Acoustic Assessment of Effects

Ararimu Cleanfill Operations

SAL Land Limited

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Prepared by:

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Basis of Report

This report has been prepared by SLR Consulting NZ (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with SAL Land Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Acronyms and Abbreviations

dB	Decibel
dBA	'A' weighted decibel.
Hz	Hertz
LAeq	The 'A' weighted equivalent noise level. It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
Lp or SPL	Sound Pressure Level.
Lw or SWL	Sound Power Level.
Time weighting	Sound level meters can be set to 'fast' or 'slow' response. 'Fast' corresponds to a 125 ms time constant and 'slow' corresponds to a 1 second time constant.
Ambient noise level	The all-encompassing sound associated with an environment or area.
ISO 9613-2	International Standards Organisation ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation".
NZS 6801	New Zealand Standard NZS 6801:2008 "Acoustics – Measurement of Environmental Sound".
NZS 6802	New Zealand Standard NZS 6802:2008 "Acoustics – Environmental Noise".
NZS 6803	New Zealand Standard NZS 6802:2008 "Acoustics – Construction Noise".
DIN4150-3	German Industrial Standard DIN 4150-3:1999 "Structural vibration – Part 3 Effects of vibration on structures".
SAC	Special Audible Characteristics
Tonality	Noise containing a prominent frequency.

1.0 Introduction

SAL Land Limited (the **Applicant**) has engaged SLR Consulting NZ Ltd (**SLR**) to assess acoustic effects associated with the establishment and operation of a managed fill facility at 1618 Ararimu Road in Hunua, Auckland.

This assessment evaluates the construction noise and vibration, and operational noise sources against the relevant rules of the Auckland Unitary Plan (the **AUP**). Where required, control measures to achieve compliance have been recommended.

2.0 Site and Project Description

The subject site is located approximately 12 km east from Bombay and approximately 9 km south from Hunua. The site and surrounding properties are situated on *Rural – Rural Production* zoned land as defined in the AUP. The surrounding land is noted to be primarily used for grazing land with pockets of small plantations. The area is scattered with residential dwellings, the nearest surrounding dwellings to the site are listed in **Table 1**. The subject site and the nearest receivers are shown on **Figure 1**.

The subject site is elongated in a north-south direction, widening towards the south. The applicant has leased a portion of Lot 1 DP166299, Lot 8 DP 369781, in addition to the main site (Lot 2 DP77813), in order to facilitate the proposed operations. Access to the subject site will be from Ararimu Road, via an existing gravel driveway along the property boundary with 1616 Ararimu Road.

Figure 1 Site location and identified surrounding receivers

Table 1 Summarised list of identified receivers

Fig. 3 ref.	Address	Comment
R1	1616 Ararimu Road	Single storey dwelling
R2	1587 Ararimu Road	Single storey dwelling
R3	1646A Ararimu Road	Single storey dwelling
R4	1628A Ararimu Road	Single storey dwelling
R5	1628B Ararimu Road	Double storey dwelling

Other receivers not noted in the **Table 1** are located further from the site and therefore the noise levels and effects at these receivers are expected to be the same or lower.

It is envisaged that the site would be operational six days a week, 7:00 am to 7:00 pm Monday to Friday during the summer season, 7:00 am to 5:00 pm during the winter season and between 7:00 am to 12:00 pm (midday) on Saturdays.

The site would be filled in stages. It is estimated that one excavator, one bulldozer, one compactor, one farm tractor and two articulated dumper trucks would be active onsite, managing the fill. The area of the site to be filled is shown on **Figure 2** with the site being filled from the south moving in a northerly direction.

Figure 2 Proposed fill area on site

3.0 Performance Standards

3.1 Construction Noise

Construction activities associated with the facility would be limited to establishment works such as creating the internal roads, turning areas, earth bunds etc.

The establishment works are not expected to exceed 20 weeks. Based on this construction activities would need to achieve compliance with the relevant noise limits specified in Standard E25.6.27 of the AUP, reproduced in **Table 2**. These limits apply at 1 m from the façade of any building occupied by an activity sensitive to noise during the works.

The AUP defines activities sensitive to noise as "…Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care, care centres, lecture theatres in tertiary education facilities, classrooms in education facilities and healthcare facilities with an overnight stay facility."

Table 2 Construction Noise Limits (for activities sensitive to noise with a duration less than 20 weeks – Table E25.6.27(1), AUP)

Day of week	Time Period	Noise Limit, dBA	
		LAeq	Maximum LAmax
Weekdays	6:30 am – 7:30 am	60	75
	7:30 am – 6:00 pm	75	90
	6:00 pm – 8:00 pm	70	85
	8:00 pm – 6:30 am	45	75
Saturdays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	75	90
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75
Sundays and public holidays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	55	85
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75

3.2 Construction Vibration

AUP Standard E25.6.30 states that construction activities must be controlled to ensure resulting vibration does not exceed:

a) the limits set out in German Industrial Standard DIN 4150-3 (1999): Structural vibration – Part 3 Effects of vibration on structures when measured in accordance with that Standard on any structure not on the same site; and
b) the limits in **Table 3** (as transcribed from Table 1 of E25.6.30.1) in any axis when measured in the corner of the floor of the storey of interest for multi-storey buildings, or within 500 mm of ground level at the foundation of a single storey building.

