



Project: **THREE KINGS QUARRY
Biannual Noise Compliance**

Prepared for: **Winstone Aggregates
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1.0 INTRODUCTION

Marshall Day Acoustics has carried out an environmental noise survey at monitoring positions adjacent to Three Kings Quarry, Mt Eden, on 5 May 2016. Winstone Aggregates is required to undertake two noise surveys per year, at two identified monitoring positions, as part of the Environmental Management Plan for the quarry, in order to determine compliance with the noise rules for the site.

“Fill” operations are also taking place within the quarry. Sound generated from these activities must comply with the conditions in Environment Court Decision No. [2011] NZEnvC 214.

A glossary of acoustic terminology used in this report is contained in Appendix A.

2.0 NOISE PERFORMANCE STANDARDS

The quarry is zoned *Business 7* in the City of Auckland District Plan Isthmus Section – Operative 1999. The closest dwellings are located immediately to the west of the quarry in Fyvie Avenue. The noise rule for operations within the quarry is:

“Noise Control at the Residential Interface

The L_{10} noise level and maximum level (L_{max}) arising from any activity measured at or within the boundary of any residential zoned property shall not exceed the following limits:

<i>Monday to Saturday</i>	<i>7.00 am – 10.00 pm</i>	<i>L_{10} 55 dBA</i>
<i>Sunday and Public Holidays</i>	<i>9.00 am – 6.00 pm</i>	
<i>At all other times</i>		<i>L_{10} 45 dBA</i>
		<i>L_{max} 75 dBA, or background (L_{95}), plus 30 dBA whichever is the lower</i>

The above noise levels shall be measured and assessed in accordance with the requirements of the NZS 6801:1991 “Measurement of Sound” and NZS 6802:1991 “Assessment of Environmental Sound” or their replacement.”

3.0 MEASUREMENTS

3.1 General

Measurements were completed at each of the two measurement positions on 5 May 2016. The first was at the Grahame Breed Drive position between 12:30 pm and 1:00 pm and the second was at the Fyvie Avenue position between 1:00 pm and 1:30 pm. The measurement positions are the same as in all previous compliance measurements of this type and are shown on the figure in Appendix B.

Sound level measurements were carried out using a Brüel & Kjaer 2250 sound level meter, which satisfies the requirements for a Type 1 sound level meter according to IEC 651. Measurements were carried out and assessed generally in accordance with the relevant New Zealand Standards.

The weather was fine with variable cloud cover and a light breeze from the SW. These conditions are considered acceptable for environmental noise surveys.

3.2 Operations and Equipment

The following equipment was operating in the quarry during the survey. These operations were confirmed by the quarry supervisor following completion of the survey.

Quarry Activity:

- No quarry extraction or supply activity

Fill Operations Activity:

- 1 x Caterpillar excavator loading Volvo articulated trucks at the trench
- 1 x Caterpillar D6 bulldozer compacting fill
- 3 x Volvo dump trucks carting fill within the site
- 1 x Caterpillar compactor
- 1 x Doosan excavator spreading rock (elevated SW corner)
- 1 x Excavator spreading soft fill at the SW corner
- 1 x Caterpillar log skidder pulling a disc harrow
- 1 x WA 380 Komatsu wheel loader moving clean fill
- Arrival and departure of trucks delivering clean fill

3.3 Results

The measured sound levels are presented in Table 1 below.

Table 1 – Measured Sound Levels

Measurement Position	Duration	dB L _{A10} ⁽¹⁾	Noise Sources ⁽²⁾
Fyvie Avenue	17 minutes	55	<u>Komatsu bulldozer spreading fill, Caterpillar excavator loading dump trucks</u> , 3 Volvo articulated dump trucks carting fill, trucks arriving / dumping soft fill / departing, Caterpillar compactor, Caterpillar log skidder pulling disc harrow <i>Non-quarry sound:</i> Bird sounds, distant traffic on Mt Eden Road
Grahame Breed Drive	15 minutes	61	<u>Doosan excavator (orange) spreading rock in SW corner</u> , Hyundai 290LC excavator spreading soft fill in SW corner, trucks dumping rubble, one bulldozer spreading and compacting fill, 3 Volvo dump trucks carting fill, Caterpillar compactor, Caterpillar log skidder pulling disc harrow <i>Non-quarry sound:</i> Bird sounds, distant traffic on Mt Albert Road

Notes to Table 1:

- (1) An explanation of technical terms is provided in Appendix A
 (2) The controlling noise source(s) is underlined
 (3) The measurement positions are shown in Appendix B

3.4 Discussion

3.4.1 Fyvie Avenue

It is understood that quarrying of Thee Kings Quarry has now ceased. Therefore associated activities including extraction of rock from the quarry face, crushing and scoria load-out by dump truck will no longer occur.

The overall noise level was controlled by fill operations occurring near the centre of the quarry (refer Photos 1 and 2 in Section 3.4.2). The primary noise generating plant was considered to be the bulldozers, compactor and tractor. Trucks (both quarry and fill operations related) moving along the haul road, were also audible. Although, it was noted that fill activity occurring in the south-western corner was inaudible at this location.

Ambient sound sources (i.e. not associated with fill operations) included birds and distant traffic.

