lease and any other industry in Tasmania, but the location of some leases in very quiet areas is unusual. However, the nearest residences to the proposed offshore leases are in fairly exposed coastal areas, so the local background noise levels are expected to be typical of ordinary rural areas, and the noise level limits that EPA usually specifies for new industries in a rural area are:

Day (7 am to 6 pm)	45 dBA
Evening (6 pm to 10 pm)	40 dBA
Night (10 pm to 7 am)	35 dBA

These noise level limits refer only to noise from the marine farming leases, not the total noise level. The total noise level consists of the noise due to lease operations plus the background noise.

As noted above, penalty adjustments may need to be applied to measured or predicted noise levels, to account for any intrusive noise characteristics.

## 4.0 NOISE LEVEL PREDICTIONS

### 4.1 Methodology

A methodology for measuring noise levels for marine farming operations has been developed by EPA, Marine Farming, and Tassal, as described in the following documents and the references therein:

1. *Management of Noise from Marine Farming Activities*, Report NLR 2011-02, Scientific and Technical Branch, EPA division, Department of Primary Industries, Parks, Water and Environment, Oct 2011.
2. *Sheppard Lease Noise Level Survey 2012/13*. Report to Tassal Operations Pty Ltd by Environmental Dynamics, Project ED5120, April 2013. [Provided to Marine Farming and to EPA].
3. *Sheppard Lease Noise Level Survey 2015/16*. Report to Tassal Operations Pty Ltd by Environmental Dynamics, Project ED5120, July 2016. [In preparation. It will be provided to Marine Farming and to EPA].

Key points are:

- There should be no noise from other sources that can influence the measurements.
- The wind should be less than 5 kts, and preferably dead calm.
- Noise measurements should be taken close enough to the operation that the noise level due to the operation is clearly audible above the background noise.
- Noise measurements should be taken far enough away from the operation that it behaves as a point noise source.
- Noise levels are usually best assessed by taking several 2-minute measurements at compass point locations around a source, so long as the measurements agree. Many farming operations do not last long enough to support the more usual series of 10 minute measurements.

This methodology was applied in 2012 to carry out a noise level compliance survey of Tassal's Sheppard lease, which has stringent noise level limits because it is located in the sheltered waters of the D'Entrecasteaux Channel. A new survey of the Sheppard lease was carried in late 2015 and early 2016, following significant changes to the structure and operation of the lease. The Sheppard lease noise level measurements are high quality, and include total noise levels, 1/3<sup>rd</sup> octave band noise levels, and narrow band noise levels.

For each marine operation, the standard practice followed by Tassal is to adjust the total noise level to a reference distance of 30 m, for an at-a-glance comparison of the operations. Sound power levels are also calculated, and provide an alternative at-a-glance comparison of the operations.

Compliance with noise level limits is assessed at the nearest residences. In the case of the Sheppard lease the residences are too far away (1.6 km) to allow assessment using noise level measurements made at the residences, so the compliance assessment strategy is to use a sound propagation model to predict noise levels at the residences, with input to the model being the 1/3<sup>rd</sup> octave band noise level measurements for each operation. Penalty adjustments are made if need be, and the total noise level due to multiple simultaneous marine lease operations is obtained by adding the individual noise levels.

The model accounts for noise attenuation with distance due to sound wave spreading, and attenuation due to absorption of sound energy by the atmosphere, which is least for an air temperature of about 10°C and a relative humidity of about 90%.

The Sheppard lease noise level measurements provide a good basis for predicting noise levels from the four proposed leases. The only additional noise level measurement that has been needed was for the feed barge, which is a different design to the feed barge serving the Sheppard lease. The feed barges that will be stationed on each of the four proposed leases will all be the same design as the *Evolution* barge that is stationed at the Creeses Mistake lease.

## 4.2 Individual operations and vessels

Figures 4.1 to 4.4 show the noise level predictions for each marine lease noise source, at a distance of 4 km, corresponding to the two eastern leases, and assuming all the noise sources are on the eastern boundaries of the leases. A second set of predictions was made at a distance of 6 km, corresponding to the two western leases, and again assuming all the noise sources are on the eastern boundaries of the leases. The plots are similar to Figures 4.1 to 4.4, and are not presented.

