Acoustic Assessment

Tokanui Hospital Demolition Works

Land Information New Zealand

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SLR Reference No.: 810.030555-R01

15 November 2023

Revision: 1.0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	15 November 2023	L. Jansen	J.E. Restrepo	J.E. Restrepo
0.1	13 October 2023	L. Jansen	J.E. Restrepo	DRAFT
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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 Land Information New Zealand (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

Term	Description
dB	Decibel
dBA	'A' weighted decibel.
Hz	Hertz
L90 , L10 , etc.	Statistical exceedance levels, where LN is the sound pressure level exceeded for N% of a given measurement period.
LAE (or SEL)	Sound Exposure Level. This is the constant sound level that has the same amount of energy in one second as the original noise event.
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.
LAmax	The A' weighted maximum sound pressure level of an event.
Low frequency	Noise containing energy in the low frequency range.
Lp or SPL	Sound Pressure Level.
Lw or SWL	Sound Power Level.
Octave-band	A frequency band where the highest frequency is twice the lowest frequency.
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 one second time constant.
Ambient noise level	The all-encompassing sound associated with an environment or area.
Free field	A monitoring location where the microphone is positioned sufficiently far from nearby surfaces for the measured data to not be influenced by reflected noise.
Impulsive noise	Noise with a high peak of short duration, or sequence of peaks.
Intermittent noise	Noise which varies in level with the change in level being clearly audible.
NZS 6803	New Zealand Standard NZS 6802:2008 "Acoustics – Construction Noise."
Offensive noise	Noise that is considered harmful or which interferes unreasonably with affected receivers.
Steady state noise	Noise which remains relatively constant in level over time, as opposed to time-varying noise which fluctuates over time.

1.0 Introduction

SLR Consulting NZ Limited (**SLR**) has been engaged to assess the proposed demolition works at the Tokanui Hospital Complex in Kihikihi, New Zealand.

The methodology and performance of the demolition works have been evaluated against the relevant noise limits outlined in Operative Waipa District Plan requirements and the New Zealand Standard NZS 6803:1999 “Acoustics - Construction Noise” (**NZS6803**). This report outlines the scope of the works, the performance standards, and a noise assessment for the demolition works.

2.0 Site and Project Description

Site 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. Te Mawhai Road form the subject site’s northern boundary, with some residences located across the road. The dwellings in the north-western corner of the subject site are occupied. The mentioned dwellings and other nearest surrounding residences are detailed in **Table 1**.