Table 3 Construction Vibration Human Amenity Limits

Receiver	Period	Peak Particle Velocity Limit
	Night-time 10:00 pm to 7:00 am	0.3 mm/s

Receiver	Period	Peak Particle Velocity Limit
Occupied building containing activity sensitive to noise	Daytime 7:00 am to 10:00 pm	2.0 mm/s
Other occupied buildings	At all times	2.0 mm/s

3.3 Operational Noise

Standard E25.6.5 of the AUP states that noise levels arising from activity in the *Rural – Rural Production Zone*, measured or assessed within the notional boundary of any other site must not exceed the levels in **Table 5**.

Notional boundary is defined in the AUP as a line 20 m from any side of a building containing an activity sensitive to noise, or the legal boundary where this is closer to the building.

Table 4 Noise Limits in the Rural – Rural Production Zone (Table E25.6.3.1, AUP)

Time Period	Noise Limit
Monday to Saturday (7:00 am to 10:00 pm)	55 dB L_{Aeq}
Sunday (9:00 am to 6:00 pm)	
At all other times	45 dB L_{Aeq} 75 dB L_{Amax}

4.0 Construction Assessment

It is envisaged that the establishment works would last not exceed 20 weeks. These would involve the creation of the office and the vehicle access route across the site. These activities are located at least 65 m away from the nearest dwellings. Based on typical plant expected to be used for this work, noise and vibration from establishment works are expected to comply with the relevant AUP construction noise and vibration limits.

5.0 Operational Noise Assessment

5.1 Sound Propagation Methodology and Assumptions

SLR has predicted operational noise levels generated from the activities associated with the proposed managed fill site in accordance with the algorithms detailed in ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation". The ISO 9613 calculation method considers a range of frequency-dependent attenuation factors that include the source sound power levels and locations, distance attenuation, ground absorption, air absorption and shielding attenuation, as well as meteorological conditions.

Our assessment is based on the following information:

- Terrain data with a contour interval of 0.5 m, building footprints and property boundaries – obtained from Auckland Council GeoMaps (https://geomapspublic.aucklandcouncil.govt.nz/).
- The proposed site layout – based on the information provided in the Cut and Fill Plan, prepared by CIVIX, provide to SLR on 25 July 2023.
- A-weighted sound power levels (L_{WA}) for each noise source based on SLR in-house measurement data of comparable projects, information provided by the project team, and published data, summarised in **Table 5**.

- No heavy vehicles accessing the site or operating inside the site before 7:00 am (Monday to Saturday).
- An average of seven truck movements per hour and up to 100 truck movements per day.
- Modelled equipment at each stage has been placed 1.5 m above the top of the finished design fill height representing the most exposed location for equipment. This is the worst-case scenario as it includes with minimal topographical screening relative to receivers.
- All noise sources modelled located within 50m of the edge closest to the nearest receiver, to replicate worst case scenario.
- A duration adjustment of 4 dB based on the daytime assessment period of 15 hours and proposed summer season operational hours assuming plant/equipment to be continuously active for a total duration of approximately 50% of the site operational hours (6 hours over a 15 hour period). This represents a worst-case scenario as the winter season works and Saturdays take place over a shorter period which would result in a greater duration adjustment.
- No reverse alarms or beepers fitted to onsite equipment, except on articulated dump trucks.

Table 5 List of Noise Sources

Source	Total A-weighted Level (LWA)
Articulated Dump Truck	103(A) dB L_{WA} (travelling at ≤30 km/h)
Tractor and Trailer	93 dB L_{WA}
Excavator (≤30 t)	103 dB L_{WA}
Dozer (≤10 t)	108 dB L_{WA}
Sheep-foot compactor roller (≤20 t)	103 dB L_{WA}

Note to Table 5:

(A) 5 dB adjustment to account for Special Audible Characteristics (SACs) associated with reverse beepers has been applied on top of the source noise level.

5.2 Predicted Noise Levels

The predicted noise levels generated by the operation of the proposed facility are summarised in **Table 6**. The predicted rating noise level represent the highest possible noise level receivers could be exposed. These levels are only likely to be experienced when activities take place in the closest stages to the receivers.

Table 6 Predicted Operational Rating Noise Level (dB)

Fig. 1 Ref.	Criteria (Daytime Period)	Predicted Rating Noise Level	Expected Outcome
R1	55	46	Compliance
R2	55	38	Compliance
R3	55	38	Compliance
R4	55	49	Compliance
R5	55	47	Compliance

The predicted noise levels show that compliance with the daytime AUP noise limits can be achieved at surrounding receivers, subject to equipment being selected with similar noise levels to those assumed.

