

**MERCY HOSPITAL - PROPOSED REZONING**

**Noise assessment**

**Rp001 R03 2012008C**

**5 July 2012**



Project: **MERCY HOSPITAL - PROPOSED REZONING**

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#### Document control

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Approved	03	Zone naming changed	5 July 2012	Jon Farren	Stuart Camp

## EXECUTIVE SUMMARY

Marshall Day Acoustics has been engaged to review potential noise effects associated with the proposed plan change to create a *Major Facilities (Mercy Hospital) Zone*.

We consider that the residential zone noise level limits that currently apply to the hospital, should be maintained for the proposed plan change. Our measurements indicate that the site currently complies with the most stringent noise limit of 35 dB  $L_{A10}$  at night.

With appropriate design and mitigation, we consider that the development outlined in the structure plan will be able to comply with the existing District Plan noise limits.

Additional control should be placed on construction (and demolition) noise through the application of NZS 6803: 1999 "*Acoustics - Construction Noise*"

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## 1.0 INTRODUCTION

Marshall Day Acoustics has been engaged by Mercy Hospital Dunedin Ltd to perform an assessment of noise effects associated with a proposed private plan change to rezone its site at 72 Newington Avenue. We understand that hospitals are not permitted within any zone under the District Plan. Therefore any new development or an extension is considered non-complying and a resource consent is required.

The proposed private plan change seeks to create a *Major Facilities (Mercy Hospital) Zone* which will provide for hospital related activities to be *permitted*, subject to compliance with specific performance standards.

This report considers:

- The current Dunedin City District Plan noise performance standards applicable to the site;
- A discussion of the existing noise environment at the site;
- An outline of potential future activities on site; and
- Recommendations for noise performance standards within the proposed zone.

A glossary of acoustics terminology used in this report is provided in Appendix A.

## 2.0 DUNEDIN CITY DISTRICT PLAN

Mercy Hospital is currently zoned *Residential 1*. The applicable noise limits applying to Mercy Hospital activities, when measured at the boundary or within any other property within the same noise area are:

- Daytime                      50dB L<sub>A10</sub>
- Shoulder period      45dB L<sub>A10</sub>
- Night-time                35 dB L<sub>A10</sub>

Where:

**Daytime**- means the period between the hours of 7:00 am and 9:00 pm, except that where any shoulder period applies day-time is between the hours of 8:00 am and 6:00 pm.

**Night-time** - means the period between the hours of 9:00 pm on any night and 7:00 am the following day and includes 24 hours on Sundays and statutory holidays.

**Shoulder Period** - means the period between 7:00 am and 8:00 am and between 6:00 pm and 9:00 pm, Monday to Friday and between 6:00 pm and 9:00 pm Saturday.

Noise measurements of an activity are to be made in accordance with *New Zealand Standard 6801:1991 Measurement of Sound* and assessed *New Zealand Standard 6802:1991 Assessment of Environmental Sound*. We note that both these standards have been superseded with 2008 versions.

In general terms, the City Plan noise limits essentially offer a daytime noise limit of 50 dBA and night-time limit of 35dBA. The night-time noise limit is particularly stringent in comparison to other District Plans around New Zealand where 40 or 45 dBA is more common. A night-time noise limit of 45dBA reflects World Health Organisation<sup>1</sup> guidance.

Also of note is that the night-time limit applies all day on Sunday. It is our experience that the daytime noise environment on Sundays is typically no different from any other day of the week and, purely in respect of noise amenity, there is no justification for having a lower limit during the day on Sunday. This approach is adopted in the current version of NZS 6802:2008 “*Acoustics - Environmental Noise*”.

The Plan makes no specific reference to construction noise within a *Residential 1* zone, however, mention is made of construction noise in the *Abbotsford Residential 6* zone where the normal noise rules do not apply. It is current best practice to assess construction noise in accordance with NZS 6803: 1999 “*Acoustics - Construction Noise*”. We note that this Standard has been adopted into recent additions to the Plan for the Stadium Zone (Rule 21.5.3 (i)(a)).