Figure 1 Site location

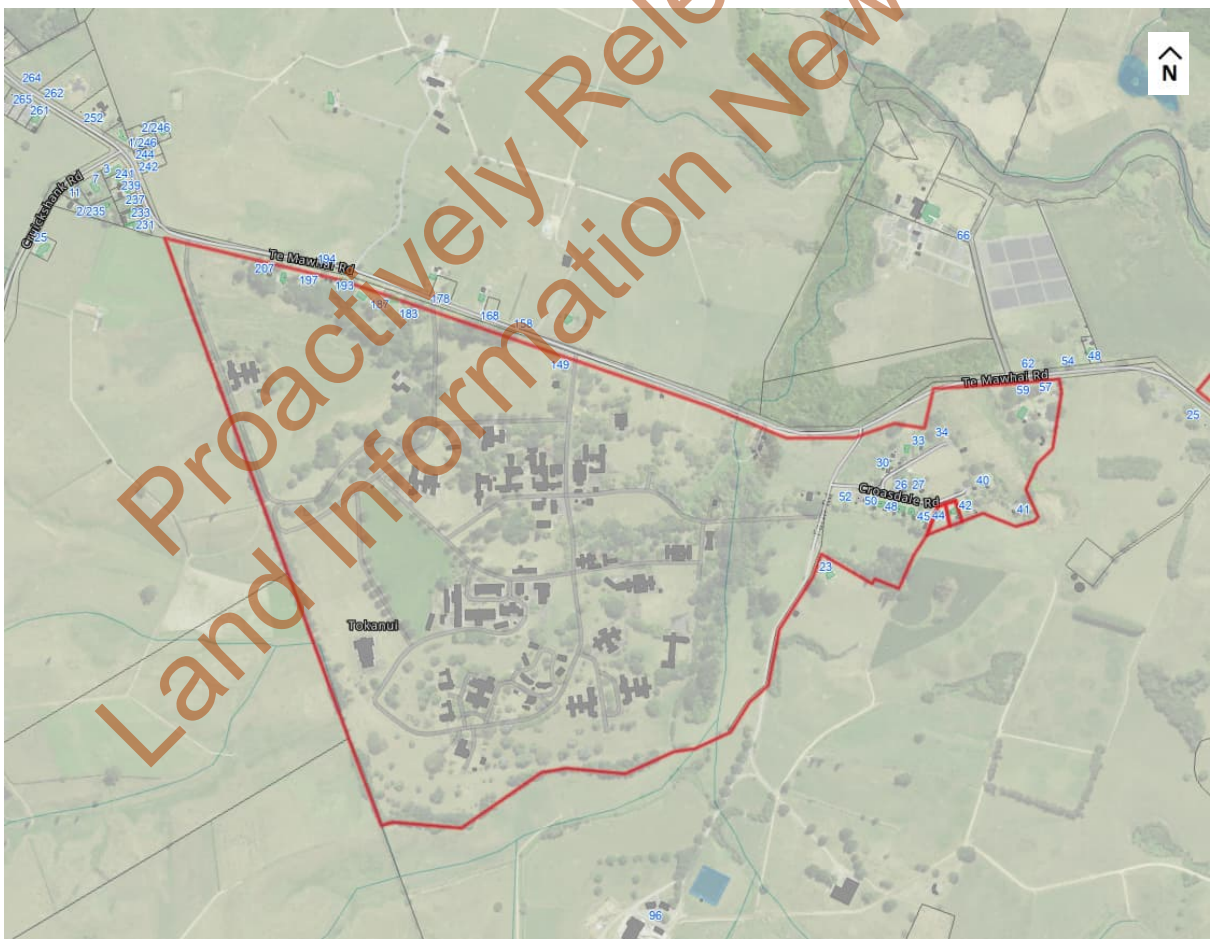


Table 1 List of Nearest Residences

Receiver	Address	Approximate distance to nearest above ground structure to be removed	Comments
R1	183 Te Mawhai Road	148 m	Single storey dwelling – located on the subject site
R2	187 Te Mawhai Road	166 m	Single storey dwelling – located on the subject site
R3	193 Te Mawhai Road	203 m	Single storey dwelling – located on the subject site
R4	197 Te Mawhai Road	171 m	Single storey dwelling – located on the subject site
R5	203 Te Mawhai Road	153 m	Single storey dwelling – located on the subject site
R6	207 Te Mawhai Road	163 m	Single storey dwelling – located on the subject site
R7	158 Te Mawhai Road	188 m	Single storey dwelling
R8	168 Te Mawhai Road	205 m	Single storey dwelling
R9	178 Te Mawhai Road	198 m	Single storey dwelling
R10	231 Te Mawhai Road	297 m	Single storey dwelling
R11	233 Te Mawhai Road	316 m	Single storey dwelling
R12	25 Cruickshank Road	390 m	Single storey dwelling