- In the case of the heavy lift operation, noise level measurements on the Sheppard lease have been made for the *Ambush* and *Bushranger* vessels when using their winches or deck cranes. There is little difference in the noise levels, which are mainly associated with the vessel's hydraulic power systems, and the highest noise level is presented (*Ambush* using its winch).
- Noise level measurements for 17 vessels have been made on the Sheppard lease. The noise levels given here are for *Tatsuta*, which is the noisiest vessel when operating at on-lease speeds.
- Each feed barge is associated with two noise sources. First, each barge has two internally mounted gen-sets, with exhaust stacks above the wheelhouse that are directed aft, although not directly aft (but aft is still worst case when both gen sets are operating). Second, each barge has six fish pellet blowers that use compressed air to pass pellets through plastic pipes to the pens. Fish pellet noise is loud near a blower, but is largely high frequency noise that is very effectively absorbed by the atmosphere at distances greater than a few hundred meters.

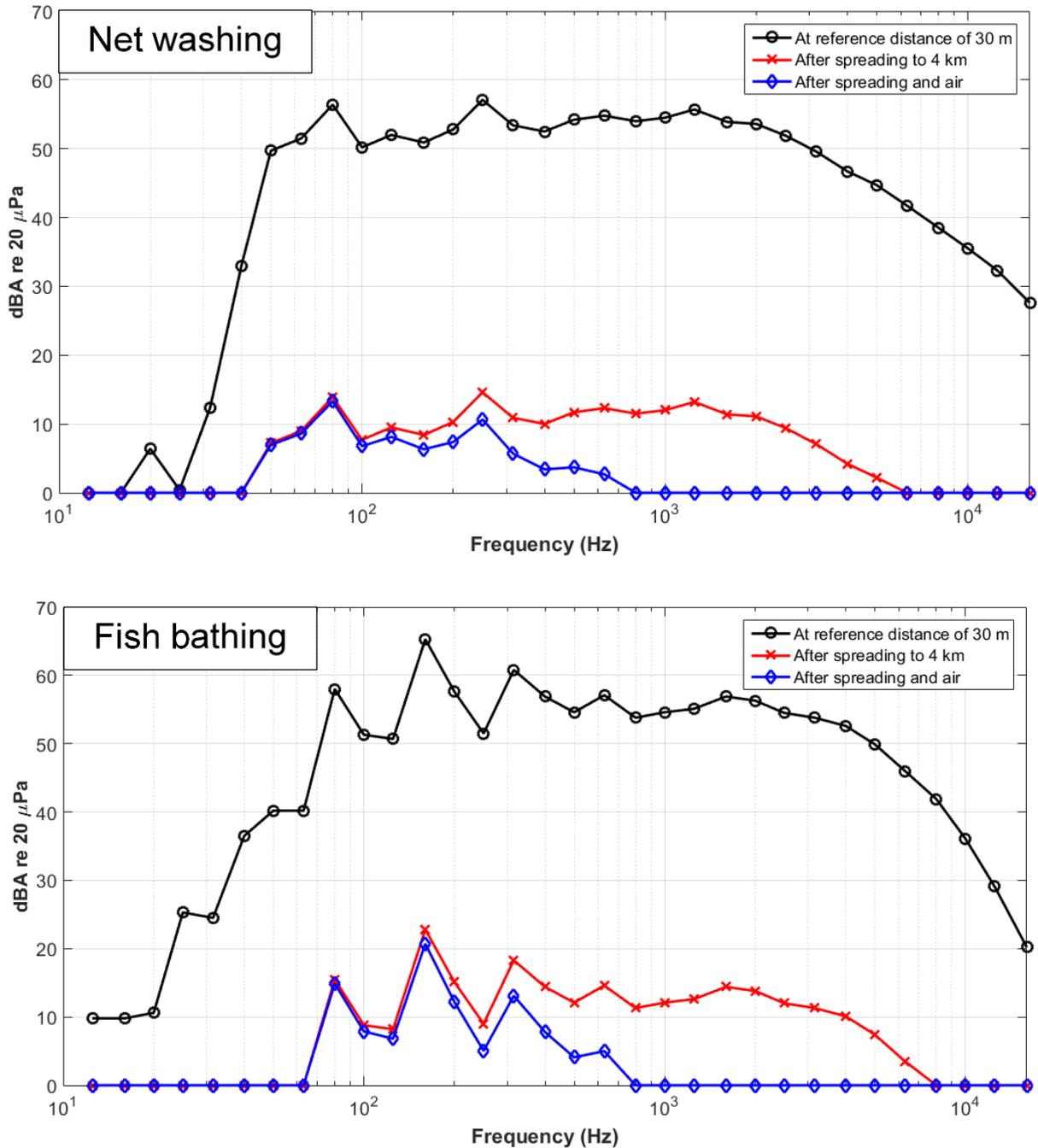
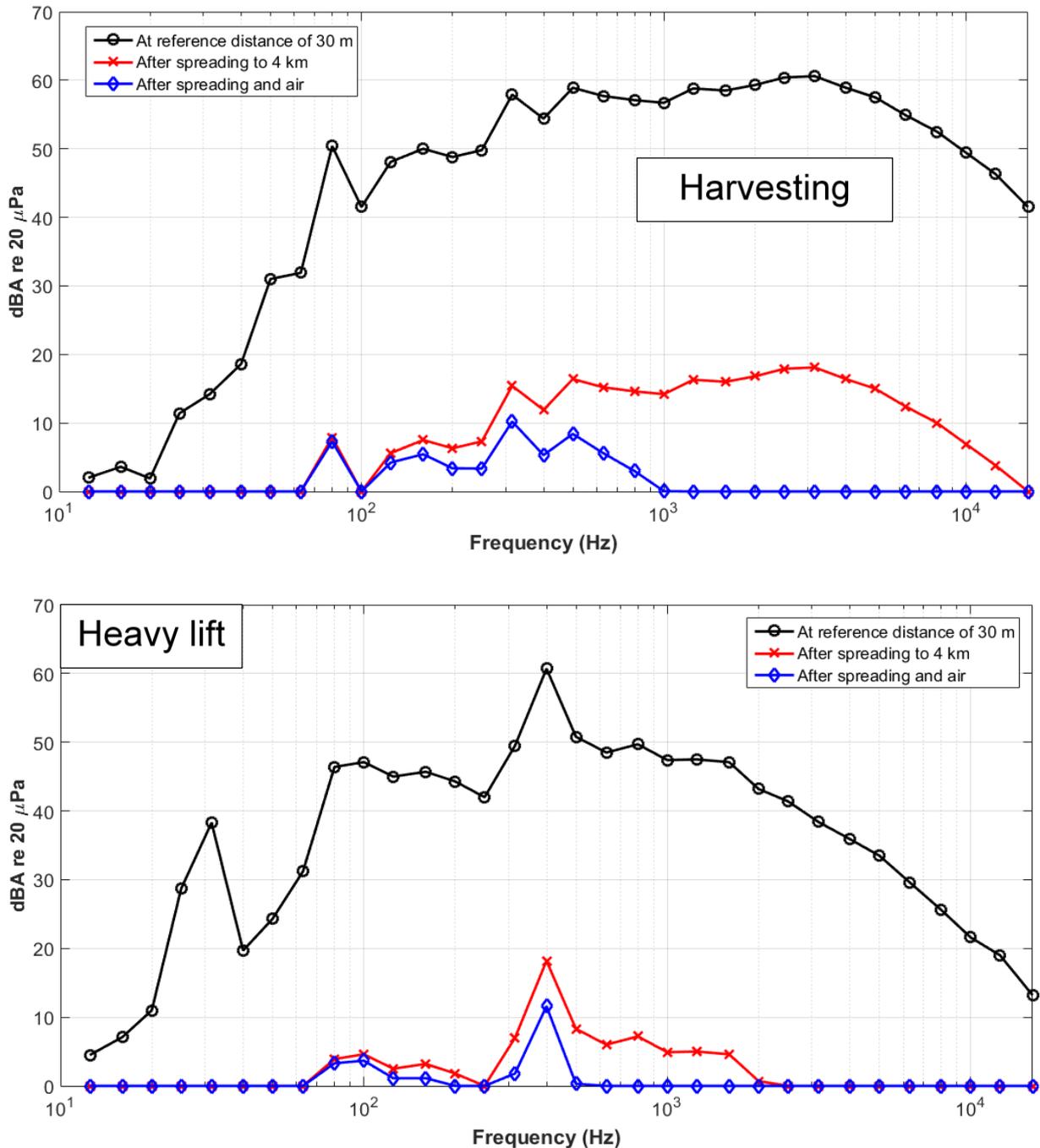