### 3.0 EXISTING NOISE ENVIRONMENT

Marshall Day Acoustics has measured noise levels in the vicinity of the site in 2007, 2008 and 2011. Our 2007 site visit was to investigate noise control options for several items of mechanical plant at the hospital. The noise level reduction resulting from the introduction of several of the noise control recommendations was measured in January 2008. A spot check of daytime and night-time noise levels was conducted in 2011.

A summary of the noise levels representative of the night-time period is provided below in Table 1 and includes noise from multiple sources including Mercy Hospital mechanical plant, leaf rustle and distant traffic. Noise from vehicular and pedestrian traffic passing directly adjacent to the sound level meter, has been excluded from the measurement data. The measurement locations are shown in Figure 1.

**Table 1: Representative night-time noise levels in vicinity of Mercy Hospital**

Location	Date	dB L <sub>A10</sub>	Sources
1. Burwood Rd	29 Nov 2011	39	Local transformer and distant traffic dominant. Mercy Hospital not audible
2. 63 Newington Ave	18 Jan 2008	36	Wind generated noise and distant traffic. Mercy Hospital not audible

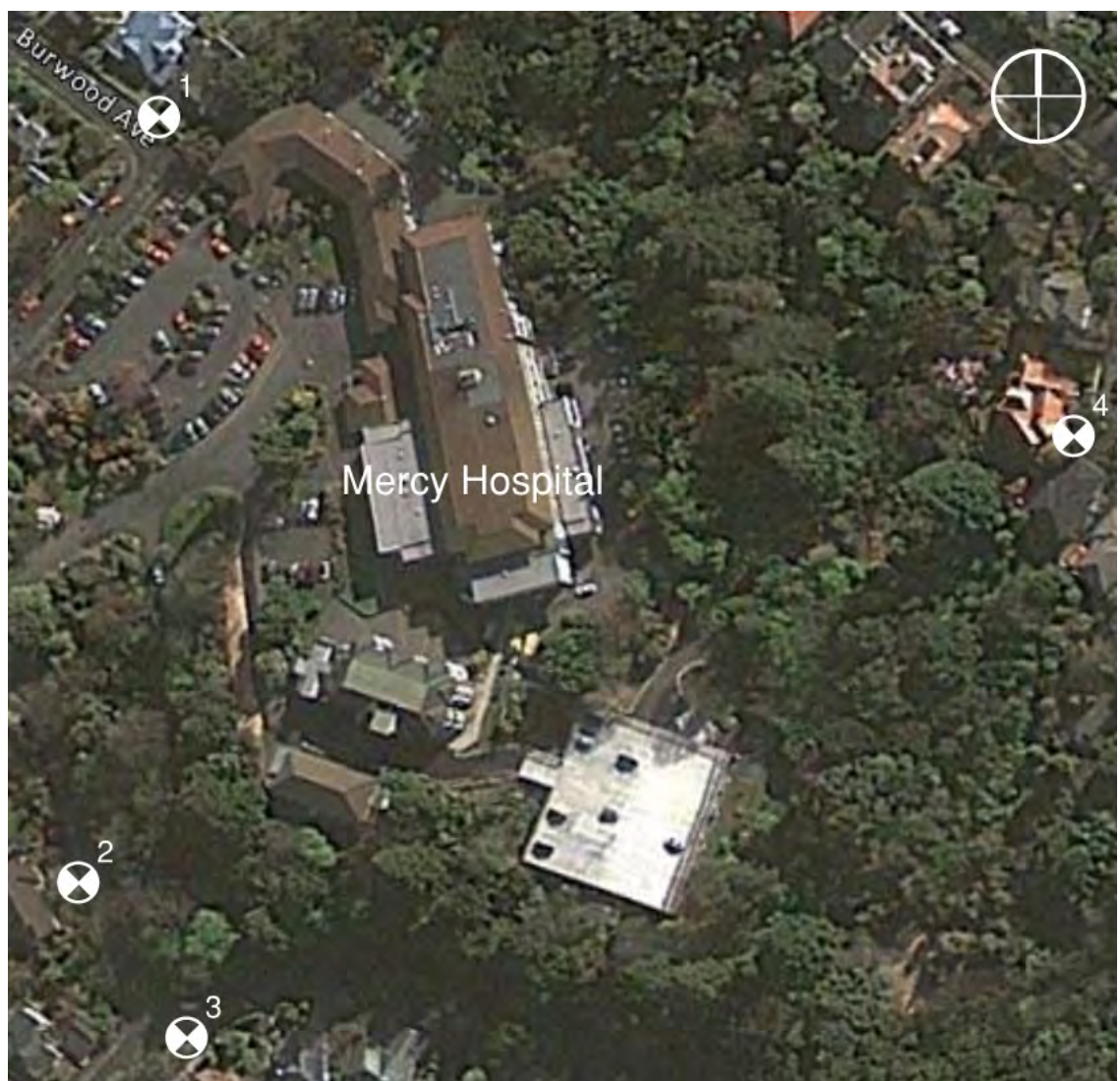
<sup>1</sup> *Guidelines For Community Noise* Edited by Birgitta Berglund, Thomas Lindvall, Dietrich H Schwela, World Health Organisation 1999