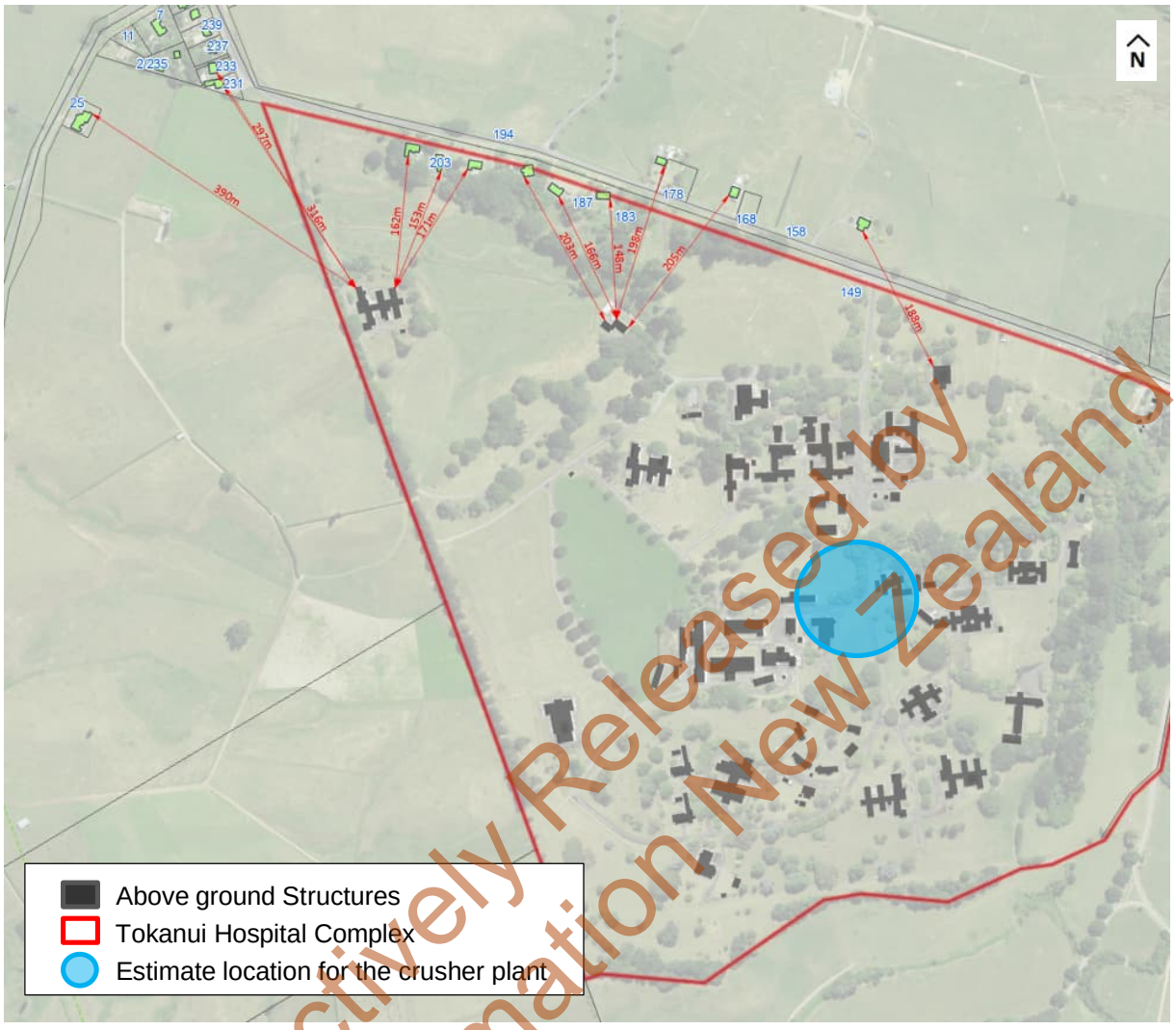
Project Description

SLR understands that the initial stage of returning the land to its original state involves the dismantling, demolition, and removal of all above-ground structures. At the time of writing, the methodology of the works is not finalised and would depend on the contractor appointed to identify the specific equipment to be used.