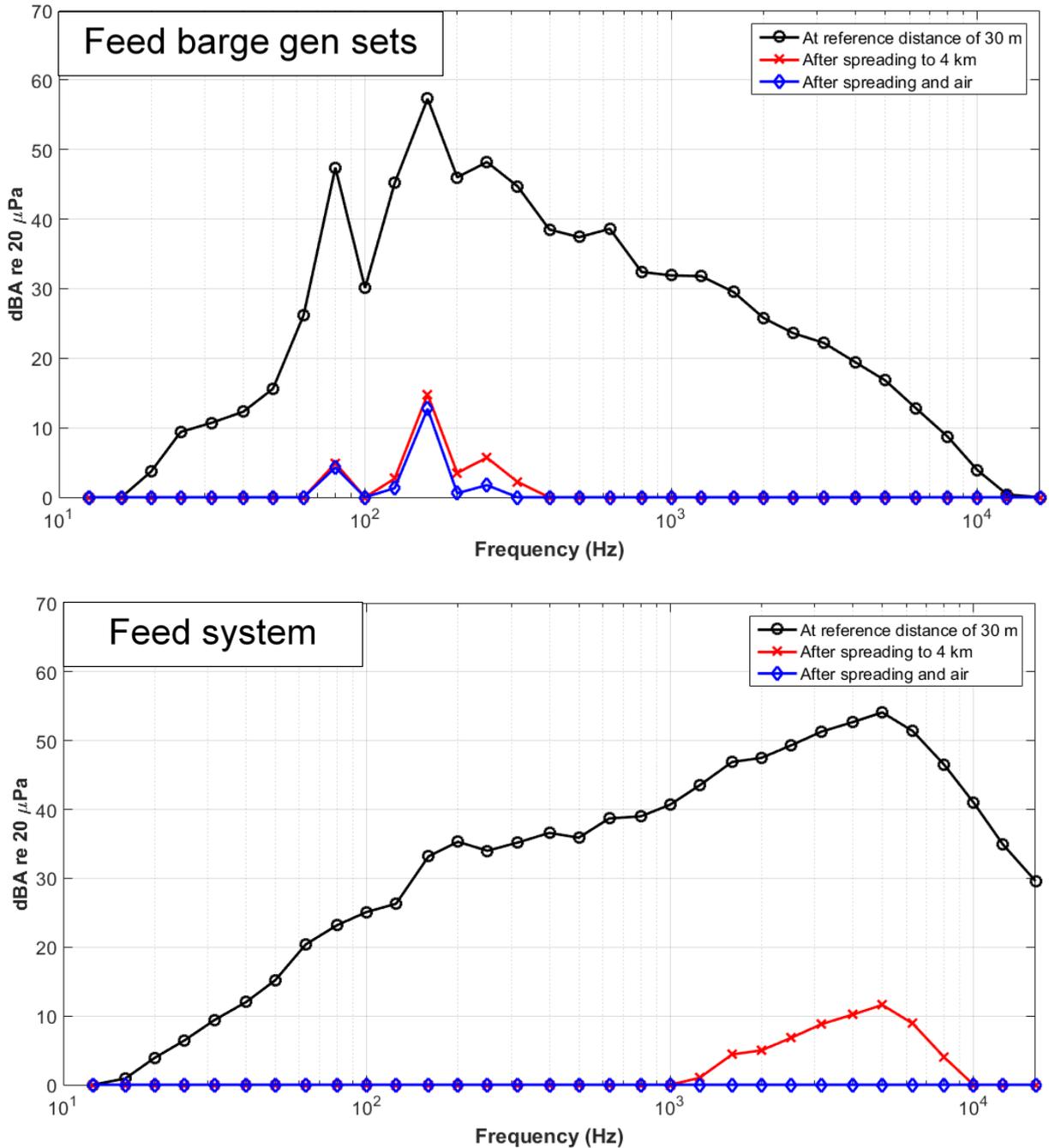
Figure 4.1 1/3<sup>rd</sup> octave band noise levels for net washing (top) and fish bathing (bottom).

