

**THREE KINGS RESIDENTIAL SCHEME**  
**Assessment of Noise Effects**  
**Rp 001 r03 2013656A**

**2 February 2015**



Project: **THREE KINGS RESIDENTIAL SCHEME**

Prepared for: **Winstone Aggregates Ltd  
PO Box 17195 Greenlane  
Auckland 1546**

Attention: **Bernie Chote**

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## 1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by Winstones Aggregates Ltd to assess the noise impact from the proposed sports fields as part of the Three Kings Quarry Residential scheme. Two fibre-reinforced sand playing fields are proposed in the centre of the development.

Noise from the fields' use, including player vocalisation, ball noise and coaching advice has been predicted to proposed dwellings. This report presents an assessment of these predicted noise levels with respect to the relevant noise rules within the District Plan .

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

### 1.1 Site Layout

A site layout is shown in Appendix B. The buildings to the south of the playing fields are proposed as 8 - 9 storey residential apartments. Two storey town houses are proposed to the north.

The apartment blocks are generally within 25 m of the edge of the playing fields. The pitches themselves would be fibre-reinforced sand due to the intended all year round usage and artificially lit.

### 1.2 Proposed Activities

It is understood that the sports field could be allocated to any football or cricket club. The fields are to be used throughout the year between the hours outlined below for an average of 30 hours per week.

- 7:00 am to 9:30 pm Monday to Saturday, with intensive use between 4 pm and 9:30 pm (after school training)
- 9:00 am to 6:00 pm on Sundays and public holidays

## 2.0 NOISE CRITERIA

### 2.1 District Plan Noise Rules

The Auckland City District Plan includes noise rules that are designed to control noise emissions from various activities and can indicate the degree of acoustical protection intended for an area.

The proposed site (currently Three Kings Quarry) is zoned Business 7 within the Auckland District Plan: Isthmus Section.

The site is zoned as Special Purpose in the proposed Auckland Unitary Plan.

Given the historic use of this site, the underlying zoning is not considered representative of a residential/open space development. It is considered appropriate to assess the noise levels emanating from the sport fields as if they were zoned as Open Space (Auckland District Plan: Isthmus Section) or Sports and Active Recreation (Auckland Unitary Plan) with the receiving dwellings being zoned residential.

2.1.1 Auckland District Plan: Isthmus Section

Rules 9.8.1.5 and 9.8.2.5 relating to noise are considered relevant to this assessment. MDA notes that the noise limits detailed in these rules are identical. The relevant noise limits are as follows:

...

*The L10 noise level and maximum level (Lmax) arising from any activity measured at or within the boundary of any residentially zoned property shall not exceed the following limits:*

<i>Monday to Saturday</i>	<i>7.00am – 10.00pm</i>	<i>L<sub>10</sub> 55 dBA</i>
<i>Sunday &amp; Public Holidays</i>	<i>9.00am – 6.00pm</i>	
<i>At all other times</i>	<i>L<sub>10</sub> 40 dBA L<sub>max</sub> 75 dBA, or background (L<sub>95</sub>) plus 30 dBA, whichever is the lower</i>	

*The Council may, subject to such conditions as are considered appropriate, permit the noise levels associated with occasional events to be exceeded for a reasonable proportion of the time.*

*Crowd noise shall not be included in any assessment of noise levels.*

*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”.*

*The noise shall be measured with a sound level meter complying at least with the International Standard IEC 651 (1979): Sound Level Meters, Type 1.*

## 2.1.2 Auckland Unitary Plan

The Unitary plan sets out rules for Recreational Noise received in the Residential Zone in Part 3: Chapter H – Rule 6.2.1.1.3 Recreational Noise:

### **Residential zone interface**

1. The  $L_{Aeq(15\ min)}$  noise level and maximum noise level ( $L_{AFmax}$ ) arising from:
  - a) any non-residential activity measured at or within the boundary of a property in a residential zone, or
  - b) any activity, other than farming, horticulture, measured at the notional boundary of any dwelling on rural zoned property must not exceed the following levels.

Table 12

Monday to Saturday 7am-9:30pm	60 dB $L_{Aeq(15\ min)}$ for 25hrs in any 7 day period during these times
Sunday and public holidays 9am-6pm	55 dB $L_{Aeq(15\ min)}$ for all other periods during these times
All other times	45 dB $L_{Aeq(15\ min)}$ 60 dB $L_{eq(15\ min)}$ at 63 Hz 55 dB $L_{eq(15\ min)}$ at 125 Hz 75 dB $L_{AFmax}$

2. At the same time, the following controls must also be met:
  - a) floodlights for sporting activities must be turned off by 9.30pm on Monday to Saturday and at 6pm on Sundays and public holidays
  - b) organised outdoor recreational activities must be finished by 9.30pm on Monday to Saturday inclusive and by 6pm on Sundays and public holidays
  - c) organised outdoor recreational activities must not commence before 7am on Monday to Saturday and 9am on Sundays and public holidays
  - d) vehicles entrances to any area exclusively serving an artificial sports field on the reserve must be closed between 11pm and 7am.

