

Appendix V Noise and Vibration Memo

Memorandum

Subject: ARL Project - Summary of Acoustic Assessment Memorandum

Reference No: Mm 001

Author: Micky Yang

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1 Introduction

Marshall Day Acoustics (MDA) has been engaged by WM New Zealand (WMNZ) to provide a technical memorandum for the proposed new solid waste management and disposal facility in the Wayby Valley, north of Auckland ('**ARL**' or '**Project**').

The Project will involve constructing, operating, closing and providing aftercare for a new 24 Mm³ landfill facility and associated infrastructure at Wayby Valley, Wellsford. Ngāti Manuhiri are Project partners and will work with WMNZ on the proposed management and mitigation measures. Once landfilling ceases, the land will be returned to Ngāti Manuhiri as tāngata whenua.

The new landfill will be a Class 1 landfill, as defined in the Technical Guidelines for Disposal to Land (WasteMINZ Technical Guidelines)¹, accepting municipal solid waste. This includes residential and commercial waste, construction and demolition waste, some industrial wastes that meet acceptance criteria, and contaminated soils. Following waste settlement, the landfill cap surface will have a maximum height of 205 m RL.

WMNZ landholdings in the Wayby Valley area comprise a total area of 1020 ha, with the landfill footprint being approximately 60 ha. The WMNZ landholdings have been divided into five general areas; the Eastern Block, the Western Block, the Southern Block, the Waiwhiu Tributary Block and the Waiteraire Tributary Block. The proposed works will involve the following:

- **Site access and operation:** Construction of site access roads, weighbridges, and a vehicle wheel wash.
- **Landfill development:** Major earthworks and the installation of environmental management systems, including a landfill lining system and collection networks for leachate, stormwater, and landfill gas (LFG).
- **Leachate and landfill gas management:** A dedicated leachate management system and a LFG treatment facility, including a LFG flare and a LFG waste-to-energy plant.
- **Support infrastructure:** Facilities for site staff, plant maintenance, and water supply.
- **Terrestrial, freshwater and wetland biodiversity measures:** This includes native revegetation, and a weed and animal pest management programme to offset or compensate for residual adverse effects on terrestrial, freshwater and wetland ecology.

This memorandum provides an outline of the initial findings substantive acoustic report² and has been prepared for inclusion in an application for Ministerial referral of the Project under the Fast-track Approvals Act 2024 ('**FTAA**'). Specifically, this memorandum responds to the requirements

¹ Technical Guidelines for Disposal to Land, WasteMINZ, September 2023, Revision 3.1.

² Marshall Day report Rp 001 20180331 dated 9 May 2019

under section 3.4 of the Fast-track Approvals Referral Application Form and section 13(4)(h) of the FTAA. A full description of the draft proposal is included in the accompanying information attached to the application form for the referral.

2 Summary of findings

This memo contains the following information:

- A description of the assessment methodology, which used a field study and computer-based modelling.
- A description of the Project site as it is relevant to noise considerations:
 - The site is rural in nature and surrounded by rural residential buildings that are more than 360m away from the site boundary.
 - The existing ambient acoustic environment is typical and expected of a rural area. Noise levels vary from an average of 45 dB L_{Aeq} during the daytime to 40 dB L_{Aeq} at night-time.
- A description of the potential construction acoustic effects:
 - Construction noise is expected to comply with the daytime noise limits at all times, at all receivers.
 - A Construction Noise and Vibration Management Plan (CNVMP)³ is to be implemented to restrict construction hours if there is any work along Crowther Road to ensure compliance.
- A description of the potential operational acoustic effects:
 - Operational noise would readily comply with the recommended daytime noise limit of 55 dB L_{Aeq} . Operational noise would be at, or below, the existing ambient noise environment and we consider the noise effects to be generally negligible during the daytime.
 - Operational noise would readily comply with the night-time noise limit of 45 dB L_{Aeq} . It would generally be similar to or below the existing noise environment and we consider the noise effects to be acceptable.
 - Operational noise would unlikely make a material difference to how Australian Bitterns would behave in wetland areas.
- The overall conclusion is that we consider the noise effects, as a result of the project, would be reasonable.

³ Marshall Day report Rp 002 r02 dated 24 September 2020

3 Assessment methodology

The methodology to inform the assessment to date has been carried out using a field study, and computer-based noise modelling.

The following desktop-based tasks have been undertaken to inform the assessment:

- An early site inspection and review of aerial maps to determine nearby potentially affected receivers.⁴
- A review of the site zoning to determine the applicable noise performance standards.