- a) Top line. Measured noise levels adjusted to total noise levels of 66.5 dBA for net washing, and 70.1 dBA for fish bathing, at a 30 m reference distance.
- b) Middle line. Noise levels at 4 km due to hemispheric sound wave spreading with distance.
- c) Bottom line. Noise levels at 4 km due to spreading and air absorption at RH=90%, T<sub>air</sub> = 10°C. Total noise levels are 18.9 dBA for net washing, and 23.3 dBA for fish bathing.



**Figure 4.2 1/3<sup>rd</sup> octave band noise levels for harvesting (top) and heavy lift work (bottom).**

- a) Top line. Measured noise levels adjusted to total noise levels of 70.2 dBA for harvesting, and 63.0 dBA for heavy lift work, at a 30 m reference distance.
- b) Middle line. Noise levels at 4 km due to hemispheric sound wave spreading with distance.
- c) Bottom line. Noise levels at 4 km due to spreading and air absorption at RH=90%, T<sub>air</sub> = 10°C. Total noise levels are 16.5 dBA for harvesting, and 14.3 dBA for heavy lift work.



**Figure 4.3** 1/3<sup>rd</sup> octave band noise levels for a feed barge (top) and single fish feeder (bottom).

- a) Top line. Measured noise levels adjusted to total noise levels of 59.0 dBA for the feed barge with both gen sets operating, and 60.2 dBA for a single fish feeder, at a 30 m reference distance.
  - b) Middle line. Noise levels at 4 km due to hemispheric sound wave spreading with distance.
  - c) Bottom line. Noise levels at 4 km due to spreading and air absorption at RH=90%, T<sub>air</sub> = 10°C. Total noise levels are 14.2 dBA for the feed barge, and -2.5 dBA for a single fish feeder.
- N.B. A negative decibel simply means the noise is below the 20 μPa threshold of human hearing.

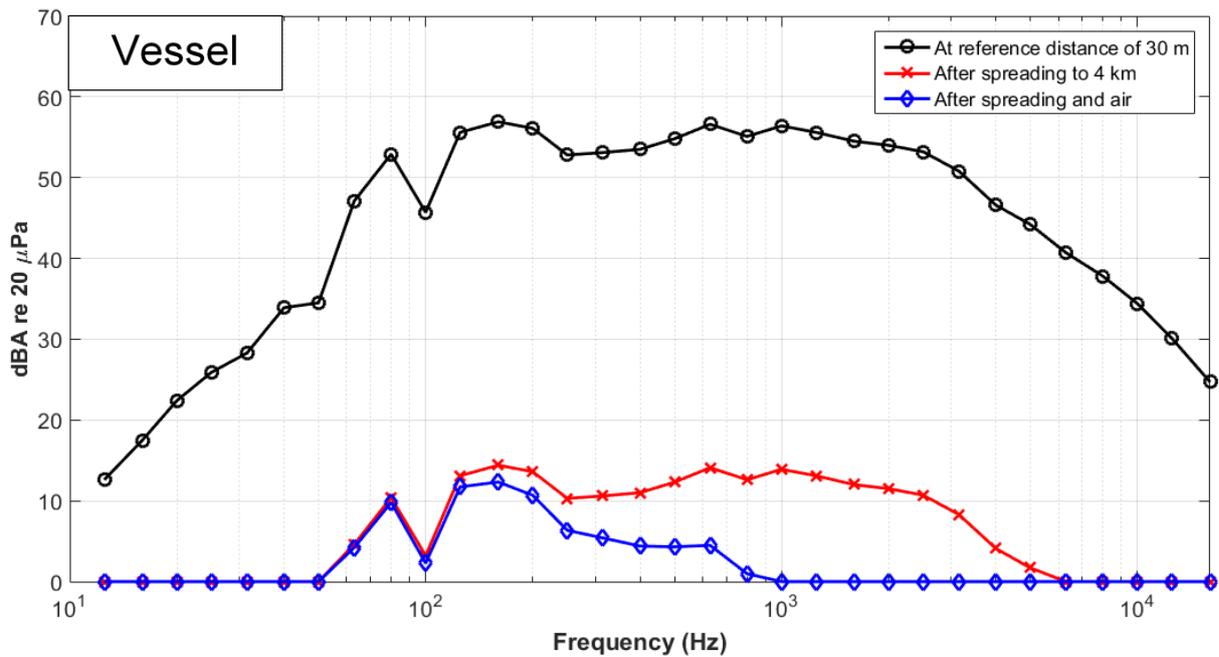


Figure 4.4 1/3<sup>rd</sup> octave band noise levels for a vessel (*Tatsuta*).