A level of 55 dB L_{A10} was measured at this location from fill operations, which complies with the consented noise limit.

3.4.2 Grahame Breed Drive

The most audible sound sources at this measurement position were trucks dumping rubble in the south-western corner of the site and the orange Doosan excavator moving rubble piles around. These activities were considered to control the maximum noise level (L_{AFmax}) and the average maximum noise level (L_{A10}).

Ambient sound sources, not associated with fill operations activity, included distant traffic sounds from the surrounding road network and bird sounds.

A level of 61 dB L_{A10} was measured for fill operations, which exceeded the consented noise limit of 55 dB L_{A10} at this location by 6 decibels.

Photos 1 & 2 below show the plant which was in the quarry during the period of the noise survey.

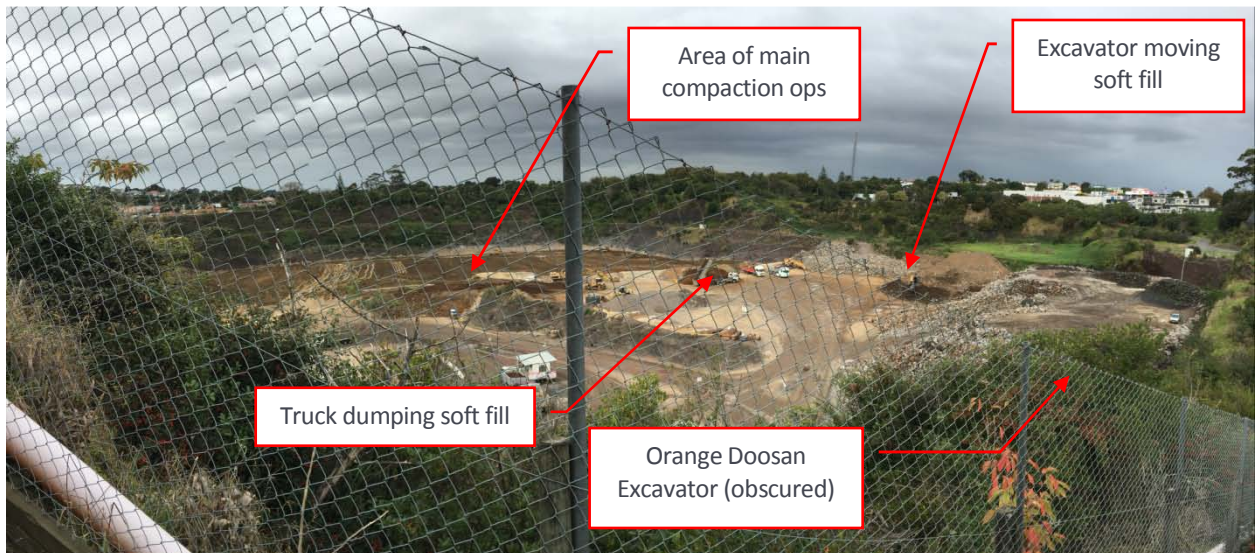


Photo 1: Southern End of Quarry (as viewed near the Fyvie Ave position)



Photo 2: Northern end of Quarry (as viewed from south boundary fence)

4.0 CONCLUSIONS AND RECOMMENDATIONS

Marshall Day Acoustics has completed noise monitoring at the two nominated monitoring positions as required by the Environmental Management Plan for the Three Kings Quarry.

Fill operations is now widespread within the quarry and it is understood that quarrying activities have permanently ceased. Therefore, sound generating activity from the quarry during the survey period originated solely from fill operations.

The cumulative acoustic emission from fill operations resulted in sound levels which complied with the relevant noise rules for quarry operations on the site at the Fyvie Avenue measurement position and exceeded by 6dB at the Grahame Breed Drive position.

Given the reported exceedance at the Grahame Breed Drive position, it is understood that Winstone Aggregates will be reviewing its operation in the south-western corner to see whether any management and /or mitigation measures can be implemented so as to ensure that noise levels are practicably reduced.

Given that fill operations is the sole sound generating activity on the site going forwards, MDA recommends that the noise section of the fill operations management plan include the following measurement positions for any compliance monitoring:

- 4 Barrister Avenue
- Adjacent to 51/53 Fyvie Avenue
- 985 Mt Eden Road (behind SHA noise to screen measurement position from Mt Eden Road traffic noise)

The assessment of compliance will be against the noise limits contained in Condition 51 of the fill operations consent.

APPENDIX A GLOSSARY OF TERMINOLOGY

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.
A-weighting	The process by which sound levels are corrected to account for the non-linear frequency response of the human ear.
$L_{A10}(t)$	The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the background 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.
$L_{A95}(t)$	The A-weighted noise level equalled or exceeded for 95% of the measurement period. This is commonly referred to as the background noise level.
L_{AFmax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
NZS 6801: 1991	New Zealand Standard NZS 6801:1991 <i>"Measurement of Sound"</i> .
NZS 6802: 1991	New Zealand Standard NZS 6802:1991 <i>"Assessment of Environmental Sound"</i> .

APPENDIX B NOISE MEASUREMENT POSITIONS



Source: Google Earth Pro