Additionally Part 3: Chapter H – Rule 6.2.1.1.8 General of the Unitary Plan states:

*Except where more specific requirements apply noise levels arising from activities must be measured and assessed in accordance with the New Zealand Standard on the Measurement of environmental sound (NZS 6801: 2008) and the New Zealand Standard on Acoustics - environmental noise (NZS 6802: 2008). Special audible characteristics (appendix B4 of NZS 6802: 2008) must not apply to measured levels at 63 and 125Hz if levels are specified for these frequencies, but must apply to all other octave frequencies.*

## 2.2 Discussion of Noise Limits

Different measurement parameters are adopted by the Auckland Unitary. This change in measurement parameter results in slightly less stringent noise limits,  $L_{10}$  is generally 2-3 decibels higher than  $L_{eq}$ , i.e. 55 dB  $L_{Aeq}$  equates to 57 - 58 dB  $L_{A10}$ .

The Auckland Unitary Plan sets out two daytime limits. A limit of 60 dB  $L_{Aeq}$  for a total of 25 hours in any 7 day period and 55 dB  $L_{Aeq}$  at all other times. This provides recognition that the use of sports field would be significantly limited if a noise limit of 55 dB  $L_{Aeq}$  was applied for the entire daytime period (as is current in the Auckland District Plan: Isthmus Section) and allows for a higher noise level for a limited time period over the course of a typical week. This enables greater amenity of the sports fields while ensuring the activities are not wholly unrestricted.

The Unitary Plan also has a less stringent overall night-time limit of 45 dB  $L_{Aeq}$  though low frequency noise controls are also applied.

The Auckland District Plan: Isthmus Section clearly indicates that crowd noise is to be excluded from any assessment, though this is not clearly defined in the Unitary Plan. However, it is expected that the same condition would be applied by Auckland Council under the Unitary Plan though it is not specifically cited.

It is considered that the Unitary Plan limits are more appropriate than those of the Auckland District Plan: Isthmus Section and adoption of the recommended noise limits outlined in Table 1 should be considered.

**Table 1: Recommended Noise Limits**

Monday to Saturday	7:00am-9:30pm	60 dB $L_{Aeq}$ for 25 hours in any 7 day period during these times
Sunday and public holidays	9:00am-6:00pm	55 dB $L_{Aeq}$ for all other periods during these times
All other times		45 dB $L_{Aeq}$ 60 dB $L_{eq}$ at 63 Hz 55 dB $L_{eq}$ at 125 Hz 75 dB $L_{AFmax}$
Crowd noise shall not be included in any assessment of noise levels		

### 3.0 NOISE ASSESSMENT

The assessment of noise has been conducted in accordance with New Zealand Standard NZS 6802:2008 “Acoustics - Environmental Noise” as specified in the Auckland Unitary Plan.

NZS 6802:2008 contains an adjustment (+5 decibels) for noise which displays a special audible characteristic (SAC) such as tonality or impulsiveness. Whilst the referees whistle could be regarded as being tonal and the striking or kicking of balls as being impulsive, it is MDA’s opinion that noise generating activities associated with the use of the fields, including referees’ whistle and ball striking, are intrinsic components of sports fields, and there is likely to be a high expectation from residents surrounding the fields that these types of noises and associated characteristics form part of the amenity of the area. Therefore, the application of the SAC penalty is considered by MDA to be unnecessary in this instance.

#### 3.1 Usage of Sports Fields

MDA has predicted the noise level from sporting activities held on the proposed fields for the surrounding dwellings. The predictions of noise are for the simultaneous use of both fields, which represents a worst-case scenario.

The predictions focus on the use of the fields for competitive games, as the vocal effort of players and coaches during games would be elevated above those during practice and coaching due to the competitive nature of rival teams.

#### 3.2 Source Sound Levels

MDA has undertaken a considerable number of sports field assessments and has built up a database of noise levels associated with their use. Experience has shown that the major source of noise for team games attended by spectators is the spectators themselves, with a mixture of raised and shouting vocal effort used by coaches and spectators to communicate with teams/players and to encourage them. However, as crowd noise is specifically excluded from the assessment of noise effects, these predictions only consider noise from players and coaching. Therefore, a sound power level of 94 dB  $L_{AW}$  has been selected based on other projects of a similar nature, and forms the basis of noise modelling.

