

14 June 2016

Winstone Aggregates
 PO Box 17195
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 Auckland 1546

Attention: Andrea Cave

Dear Andrea

THREE KINGS QUARRY – COMPLIANCE SURVEY

Introduction

Marshall Day Acoustics has carried out an environmental noise survey at the regular monitoring positions adjacent to Three Kings Quarry, Mt Eden. The survey measured noise from the quarry, principally from controlled fill operations, for which Winstone Aggregates has resource consent to undertake on the site.

The survey has been carried out at the request of Winstone Aggregates with the purpose of quantifying whether noise has reduced at the south-western end of the site resulting from moving the concrete / rock reception area to the northern end of the site (previously it was located in the south-western corner of the site).

The measured levels have been assessed against the noise performance standards contained in Environment Court Decision No. [2011] NZEnvC 214, and are described in the following section.

A Glossary of acoustic terminology used in this report can be found in Attachment 1.

Noise Performance Standard

Condition 51 of the consent sets out the following noise limits:

“Any activity on the site associated with fill operations at the Three Kings Quarry shall not exceed the following noise limits at residentially zoned land fronting Mount Eden Road between street numbers 904 and 944 (including 14-16 Kingsway):

Monday to Saturday	7:00 am to 10:00 pm	L_{10} 60 dBA
Sunday & Public Holidays	9.00 am to 6.00 pm	
At all other times	L_{10} 45 dBA L_{MAX} 75 dBA	

At all other residentially zoned land noise limits as per the table below shall not be exceeded.

Monday to Saturday	7:00 am to 10:00 pm	L_{10} 55 dBA
Sunday & Public Holidays	9.00 am to 6.00 pm	
At all other times	L_{10} 45 dBA L_{MAX} 75 dBA	

N.B - Noise shall be measured and assessed in accordance with NZS6801: 1991 and NZS6802.2008.”¹

For the purposes of this report, we have assessed compliance against the limits contained in the table for ‘*all other residentially zoned land*’. Based on previous noise survey experience², the measurement of controlled fill operations noise at receiver locations located along Mt Eden Road is considered impractical, due to noise from traffic on Mt Eden Road masking noise from the quarry.

The selected monitoring locations align with Winstone Aggregates’ request to reconfirm the noise level at the biannual monitoring positions, namely Fyvie Avenue and Grahame Breed Drive, to ensure that site activities remain compliant with Condition 51 with respect to noise.

Measurements

We visited the site on 13 June 2016 between 1300 and 1400 hrs and carried out compliance measurements at the aforementioned monitoring positions, as shown on Attachment 2. The measurements were undertaken in accordance with the relevant acoustic standards and the weather during the survey was fine and within the allowable parameters for measuring outdoor noise.

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

Quarry Activity:

- No quarry extraction or supply activity

Controlled Fill Operations Activity:

- 1 x 30t Caterpillar excavator operating at top trench
- 1 x Caterpillar D6 bulldozer pushing out fill
- 2 x Excavators separating rock with rake
- 1 x 50t excavator placing rock in NW corner
- 1 x 30t excavator operating at the lower trench
- Arrival and departure of trucks delivering clean fill

The measured sound levels resulting from the identified operational activities are presented in Table 1.

Table 1: Measured Sound Levels

Measurement Position	Duration	dB L _{A10}	Noise Sources ^{(1) (2)}
Fyvie Avenue	20 minutes	55	Trucks delivering soft fill, excavator moving soft fill from reception trough, Caterpillar D6 bulldozer spreading fill, Hyundai excavator moving fill (bucket banging/shaking noise prominent), truck dumping concrete/rocks near centre of site, trucks on haul road and wheel wash <i>Non-quarry sound:</i> Birds, distant building noise, distant traffic on surrounding roads
Grahame Breed Drive ⁽³⁾	20 minutes	53	Trucks delivering soft fill, Hyundai excavator moving fill near centre of site (bucket banging/shaking noise prominent), trucks depositing and excavator moving

¹ It is noted that there is a discrepancy in the versions (year) of the standards quoted in the condition. It is also noted that NZS6802:2008 does not use the L₁₀ noise descriptor which has been used to specify the noise limits in condition 51. Therefore, NZS6802:1991 has been used.

² Refer MDA report Rp 001 R01 2012309A dated 23 July 2012

concrete/rocks northern end of site, trucks on haul road
and wheel wash

Non-quarry sound: Breeze in trees, birds, distant traffic
on surrounding roads

Notes to Table 1:

- (1) Controlling sound source(s) underlined
- (2) Crusher not operating during measurements
- (3) Measurement position considered to be generally representative of noise levels received at dwellings on Barrister Avenue

Discussion

At the Fyvie Avenue position, we observed that the controlling sound sources were split into two groups – the Hyundai excavator moving fill around near the centre of the site; and secondly, those associated with soft fill reception toward the northern end of the site i.e. truck movements, excavator removing fill from the reception trough, and the Caterpillar D6 bulldozer spreading fill.

Sound generated by the activities at the northern end of the site was more steady-state, whereas the Hyundai excavator operating toward the centre of the site produced more impulsive sounds associated with bucket banging and shaking. The latter is considered to have more of an effect on the L_{A10} measurement parameter and therefore compliance with the noise limit than steady-state sound.

At the Grahame Breed Drive position, the Hyundai excavator operating toward the centre of the site was the controlling sound source. As there was considerably less machinery observed to be operating on the southern half of the site, the measured level at this position was appreciably lower (8dB) than measured during our previous compliance survey in May³. We have been informed by the quarry operations manager that this is due in part to the conclusion of the compaction fill season.

The measured levels at both positions complied with the consented noise limit of 55 dB L_{A10} .

Conclusion

Based on the results of our latest compliance survey, we consider that noise emission from the site has been reduced to compliant levels based on moving the concrete / rock reception activity to the northern end of the site, and the cessation of the fill compaction season.

We trust this information is satisfactory. If you have any further questions please do not hesitate to contact us.

Yours faithfully

MARSHALL DAY ACOUSTICS LTD



Mathew Cottle

Consultant

³ MDA report Rp 009 R01 2011528A MC 160513 dated 19 May 2016

ATTACHMENT 1: 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> .

ATTACHMENT 2: NOISE MEASUREMENT POSITIONS AND PRIMARY NOISE GENERATING AREAS



Source: Google Earth Pro