

16th March 2015

Auckland Council
Private Bag 92300
Auckland 1142

Attention: Richard Preece

Re: Winstone Aggregates Three Kings Fill – Self Propelled Compaction Equipment
Permits 36221, 36222, 37770, R/LUC/2009/743

Dear Richard

Condition 54 of the abovementioned permits requires additional noise modelling and monitoring should the use of self propelled compaction equipment be proposed.

On 24th February 2014 a noise modelling report completed by a suitably qualified acoustical consultant demonstrating that the revised fill procedure will not generate noise in excess of the noise limits stated in Condition 51 was submitted to Council.

In late January 2015 the use of self propelled compaction equipment commenced. Attached is the noise monitoring completed within one month of use of this equipment confirming compliance with the noise limits stated in Condition 51.

Should you have any queries please do not hesitate to contact me on 027 504 3624 or at elyse.laface@winstoneaggregates.co.nz.

Yours faithfully



Elyse LaFace
Environmental Coordinator



MARSHALL DAY 
Acoustics

THREE KINGS QUARRY CONTROLLED FILL
OPERATIONS
NOISE COMPLIANCE SURVEY

Rp.002 2014039A | 12 March 2015

Project: **THREE KINGS QUARRY CONTROLLED FILL OPERATIONS**

Prepared for: **Winstone Aggregates Limited**
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Greenlane
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Attention: **Elyse LaFace**

Report No.: **Rp 002 2014039A**

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1.0 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 Winstones has resource consent.

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

A glossary of acoustic terminology used in this report can be found in Appendix A.

2.0 NOISE PERFORMANCE STANDARDS

Condition 51 of the consent sets out the following with respect to 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

Condition 54 sets out the trigger point for when monitoring should be undertaken”

“Should the consent holder propose to use self propelled compaction equipment, a suitably qualified acoustical consultant shall, prior to the equipments use, undertake noise modelling to predict noise levels to demonstrate that the revised fill procedure will not generate noise in excess of the noise limits in Condition 51. Monitoring confirming compliance with the noise limits shall be conducted within one month of implementation of the revised procedures.”

For the purposes of this report, compliance has been assessed against the limits contained in the table for ‘all other residentially zoned land’. Based on a previous noise survey², the measurement of

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 L_{10} noise descriptor which has been used to specify the noise limits in condition 51.

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

controlled fill operations noise at receiver locations located along Mt Eden Road is considered impractical, due to noise from traffic on Mt Eden Road being the controlling source of sound, which masks noise from the quarry.

3.0 MEASUREMENTS

3.1 General

Measurements were carried out on 27 February 2015 at each of the two compliance measurement positions. The first was at the Grahame Breed Drive position between 7:50 am and 8:05 am and the second was at the Fyvie Avenue position between 8:20 am and 8:35 am. The measurement positions are shown in 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 2 okta cloud cover and no wind. 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:

- 1 x Komatsu WA480 wheel loader moving aggregate and loading trucks but also assisting with fill operations
- Arrival and departure of trucks picking up aggregate

Controlled Fill Operations Activity:

- 1 x Volvo EC290 excavator was working on the fill stockpile loading trucks
- 1 x Doosan DX225 excavator was working on the rubble/concrete moving material down the face
- 1 x Volvo A35, 1 x Terex A40 and 1 x Komatsu HD205 dump trucks moving fill from the stockpile down toward the south-eastern area of the quarry
- 1 x Caterpillar 815 compacting fill in the south-eastern area of the quarry
- 1 x Komatsu D85 bulldozer
- Arrival and departure of trucks delivering fill materials

3.3 Results

The measured sound levels are presented in Table 1 below.

Table 1: Measured sound levels

Measurement Position	Duration	dB L _{A10}	Noise Sources ^{(1) (2)}
Fyvie Avenue	15 minutes	53	<u>Volvo EC290 excavator loading up the Volvo, Terex and Komatsu dump trucks. Dump trucks using eastern haul route.</u> CAT 815 compactor audible although secondary noise source. Komatsu D85 bulldozer pushing fill near centre of quarry however mostly screened from measurement position. <i>Non-quarry sound:</i> Distant traffic on surrounding roads
Grahame Breed Drive ⁽³⁾	15 minutes	54	<u>Doosan DX225 pushing rubble down face. Trucks manoeuvring tipping fill (incl reverse beepers).</u> Komatsu WA480 loading truck. Komatsu D85 drives from north to south to refuel. Volvo EC290 moving fill. <i>Non-quarry sound:</i> 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

3.4 Discussion

3.4.1 Fyvie Avenue

Sounds from activities associated with controlled fill operations were the controlling sources during the measurement at this position. The Volvo EC290 was removing fill from the stockpile and loading onto three dump trucks. The dump trucks were transporting the fill along a haul route at the base of the eastern quarry face. These vehicles were considered to be the controlling sources during the measurement. A CAT 815 compactor and Komatsu D85 bulldozer were also working at a lower RL. However, for the most part, the bulldozer was screened behind aggregate stockpiles.

Ambient noise sources (i.e. not associated with the quarry) included distant traffic noise from vehicles on Mt Eden Road and Mt Albert Road.

A level of 53 dB L_{A10} was measured at this location which complies with the relevant noise limit of 55 dB L_{A10}.

3.4.2 Grahame Breed Drive

As with the Fyvie Avenue measurement, sounds generated by controlled fill operations were the controlling sources of sound during the measurement. The Doosan DX225 excavator was pushing material down the face of the clean fill reception area – some track noise was evident, as too was the sound of rubble falling down the face. Approximately 5 trucks delivered material to the reception area during the measurement.

Ambient noise sources are the same as for the Fyvie Avenue measurement.

A level of 54 dB L_{A10} was measured at this location which complies with the noise limit of 55 dB L_{A10}.

The following photos 1 & 2 show most of the plant which was in the quarry during the period of the survey.



Photo 1: Quarry looking northwards (From Grahame Breed Drive)



Photo 2: Quarry looking eastwards (from Fyvie Avenue)

4.0 CONCLUSIONS

Marshall Day Acoustics has completed noise monitoring at the two monitoring positions as used for the biannual quarry noise compliance surveys.

The principal noise generating activities during the survey were from equipment associated with controlled fill operations. Quarry activities were considered to be secondary noise sources.

Controlled fill operations were taking place approximately half way along the eastern face of the quarry and involved one excavator loading stockpiled fill into three dump trucks. A compactor was compacting fill at lower RL further southwards. Trucks were delivering material to the clean fill reception area located at the south-western end of the quarry and an excavator was pushing new fill down the face. A bulldozer was spreading fill although it was screened from view for the majority of the survey.

Quarry activity included the sporadic arrival and departure of trucks collecting aggregate from the stockpiles, and general loader operation. Aggregate extraction and crushing did not occur.

The cumulative acoustic emission from quarry and fill operations resulted in sound levels which complied with the relevant noise performance standards.

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.
$L_{A\text{max}}$	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 MEASUREMENT POSITIONS³



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