



# Tokanui Landfill Upgrade

## Acoustic Assessment

Toitū Te Whenua Land Information New Zealand

Prepared by:

**SLR Consulting New Zealand**

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## Revision Record

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## Basis of Report

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## Acronyms and Abbreviations

<b>A' weighted</b>	A frequency adjustment which represents how humans hear sounds.
<b>dB</b>	Decibel
<b>dBA</b>	'A' weighted decibel
<b>Impulsive noise</b>	Noise with a high peak of short duration, or sequence of peaks.
<b>Intermittent noise</b>	Noise which varies in level with the change in level being clearly audible.
<b>LAeq</b>	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.
<b>LAmx</b>	The A' weighted maximum sound pressure level of an event.
<b>Low frequency</b>	Noise containing energy in the low frequency range.
<b>LP or SPL</b>	Sound Pressure Level.
<b>Lw or SWL</b>	Sound Power Level.
<b>NZS 6803:1999</b>	New Zealand Standard NZS 6803:1999 "Acoustics – Construction Noise."

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## 1.0 Introduction

SLR has been engaged to assess the potential acoustic effects associated with the proposed landfill repair and upgrade works at the Tokanui Hospital Complex in Kihikihi, New Zealand.

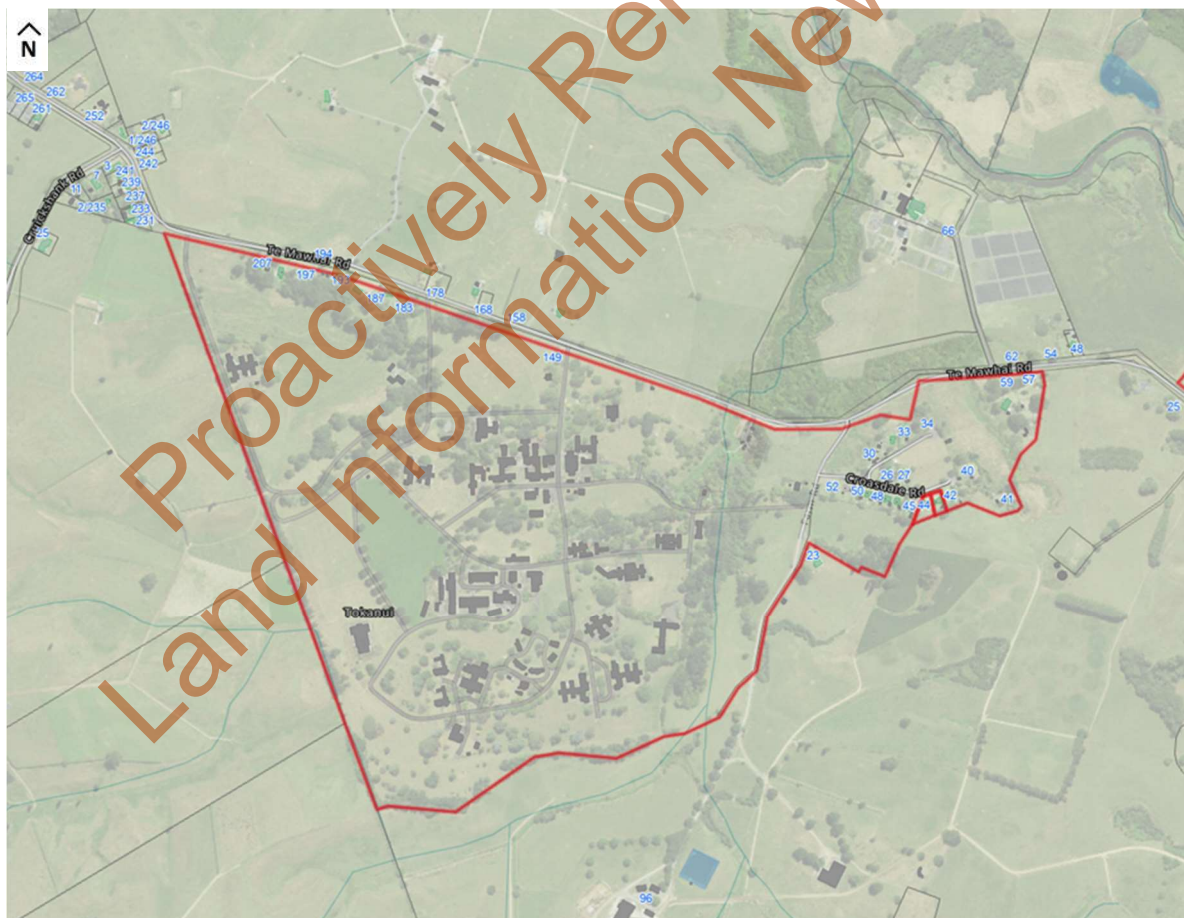
The methodology and performance of the earthworks associated with the proposed landfilling repair/upgrade works have been evaluated against the relevant noise limits outlined in Operative Waipa District Plan (the Plan) requirements and the New Zealand Standard NZS 6803:1999 “Acoustics - Construction Noise”. This report outlines the scope of the works, the relevant acoustic criteria, and a noise assessment of the proposed works.