However, based on our understanding of the project and experience working on similar projects, we anticipate that excavators (ranging from 5-20 t) with bucket attachments and hydraulic breakers would be used, along with an on-site mobile concrete crusher plant. SLR has been informed by the project team, that it is not anticipated that the crusher plant would move to different areas during the demolition phase of the project. The mobile concrete crusher plant would be in the centre of the site and material would be brought to the location for sorting and processing.

The shortest distance to the nearest residences from potential demolition works (including the location of the crusher plant) are depicted in **Figure 2**.

Figure 2 Extent of Demolition works and Concrete Crusher Plant Location



3.0 Performance Standards

In accordance with Rule 4.4.2.19 of the Plan, it is necessary 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 demolition works are assessed and managed in accordance with regulations and to minimise disruptions to the surrounding area.

Based on our estimates, the demolition works are expected to continue for a period of more than 20 weeks. It is important to note that no noisy activities beyond normal construction hours (7:30 am to 6:00 pm) are anticipated.

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 at Dwellings in Rural Areas – Table 2 of NZS 6803

Time of Week	Time Period	Long-term duration (more than 20 weeks)	
		L_{Aeq}, dB	L_{Amax}, 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

4.0 Demolition Works Assessment

4.1 Noise Assessment

The highest levels of noise for this project are expected during the breaking up of building structures with an excavator and breaking up concrete and road surfaces with a hydraulic breaker bit. The sound pressure level (**SPL**) of the demolition works is provided in **Table 3** and is based on in-house measurements undertaken by SLR of other similar activities and published data (British Standard BS 5228-1: 2009 "Code of practice for noise and vibration control on construction and open sites – Part 1; Noise").

The noted approximate setback distances to compliance have been calculated in accordance with the methodology in NZS 6803 and include facade corrections.

Table 3 Dismantling and Demolition Plant Items and Typical Noise Emission Levels

Plant Item	Sound Pressure Level at 10 m	Approximate setback distance to compliance[(A)]
Excavator (5-20ton) fitted with bucket attachment	70-75 dB L_{Aeq}	15-25 m
Excavator (25-30t) fitted with bucket attachment	75 dB L_{Aeq}	25 m
Excavator (<25t) fitted with hydraulic breaker bit attachment	90 dB L_{Aeq}	140 m
Excavator (<25t) fitted with hydraulic breaker bit attachment, wrapped with an acoustic shroud	83 dB L_{Aeq}	65 m
Excavator (<25t) fitted with hydraulic breaker bit attachment with localised screening	80 dB L_{Aeq}	45 m
Excavator (<25t) fitted with hydraulic breaker bit attachment with localised screening and breaker bit wrapped with acoustic shroud	73 dB L_{Aeq}	20 m
Tracked Concrete and Building Waste Crusher Plant	85-90 dB L_{Aeq}	80-140 m

Notes to Table 3:

(A) Compliance level is 70 dB LAeq, representative of the day-time limit (7:30 am to 6:00 pm).

Compliance with the 70 dB L_{Aeq} noise limit is expected at approximately 145 m from the noisiest activity (breaking up concrete with hydraulic breaker) without mitigation measures. The nearest residence to where this source could occur (*B75 – Doctors Flats*) is approximately 148 m from the potential works. Therefore, compliance is expected during the noisiest demolition works.

Noise from other activities such as breaking material into smaller pieces, 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 be able to be controlled to achieve compliance with the relevant noise limit 70 dB L_{Aeq}, at surrounding receivers.

5.0 Conclusion

SLR has assessed the potential noise that could be generated during the planned demolition works at the Tokanui Hospital Complex in Kihikihi, New Zealand.

It is anticipated that the noise levels during the works will achieve compliance with the relevant noise limits stipulated by NZS 6803, when noisy works are limited to normal construction hours (7:30 am to 6:00 pm).

SLR Consulting NZ

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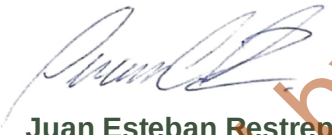

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