#### 3.3 Predicted Sound Levels

Table 2 summarises the calculated sound levels from competitive sports games held simultaneously on both fields incident on the façades of the buildings immediately overlooking the playing fields. Sound levels would be lower at the next set of buildings away from the sports fields due to the screening offered by other buildings.

**Table 2: Summary of Noise Limits and Calculated Sound Levels**

		UP Limit*	DP Limit	Calculated Levels
Monday to Saturday	7:00am-9:30pm	60/55 dB $L_{Aeq}$	55 dB $L_{A10}$	49 – 51 dB $L_{Aeq}$
Sunday and public holidays	9:00am-6:00pm			
All other times		45 dB $L_{Aeq}$	40 dB $L_{A10}$	51 – 54 dB $L_{A10}$

\* Higher level permitted for up to 25 hours per week



These calculated levels will be similar on floor levels of the multi-storey buildings. While there is an increase in distance attenuation the higher up the building, there is also a reduction in ground attenuation (further from the ground). The resultant change in overall level with height up the building would be negligible.

The sound level predictions readily comply with the daytime noise limits of both the Unitary and District Plan. There would be a significant exceedance of the night-time (Mon-Sat after 9:30 pm) and Sunday evening (after 6:00 pm) limits if the fields were used during these times. However, based on the information outlined Section 1.2, it is expected that the fields would not be used during these periods.

### 3.4 Assessment of Noise Effects

Under the provisions of the Resource Management Act (RMA) there is a duty to adopt the best practicable option to ensure that the noise from any activity does not exceed a reasonable level. Specifically, Sections 16 and 17 reference noise effects as follows.

Section 16 states that *“every occupier of land (including any coastal marine area), and every person carrying out an activity, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level”*.

Section 17 states that *“every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity, whether or not the activity is in accordance with a rule in a plan, a resource consent or relevant sections of the RMA”*.

Notwithstanding compliance with the recommended noise limits detailed in Section 2.2, MDA consider that adoption of an appropriate management plan for the sport fields operation would constitute the best practicable option. This management plan should outline the periods during the week the sports fields would be in use and include procedures for handling and addressing any complaints received by residents.

In the opinion of MDA, due to the ready compliance of the predicted sound levels with the recommended noise limits, together with the adoption of a management plan (constituting the best practicable option), it is considered that the noise effects can reasonably be described as no more than minor.

### 4.0 SUMMARY AND CONCLUSION

An acoustic assessment has been undertaken for the proposed two new sports fields as part of the Three Kings Residential development.

MDA has predicted the sound levels that would be received at nearby dwellings from sporting activities held on both fields concurrently.

It is predicted that sound from sporting activities held on the fields between the hours outlined in Section 1.2 would readily comply with the relevant daytime noise limits at the surrounding properties.

As predicted sound levels do not exceed the recommended daytime noise limit, the effects would be no more than minor.