Fieldwork to inform the assessment undertaken to date has included:

- A site visit in August 2018 to deploy (then retrieve) two noise loggers, that were left unattended for one week, to continuously measure the existing ambient noise environment at the time. Figure 1 shows the measurement positions below.

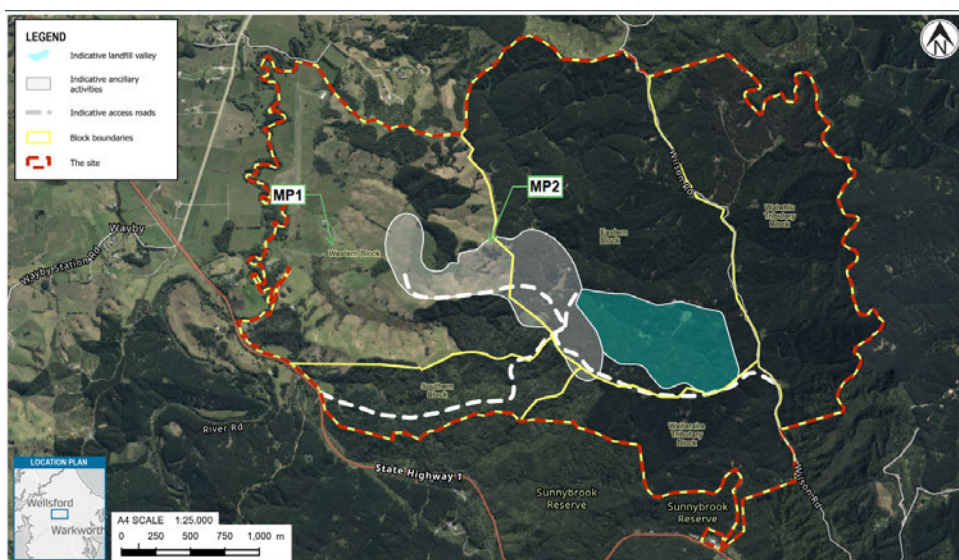


Figure 1: Measurement positions

Modelling that has been undertaken to inform the assessment has included:

- Preparing a 3D noise model, in SoundPLAN, to predict operational noise. The model assumes a universal "down-wind" situation, where all receivers are located downwind from all potential noise sources. Further, the model is conservative and assumes all equipment operates continuously and simultaneously. Key equipment included excavators, bulldozers, trucks, generators, gas blowers and flares.
- Modelling six different scenarios, for six different stages of the Project:
 - Scenario 1 – Low-level fill with western stock piles in use
 - Scenario 2 - Mid-level fill with western stockpile in use
 - Scenario 3 – Mid level fill with eastern stockpile in use
 - Scenario 4 – Final cap with western stockpile in use
 - Scenario 5 – Common night-time scenario
 - Scenario 6 – Worst-case night-time scenario
- Predicting construction noise using a simpler 2D approach.

⁴ Appendix B in our substantive acoustic report

4 Site and Project context

A general description of the site and surrounding locality is included in the accompanying information as part of the referral application. The following elements of the site and Project are key to the acoustic assessment:

- The local area is rural in nature, with all dwellings located more than 360m from the site boundary, predominantly to the west and the south. The site is currently used for forestry and farming, and is close to the nearby State Highway 1 ("SH1").
- It is zoned *Rural Production Zone* in the Auckland Unitary Plan (AUP).
- There are 16 receivers near to the site⁵. Their locations are shown below (**Error! Reference source not found.**) with a blue circle.
- The ambient noise environment is typical and representative of a rural environment. The day-to-day variation in noise level is due to a combination of local anthropogenic noise sources and natural sounds, including from the nearby forestry block. During the early morning period prior to 6am, the ambient noise levels are generally relatively low, around 30 dB L_{Aeq} , and rise after 6am to an average of around 45-46 dB L_{Aeq} . Night-time noise levels are generally low with typical noise levels around 30 dB L_{Aeq} .
- The area is also home to Australian Bitterns who may be present in the wetlands close to the site⁶.