- a) Top line. Measured noise levels adjusted to total noise level of 67.0 dBA for a vessel (*Tatsuta*) at a 30 m reference distance.
- b) Middle line. Noise levels at 4 km due to hemispheric sound wave spreading with distance.
- c) Bottom line. Noise levels at 4 km due to spreading and air absorption at RH=90%, T<sub>air</sub> = 10°C. Total noise level is 18.8 dBA.

### 4.3 Night time noise impact

The only night time noise source will be the night watch vessel. There will only be one night watch vessel for all four leases, and its noise levels at the nearest residences are predicted to be 19 dBA when on the eastern leases, and 14 dBA when on the western leases. These noise levels are well under the expected night time noise level limit of 35 dBA.

These noise level predictions are the *Tatsuta*'s noise levels, and the night watch vessel will be a quieter vessel than the *Tatsuta*. Also, background noise levels at night are expected usually to be higher than 20 dBA, so the night watch vessel's noise should not be audible at the nearest residences.

### 4.4 Day time noise impact

Table 4.1 summarises the sound power (L<sub>w</sub>) and sound pressure (L<sub>eq</sub>) levels predicted for each lease operation at distances of 4 km and 6 km, which as noted are a little less than the actual distances to the nearest residences from the eastern edges of the eastern leases, and of the western leases, respectively.

Operation	L <sub>w</sub> dB re 1 pW	----- L <sub>eq</sub> noise levels (dBA re 20 µPa) -----		
		30 m	4 km	6 km
Feed barge gen sets	97	59.0	14.2	9.6
Single fish feeder	98	60.2	- 2.5	- 8.6
Fish bathing	108	70.1	23.3	18.6
Net washing	97	66.5	18.9	14.3
Harvesting	108	70.2	16.5	10.6
Heavy lift	101	63.0	14.3	8.5
Single vessel	105	67.0	18.8	14.0

**Table 4.1** Expected noise levels from noise sources on the proposed leases.

**L<sub>w</sub>** is the sound power level (dBA re 1 pW).

**L<sub>eq</sub>** is the sound pressure level (dBA re 20 µPa) at a reference distance of 30 m; and at 4 km and 6 km from the lease. The L<sub>eq</sub> predictions are for attenuation by sound wave spreading alone, plus sound energy absorption by 10°C air with a relative humidity of 90%, under which conditions sound energy absorption is least.

Overall day time noise level predictions for multiple on-lease operations can be obtained from Table 4.1 by adding the individual predictions, taking into account that up to six fish feeders can be working during a given feeding session, and up to eight vessels are expected to service the four leases. Worst case noise emission scenarios for the leases are given in Table 4.2.

Operation	4 km	6 km
Four feed barge gen sets	2 x 14.2	2 x 9.6
Six fish feeders on each barge	6 x -2.5	6 x -8.6
Fish bathing	23.3	18.6
Net washing	18.9	14.3
Harvesting	16.5	10.6
Heavy lift	14.3	8.5
Eight vessels on each lease	<u>8 x 18.8</u>	<u>8 x 14.0</u>
	<b>30.1</b>	<b>24.2</b>

**Table 4.2** Worst case noise levels (dBA) from the leases.

For all four leases operating at the same time, each carrying out all the marine operations listed in Table 4.2, the total day time noise level at the nearest residences is predicted to be:

$$2 \times 30.1 + 2 \times 24.2 = 34 \text{ dBA}$$

This absolute worst case prediction does not include a possible penalty adjustment for intrusive noise characteristics, but the maximum penalty adjustment is 10 dB, and  $34 + 10 = 44$  dB is still under the day time noise level limit of 45 dBA that EPA usually sets for a new industry in a rural area.