## 2.0 Site and Project Description

The Tokanui Hospital Complex is located south of Kihikihi and comprises of several abandoned buildings. The subject site (see **Figure 1**) and surrounding properties are on *Rural* zoned land under the Plan.

The eastern section of the Site adjoins a cluster of dwellings (managed by LINZ), and a property owned and managed by AgResearch which contains another dwelling. The mentioned dwellings and other nearest surrounding residences are detailed in **Table 1**.

**Figure 1 Subject Site Location**



While the hospital was operational, landfilling of waste occurred on the eastern part of the Site, in close proximity to Wharekōrino Stream, which transects the property. Landfilling ceased with the closure of the hospital in 1998 and the landfill areas were capped in the early 2000's.

It is proposed that the landfill areas be upgraded in association with the rehabilitation of the site and would involve the relocation of material to the consented landfilling area, transfer of contaminated soil from the hospital remediation works to a dedicated landfill area, removal of medical waste and improvements to the capping of all landfill areas.

**Figure 2 Proposed Land Fill Works Area**



**Table 1 List of Nearest Residences**

Receiver	Address	Approximate distance to extent of landfill works	Comments
R1	23 Farm Road	50	Single-storey dwelling located off the subject site
R2	52 Croasdale Road	100	Single-storey dwelling – located on the subject site
R3	51 Croasdale Road	120	Single-storey dwelling – located on the subject site



## 3.0 Performance Criteria

### 3.1 Construction Noise

In accordance with Rule 4.4.2.19 of the Plan, it is required to measure and assess construction noise on site to ensure that it meets the relevant noise limits outlined in the New Zealand Standard NZS 6803:1999 "Acoustics - Construction Noise" (**NZS6803**).

This Standard provides comprehensive guidelines for measuring and assessing noise from both existing and proposed construction work, including activities such as maintenance and demolition. Therefore, the noise limits in NZS 6803 are relevant and reasonable for this project, allowing that noise from landfilling activities are assessed and managed in accordance with regulations and to minimise disruptions to the surrounding area.

NZS 6803 provides noise limits (at 1 m from the facade of any dwellings occupied during the works) to control and manage noise. The recommended noise limits for works, with an expected duration exceeding 20 weeks, are reproduced in **Table 2**.

**Table 2 Recommended Upper Noise Limits – Table 2 of NZS 6803**

Time of Week	Time Period	Long-term duration (more than 20 weeks)	
		L <sub>Aeq</sub> , dB	L <sub>Amax</sub> , dB
Weekdays	6:30 am – 7:30 am	55	75
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	65	80
	8:00 pm – 6:30 am	45	75
Saturdays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	70	85
	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

Rule 4.4.2.18 of the Plan state that the Vibration emanating from a site shall not exceed the limits recommended in and be measured and assessed in accordance with New Zealand Standard NZS 4403:1996 "Code of Practice for Storage, Handling, and Use of Explosives". The mentioned standard is not considered applicable as it relates to the vibration from blasting which does not form part of the project.

However, the principal concern of receivers regarding vibration relates to the potential damage to property, rather than impact on amenity. A certain level of amenity impact is expected and common during construction/demolition (as is the case with noise) and is commonly accepted with prior advice, such as letter drop and to make occupants aware ahead of the works beginning.



The nearest dwelling is approximately 50 m from any works. The anticipated setback distance for a large compactor to achieve compliance with the relevant DIN 4150-3 vibration threshold (5mm/s PPV), is less than 15m. Therefore, compliance with DIN4150-3 would be readily expected at all receivers.

