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Waste Management New Zealand (WMNZ) has requested that Marshall Day Acoustics (MDA) provide additional noise level data and commentary in response to preliminary questions from Auckland Council (AC) regarding the Auckland Regional Landfill project.

The specific questions from AC relate to:

- Assessment of ARL operations with respect to background noise levels (L_{A90}), and
- Assessment of the effects of construction and operational noise on wetland bird species within the WMNZ landholdings and the recommendation of suitable mitigation measures where appropriate.

Each of these is dealt with in turn, below.

Assessment against the measured background noise level

The predicted noise levels at most of the receivers range from 25 to 43 dB L_{Aeq} . The measured *background* noise level at the measurement positions range from 25 – 45 dB L_{A90} , with daytime background noise levels typically 35-45 dB L_{A90} .

The predicted levels at these receivers are therefore similar to the existing background noise environment. Although the landfill activity would be audible on occasion at some receivers, the overall noise emissions from the activity areas would generally be similar to the existing background noise level at all receivers.

Overall, as stated in our assessment report, MDA conclude that activity at the proposed landfill activity areas would be acceptable and permitted with respect to noise.

Noise effects on wetland birds.

The request for further information from Auckland Council specifically refers to Australian Bitterns that may use the wetlands in proximity to the ARL. Our response below refers to this species, however the noise levels we predict could be used with reference to other species.

The AC request for further information references the Environment Court case *Pierau v Auckland Council - ENV-2016-AKL-000174* and the decision pertaining to that case. We have reviewed the relevant sections and set out some further concerns in our discussion at the end of this document. In our opinion this makes it difficult to utilise the data from the Pierau case.

Nevertheless, we have predicted noise levels at several key locations as requested by the T&T ecologist and as shown in the attached plan. The predicted noise levels are for the same 6 scenarios that are contained in the MDA report. The purpose of these predictions is to compare these to the existing noise environment in the vicinity of the wetlands to see how the acoustical environment may be impacted by ARL operations.

In the Pierau case there was discussion about the frequencies of interest for this species, being in the 100 – 200 Hz range. Our predictions have been undertaken in the frequency range of interest at 125Hz, as well as for the overall L_{Aeq} noise level.

The overall predicted L_{Aeq} noise level was in all cases higher than the 125 Hz L_{eq} noise level. The results at 125 Hz ranged from 20-40 dB L_{eq} for the receivers, but only the worst case predicted 125 Hz L_{eq} noise level (and corresponding L_{Aeq} value) is presented at each receiver in the table below:

The summary results are presented below:

Table 1: Predicted noise level – wetland receivers

Receiver Location	Predicted Noise Level (dB)		Relevant Scenario
	Overall L_{Aeq}	125 Hz L_{eq}	
EA1	41	30	Scenario 1, 2
EA2	38	28	Scenario 1, 2
EA3	41	31	Scenario 1, 2
EA4	48	37	Scenario 1, 2
EA5	43	32	Scenario 1, 2
EA6	44	33	Scenario 2
EA7	41	32	Scenario 2, 3,4,6
EA8	52	38	Scenario 1, 2, 3, 4
EA9	53	40	Scenario 1, 2, 3, 4

For comparison we have also analysed the 125 Hz L_{eq} measured noise levels, the results are as follows:

Maximum: 65 dB at 125 Hz L_{eq}

Minimum: < 20 dB at 125 Hz L_{eq}

Average: 36 dB at 125 Hz L_{eq}

The existing ambient environment also shows significant diurnal variation, and that the measured noise levels are typically higher during the day, and lowest at night. At dawn and dusk the noise levels are 30 -35 dB at 125 HZ L_{eq}

This shows that for most receivers the measured 125 Hz L_{eq} noise level is at times similar or less than what is predicted would occur. For receivers EA8 and EA9, the predicted noise level is just higher.

It is unclear what times of the day is of concern with respect to the bittern, and we can do further analysis if required.

Discussion

With respect to the Pierau case, we note that we are not experts in the ecological impact of noise on this species, but that there are some technical acoustical concerns we can comment on regarding the case.

In our opinion the discussion between the noise experts on the noise limits required to protect the Australian Bittern is not particularly useful.

We note the following;

The only thing that is helpful out of the discussion is that the predominant frequencies of the boom is 100Hz to 200Hz. This is helpful for our analysis above because the predicted noise levels in this frequency range from the proposed operation are found to be similar to or in some cases less than the ambient noise level at these frequencies.

This shows that there is unlikely to be a change to the 'acoustic mating environment'.

Our primary concern relates to the use of the 40dB data as contained in the discussions. The 40dB sonogram used as the basis for setting their 40 dB limit, was from a Eurasian bittern, not an Australasian bittern [para 150]. It is not clear that they are similar in their mating calls and to what extent they may differ. Therefore, it is not conclusive that they are similar and should be treated in the same way.

Notwithstanding this, the most significant issue is that no distance is quoted for the measured level of 40dB from the Eurasian bittern [confirmed in para 150]. It is the nature of sound propagation that sound decreases with distance. This 40 dB level could have been measured at 1,000m or 1m thus the 40dB level becomes meaningless.

Typical separation distances for potentially mating birds are also not provided either. This raises the concern as to how far away from each other do birds need to be to 'communicate' i.e that the boom becomes audible for the mating pair.

In our opinion it is uncertain as to at what noise level the bittern would suffer significant effects in terms of noise, and therefore very difficult to set appropriate noise limits for landfill operations that must not be exceeded.