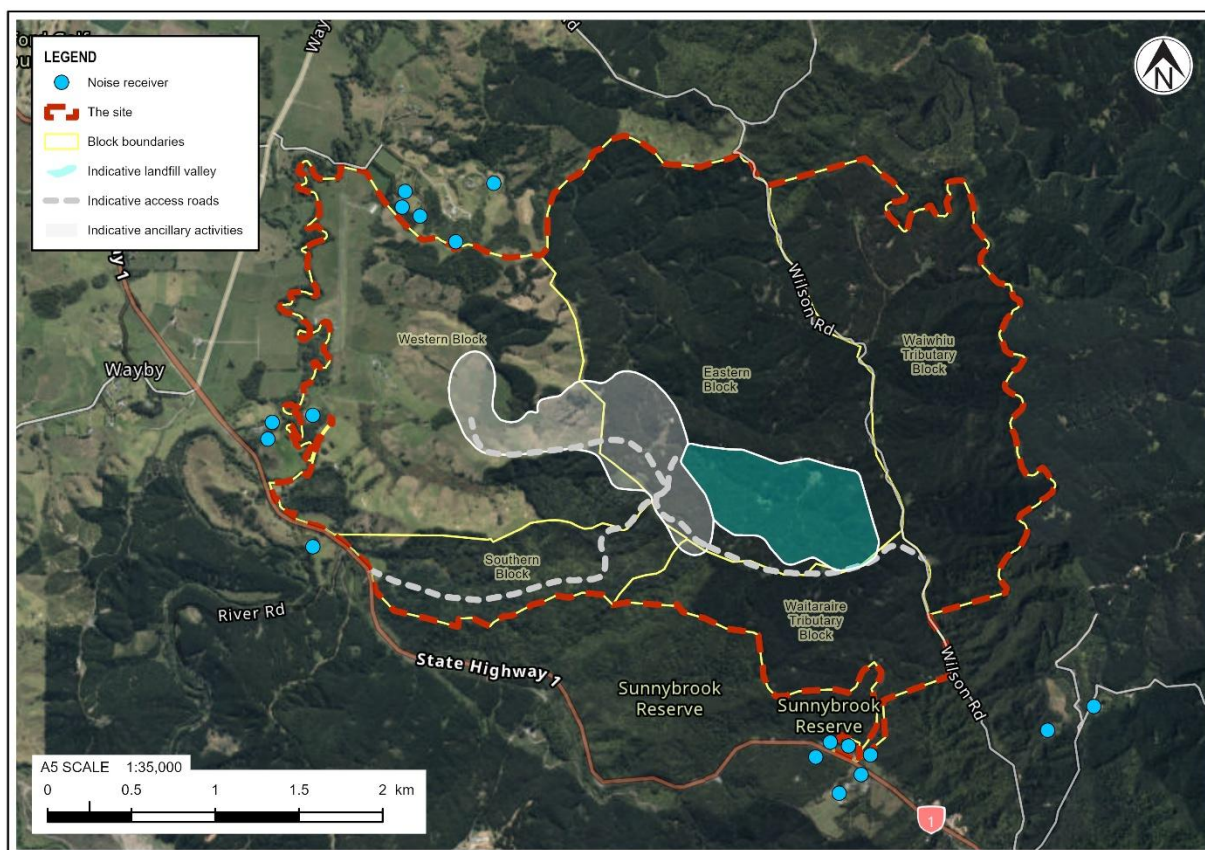


Figure 2: Receiver locations relative to the site

⁵ Section 2.3 of our substantive acoustic report

⁶ Paragraph 4.3 of Stephen Peakall's Evidence v11 dated 8 October 2020

5 Assessment of potential noise and vibration effects

Based on the proposal and the information available, an assessment of potential noise effects has been undertaken and summarised below.

- Construction:
 - Criteria:
 - The AUP construction noise limits for long term construction are appropriate for general work and blasting. The key noise limits are 70 dB L_{Aeq} and 85 dB L_{AFmax} for general construction, and 120 dB L_{Zpeak} for blasting.
 - The AUP vibration limits, which references DIN 4150-3, apply for blasting. The key vibration limit is 5 mm/s PPV.
 - Assessment:
 - Blasting can readily comply with 120 dB L_{Zpeak} .
 - Blasting can readily comply with 5mm/s PPV.
 - A CNVMP is proposed as a condition of consent. The CNVMP will include a restriction on construction times if working on or using Crowther Road as vehicle access.
 - With a CNVMP and management measures in place, it is expected that construction noise can comply at all times at all receivers.
- Operational:
 - Criteria:
 - The applicable and appropriate noise performance standards are the AUP zoning's noise limits of 55 dB L_{Aeq} daytime and 45 dB L_{Aeq} and 75 dB L_{AFmax} night-time. These limits apply at the notional boundary of any dwelling.
 - Conditions will be imposed to comply with the applicable noise performance standards.
 - Assessment:
 - The highest predicted daytime noise level is 43 dB L_{Aeq} at the notional boundary.
 - The daytime noise levels readily comply with the AUP noise limit of 55 dB L_{Aeq} .
 - This noise level is at or below the existing ambient noise environment (average of around 45 dB L_{Aeq}).
 - While the landfill activity may be audible from time to time, the noise effects are considered to be generally negligible during the daytime.
 - The highest predicted night-time noise level is 42 dB L_{Aeq} for a worst-case scenario and 33 dB L_{Aeq} for a common night-time scenario, at the notional boundary.
 - For nine receivers, the typical worst-case noise level is 30 – 35 dB L_{Aeq} but is 25 – 30 dB L_{Aeq} for the common night-time scenario.
 - This complies with the AUP zoning's noise limits of 45 dB L_{Aeq} .
 - While the predicted night noise levels may be above the ambient noise environment (average of 40 dB L_{Aeq}), the predicted noise levels are reasonable in the context of the receiving environment. Noise levels inside houses would be below 30 dB L_{Aeq} and 50 L_{AFmax} and therefore not cause sleep disturbance
 - Overall, although the landfill activity may be perceivable at times, it would be similar to what could reasonably be expected of the current zoning
 - Recommended operational management practices⁷:

⁷ Paragraphs 4.48 to 4.52 of Stephen Peakall's Draft Evidence v11 dated 8 October 2020

- The following management practices are proposed in the conditions of consent:
 - No tonal reversing alarms to be used on site equipment;
 - Mufflers should be fitted to all vehicles where practicable; and
 - Customer trucks will not be allowed to access the landfill valley outside of daylight hours.
- Further mitigation measures will be investigated (subject to feasibility):
 - Designing and using stockpiles so they act as noise screens;
 - Investigating localised screening of noise sources ; and
 - Limiting mulching of cleared vegetation, servicing of heavy machinery, crushing of site sourced rock, use of Crowther Road; and
 - Any potential rock blasting to be limited to daylight hours.
- Note, the above is not required for compliance but is further measures to ensure noise levels are reasonable.
- Australian Bitterns
 - The existing ambient environment has significant variation, and the noise levels are typically higher during the day, and lowest at night.
 - The measured noise level is at times similar or less than the predicted landfill operations' noise levels. For two locations, the predicted noise level is only slightly higher.
 - This shows that there is unlikely to be a change to the "acoustic mating environment".
 - In other words, if Bitterns are present at the site, the noise from the Project would be similar to what the Bitterns are currently exposed to, and would unlikely make a material difference in how they behave.

6 Conclusions

The key conclusions are:

- Construction noise and vibration is predicted comply with the AUP construction noise limits with a CNVMP in place – this will be captured in the proposed conditions of consent.
- Operational noise is predicted to comply at all receivers at all times. Conditions of consent are proposed to minimise noise effects.
- Operational noise would be at, or similar, to the existing ambient noise environment. It may be perceivable at times but and the type of noise could be reasonably expected of this zoning.

7 Applicability

This technical memorandum produced by Marshall Day Acoustics Limited is based on a specific scope, conditions, and limitations, as agreed between Marshall Day Acoustics and the WMNZ. This memo prepared by Marshall Day Acoustics may not be suitable for uses other than the specific project. No parties other than the WMNZ, or a Hearing Panel acting under the FTAA (2024) addressing the matter that is the subject of this technical memorandum, should use this memorandum or any information contained within it without first conferring with Marshall Day Acoustics.

The advice given herein is for acoustic purposes only. Relevant authorities and experts should be consulted with regard to compliance with regulations or requirements governing areas other than acoustics.

We understand and agree that WMNZ will submit this technical memorandum to the Environmental Protection Authority in support of a referral application under the Fast-track Approvals Act 2024 for the works described herein, and that the Environmental Protection Authority will rely on this technical memorandum for the purpose of assessing that application.

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Appendix A Glossary of Terminology

A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
dB	<u>Decibel</u> The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r = 20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
$L_{A10}(t)$	The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
$L_{A90}(t)$	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
$L_{Aeq}(t)$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 <i>"Acoustics – Measurement of environmental sound"</i>
NZS 6802:2008	New Zealand Standard NZS 6802:2008 <i>"Acoustics – Environmental Noise"</i>
Octave Band	A range of frequencies where the highest frequency included is twice the lowest frequency. Octave bands are referred to by their logarithmic centre frequencies, these being 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz for the noticable range of sound.
SPL or L_p	<u>Sound Pressure Level</u> A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing ($20 \mu\text{Pa}$ RMS) and expressed in decibels.
SWL or L_w	<u>Sound Power Level</u> A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.