## APPENDIX A GLOSSARY OF TERMINOLOGY

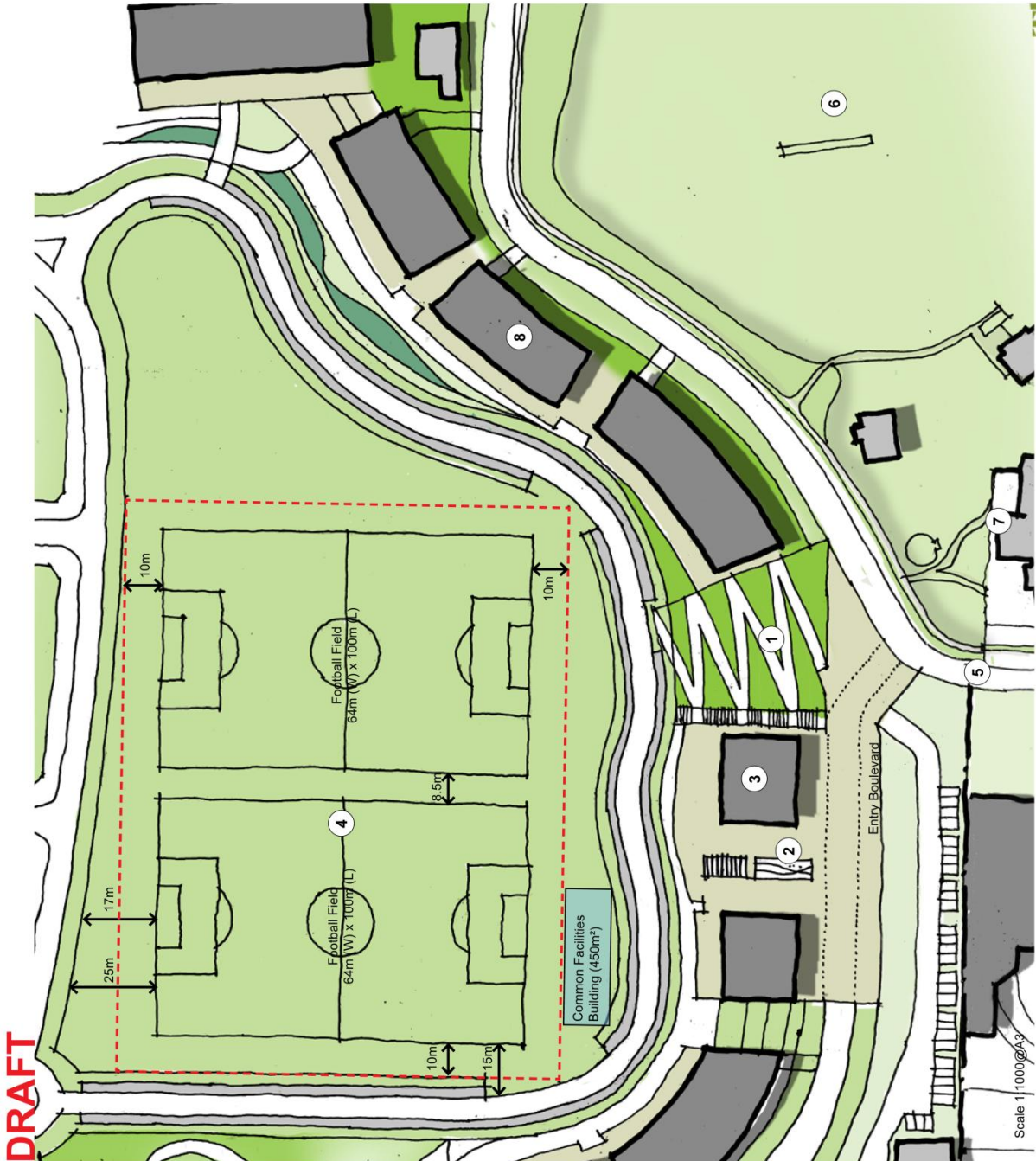
<b>Masking Noise</b>	Intentional background noise that is not disturbing, but due to its presence causes other unwanted noises to be less intelligible, noticeable and distracting.
<b>Ambient</b>	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
<b>Special Audible Characteristics</b>	Distinctive characteristics of a sound which are likely to subjectively cause adverse community response at lower levels than a sound without such characteristics. Examples are tonality (e.g. a hum or a whine) and impulsiveness (e.g. bangs or thumps).
<b>dB</b>	<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. $\text{dB} = 20 \times \log(P/P_r)$
<b>dBA</b>	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.
<b>A-weighting</b>	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
<b><math>L_{Aeq}(t)</math></b>	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average 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.
<b><math>L_{A90}(t)</math></b>	The A-weighted noise level equalled or exceeded for 90% 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.
<b><math>L_{A10}(t)</math></b>	The A-weighted noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum 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.
<b>NZS 6801:1991</b>	New Zealand Standard NZS 6801:1991 " <i>Measurement of Sound</i> "
<b>NZS 6802:1991</b>	New Zealand Standard NZS 6802:1991 " <i>Assessment of Environmental Sound</i> ".
<b>NZS 6803:1999</b>	<i>New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise"</i>

APPENDIX B PROPOSED SITE LAYOUT

**ATTACHMENT A.2  
Town Centre &  
Sports Fields**

**LEGEND**

- 1. Stair & Ramp**  
Proposed grand staircase and pedestrian ramp relocated to align with 'main street' axis leading from Mt. Albert Road to Grahame Breed Drive. The combined width of both the stair and ramp also opens up a wider line of sight towards the maunga.
- 2. Plaza**  
A paved plaza is proposed at the intersection of Grahame Breed Drive and 'main street'. This plaza, in addition to the undercroft area of the proposed mixed use building, will support community activities such as craft markets and passive recreation.
- 3. Key mixed use building**  
The undercroft of this building will support spillover seating and activities from potential cafe or business uses on the ground floor. Glazed or permeable portions on the ground floor allow residents and visitors to see through the building. A public lift is also proposed within this building to accommodate disabled access from Grahame Breed Drive to the proposed sports fields.
- 4. Sports fields**  
Two 64m x 100m football fields with generally 10m buffer zones can be accommodated within the main public open space.
- 5. Main Street**
- 6. Three Kings Park**
- 7. Fickling Centre**
- 8. Cascading Apartments**



**DRAFT**

Scale 1:1000 @ A3

**Fletcher Living** JK0

**Three Kings**



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