SLR recommend initial verification monitoring is undertaken at the start of filling works to confirm the sound power levels of the equipment on site to ensure the predicted levels above remain relevant.

6.0 Conclusion

SLR has been commissioned to undertake an acoustic assessment of the proposed operation of a managed fill facility located at 1618 Ararimu Road in Hunua, Auckland.

Based on the location of the identified surrounding sensitive receivers relative to the establishment and operational works within the site; these works are expected to comply with the relevant limits in the AUP (Standards E25.6.3, E25.6.27 and E25.6.30) at surrounding receivers.

On this basis noise effects are acceptable in terms of the context in which the facility is proposed to operate and thus confirming the suitability of the site for the proposed managed fill facility.

SLR Consulting NZ

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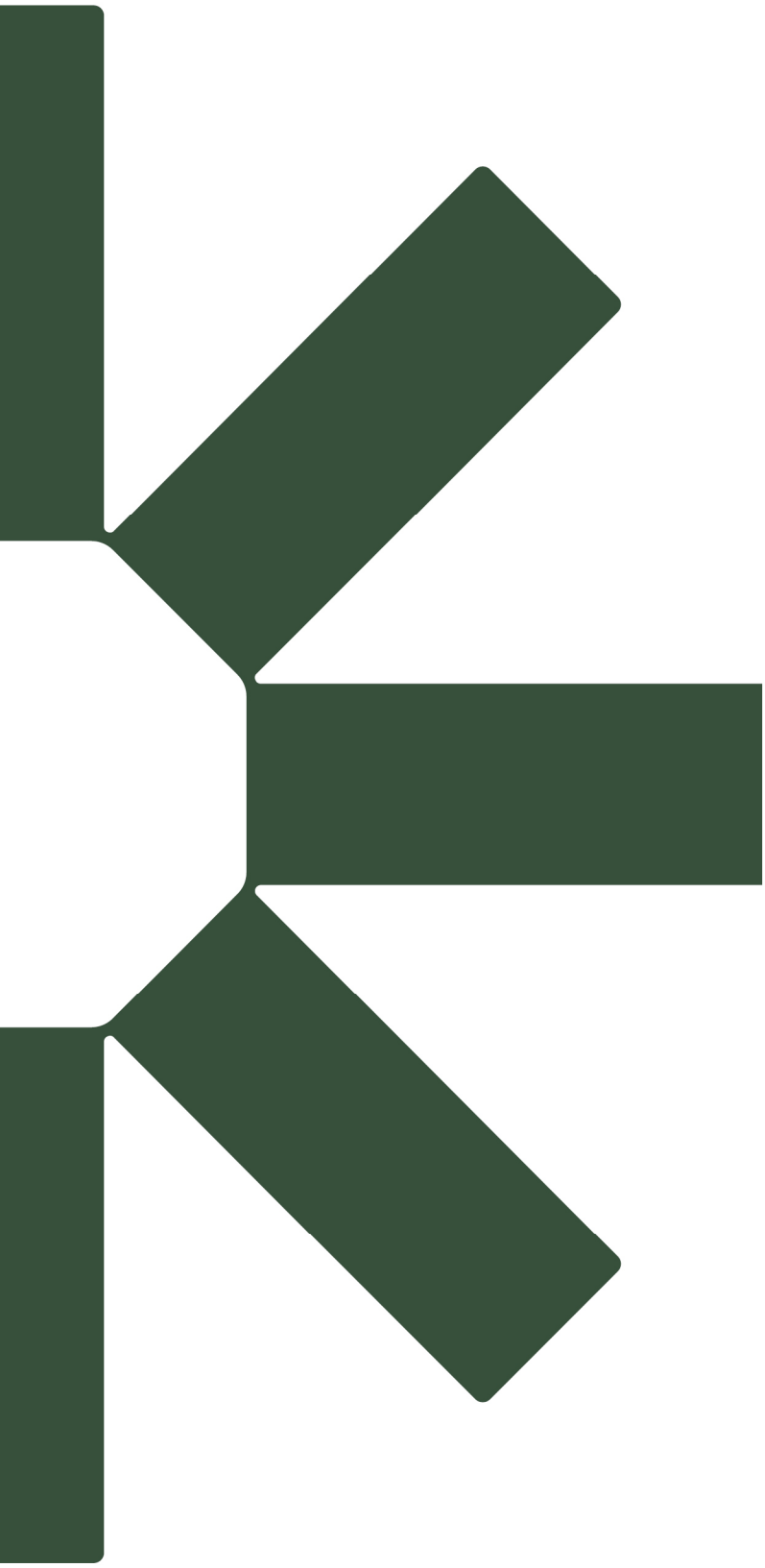

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