## 4.0 Landfilling Activity Acoustic Assessment

At the time of writing, details of the specific plant/equipment and methodology are not available. However, the extent of earthworks and landfilling will be limited to the areas depicted in Figure 2 (Areas A1 to H). The following work has been proposed:

- Area H and part of Area A2 will be transferred to Area A1. It is envisaged that excavation work in this area would be the loudest noise source.
- Culvert 3 will be removed and a shorter culvert with embankments will be installed. Any refuse waste material discovered will be transferred to Area A1. It is envisaged that excavation work in this area would be the loudest noise source.
- Isolated medical waste from Areas E and F will be removed and disposed of offsite at a Class 1 landfill. It is envisaged that excavation work in this area would be the loudest noise source.
- Suitable non-engineered fill from Areas E and F will be transferred to the hospital site for use as backfill. Subsequently, low to moderate level contaminated soil from the hospital site will be transferred to Areas E and F and placed as compacted fill. It is envisaged that excavation and compaction work in this area would be the loudest noise sources.
- To ensure compliance with existing and future resource consent requirements, all remaining landfill Areas (A1 to G) will be recapped. Topsoil that exceeds adopted “cleanfill” standards will be stockpiled separately, with unsuitable topsoil either buried within the landfill or removed offsite to an appropriate disposal facility. The existing landfill caps will be stripped and stockpiled, with the option to reuse it as capping material or as backfill material at the hospital. The landfill will then be recapped using appropriate, low-permeability engineering capping material, with an additional layer of clean topsoil that will be grassed. It is envisaged that excavation, compaction and managing the fill heights likely by a dozer, excavator, compactor, etc. would be the loudest noise sources.

The theoretical worst-case scenario for all earthworks in operation onsite and overlapping in full capacity, would generate a maximum of 80 vehicles per day and 21 vehicles in the peak hour. All traffic movements will be internal to the site as material is moved between the hospital site and the landfill area.

At the landfilling site, the most significant noise levels would be produced by the operation of large machinery, associated with the proposed works. A summary of equipment and reference sound pressure levels has been provided in **Table 3**, these sound pressure levels are based on measurements and published data (*BS 5228 - 1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1; Noise*). The noted setback distances to compliance have been calculated in accordance with the methodology in NZS 6803:1999 and include facade corrections.



**Table 3 Plant Items and Typical Noise Emission Levels**

Type of Activity	Plant Item	Plant Noise Level at 10 m	Approximate setback distance to compliance <sup>1</sup>
Excavation	Excavator (25-30t) fitted with bucket attachment	75 dB LAeq	25m
Compaction	Dozer (<20t)	75 dB LAeq	25m
	Dozer (20-25t)	80 dB LAeq	45m
	Dozer (25-40t)	85 dB LAeq	80m
	Dozer (≥40t)	90 dB LAeq	140m
	Small ride-on vibratory compactor (<5t)	70 dB LAeq	15m
	Non-vibratory compactor roller (<15t)	65 dB LAeq	10m
	Vibratory compactor roller (5-15t)	80 dB LAeq	45m
	Vibratory Compactor (>15t)	85 dB LAeq	80m
Soil transportation	Articulated dump truck	80 dB LAeq	45m

**Notes on Table 3:**

(1) Based on the daytime (7:30am to 6:00pm) limit of 70 dB LAeq.

Based on the distances of receivers (see **Table 1**) and the setback distances to meet the NZS6803 noise requirement (**Table 2**), compliance can be achieved at the surrounding receivers. It is advised that the size of compactor and dozer to be used in Areas D,E and F are managed and controlled so that compliance can be achieved at the nearest residence (R1), without additional mitigation measures (i.e., screening or shrouds) in place. Therefore, the noise from the proposed activities is considered reasonable and acceptable.

Noise from other activities such as loading dump trucks and dump truck movements (on the basis that they would be quieter or at a similar level than those discussed above) would be expected to either comply or controlled to achieve compliance with the relevant noise limit 70 dB LAeq, at surrounding receivers.



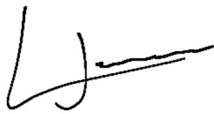
## 5.0 Conclusion

SLR has assessed the noise effects associated with the proposed landfilling and upgrading of the landfill areas at the Tokanui Hospital Complex in Kihikihi as part of the wider demolition and rehabilitation works.

Compliance with the relevant DIN4150-3 vibration threshold at residential type buildings (5mm/s PPV) would be readily expected at all receivers.

It is anticipated that the noise levels during the landfilling works would achieve compliance with the relevant noise limits stipulated by NZS 6803, and the noise effects would be reasonable and acceptable.

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