In review, the absolute worst case prediction is for the unrealistic scenario whereby four leases are all operating at the same time, when in fact Tassal expects only to operate two leases at a time, and occasionally three at a time. The scenario assumes each lease is served by eight vessels, whereas Tassal expect that eight vessels will be able to serve all the leases. And it assumes all possible marine operations are active at the same time, on each lease, which is never going to happen in practice.

### **Wedge Island**

For the above absolute worst-cased situation, the total day time noise level due to all four leases operating at the same time is predicted to be just under 40 dBA on the west side of Wedge Island. A target noise level of 50 dBA is usually considered to be acceptable when assessing noise impact on people engaged in recreational activities near an industrial facility [see Table 1 of the *Environment Protection Policy (Noise) 2009*].

## **4.5 Lease establishment noise**

It is not expected that lease establishment work will cause noise nuisance. The feed barge and fish pens will be readied off site, and towed to the lease. There will be no pile driving work. Establishing the moorings should not take long (perhaps a week or two), and noise from short-term construction work is recognised by both regulatory authorities and the community as different in nature to noise from facility operation, and requiring some tolerance.

In a regulatory context, the *Interim Construction Noise Guidelines* (NSW Department of Environment & Climate Change, 2009) are widely used, and are recognised both by the Environment Protection Authority, and by the Tasmanian Resource Management and Planning Appeals Tribunal.

## **5.0 CONCLUSIONS**

This report has presented worst-case noise level predictions at the nearest residences, on the coast east of Wedge Island, to the four leases in the proposed marine farming zone west of Wedge Island. The east sides of the two eastern and the two western leases are respectively just over 4 km and 6 km from the coast, and these distances have been assumed for this noise impact assessment, although the actual distances will be greater since marine operations will be inside the 45 ha leases.

A noise level measurement methodology for marine lease operations has been developed by Tassal, EPA, and Marine Farming, supported by a computer model to predict noise levels at residences located too far from a lease to allow compliance assessment using direct noise level measurements at the residences. The methodology has been applied to Tassal's Sheppard lease in the D'Entrecasteaux Channel, and the resulting high quality noise level data set has provided a basis for the noise level predictions made by this study.

The most stringent noise levels that are usually applied by EPA to new industries located in a rural area are {Day = 7am to 6pm Evening = 6pm to 10pm Night = 10pm to 7am} = {45 40 35} dBA. These are appropriate noise levels in that the nearest residences to the proposed leases are located in an exposed coastal area facing the open ocean, and the background noise levels are not expected to be characterised by the occasionally very low background noise levels that occur in the areas near leases in sheltered waters such as the northern D'Entrecasteaux Channel.

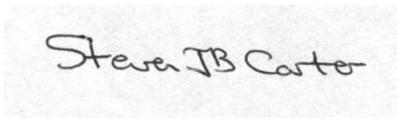
Tassal expects that only two leases will be operational most of the time, although there will be times when three leases will be needed. However this study conservatively assumes that all four leases will be operated simultaneously, since this is an obvious worst-case situation.

The only night time noise emissions from the lease will be due to a fairly small, and slow moving, night watch vessel, which will produce noise levels less than 20 dBA at the nearest residences, well under the expected 35 dBA night time noise level limit.

For day time noise, this study has predicted a total noise level of 34 dBA at the nearest residences for an unrealistic absolute worst case situation, with all four leases operating at the same time, and each lease carrying out every possible noise-producing operation: all four feed barges feeding from all their blowers (six per barge), eight vessels working on each lease, net washing and fish bathing operations being carried out on each lease, and a heavy lift vessel working on each lease. The resulting total noise level at the nearest residences is 34 dBA, well under the expected 45 dBA day time noise level limit. The maximum penalty adjustment for intrusive noise is 10 dB, so compliance with the day time noise level limit is assured.

The same absolute worst case situation is predicted to produce a total noise level of about 40 dBA on the west side of Wedge Island, which is a conservation area and not inhabited. This is 10 dB less than the target noise level of 50 dBA that is usually considered to be acceptable when assessing noise impact on people engaged in recreational activities near an industrial facility.

In summary, this study has confirmed the a priori expectation that the four proposed offshore leases will produce noise levels at the nearest residences that are well under the expected noise level limits. This assumes that Tassal applies the same noise mitigation measures to marine operations on the proposed leases as it does to leases located in more sheltered areas, which will of course have on-lease OH&S benefits.



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