Location	Date	dB L <sub>A10</sub>	Sources
3. Cnr Newington & Hamel	29 Nov 2011	32	Distant traffic dominant. Mercy Hospital not audible
4. 58 Grendon St	18 Jan 2008	36	Birdsong and traffic audible. Mercy Hospital mechanical plant just audible

At all but one measurement location (Pos 4), mechanical plant from Mercy Hospital was inaudible. Given this, we are able to determine that the noise level contribution from Mercy Hospital complies with the District Plan night-time noise limit of 35 dB L<sub>A10</sub>.

**Figure 1: Aerial photo showing noise measurement locations (Source Google Earth)**



#### 4.0 POTENTIAL FUTURE NOISE LEVEL GENERATION

We have reviewed the *Mercy Hospital Structure Plan* drawings dated May 2011 prepared by Octa Associates Ltd and the accompanying document *Plan Change Request including section 32 Report* (draft dated 28/05/12) prepared by Mitchell Partnerships. The report identifies areas where future development work may be required on site. In respect of potential noise generation, the following items are noteworthy:

- Re-planning and reconfiguration is required to some departments which is likely to include some demolition and construction noise;
- Upgrade to the energy centre may introduce new or modified items of mechanical plant;
- Additional car parking may be developed.

Due to the relatively short duration of construction activities, any corresponding potential noise effects are correspondingly short lived. We do not consider it appropriate for construction activities to be assessed against normal District Plan noise limits. Current best practice is to assess construction (and demolition) noise in accordance with the recommendations outlined in NZS 6803: 1999 “*Acoustics - Construction Noise*”. We consider that this is the appropriate means by which construction noise effects should be assessed.

Noise from mechanical plant and car parking can be readily predicted and noise control measures developed to ensure compliance with noise limits, and this has been the approach adopted by Mercy Hospital in the past.

With appropriate design and mitigation, we consider that the development outlined in the structure plan will be able to comply with the existing District Plan noise limits.

As the hospital currently complies with the existing District Plan noise limits, we see no justification for relaxing the District Plan noise performance standards to accommodate current best practice referred to in Section 2.0 above. Any change could, over time, alter the noise amenity afforded to residences immediately neighbouring the hospital. Any review of the residential noise limits to reflect current best practice should be conducted as part of a district wide review at the appropriate time.

Therefore, in order to maintain the existing level of noise amenity in the area, we consider it appropriate that the current District Plan residential noise performance standards also apply to the proposed *Major Facilities (Mercy Hospital) Zone*.



## 5.0 PERFORMANCE STANDARD RECOMMENDATIONS

Based on discussion above, we propose that the following items are considered when forming performance standards for the proposed *Major Facilities (Mercy Hospital) Zone* in order to ensure acceptable noise effects:

- Rule 21.5.1 “Performance Standard: Noise Limits - General Levels” should apply to activities within the *Major Facilities (Mercy Hospital) Zone*;
- Construction and demolition activities should be assessed in accordance with NZS 6803: 1999 “*Acoustics - Construction Noise*”.

## APPENDIX A GLOSSARY OF TERMINOLOGY

<b>Noise</b>	A sound that is unwanted by, or distracting to, the receiver.
<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>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_{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><math>L_{A\text{max}}</math></b>	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
<b>NZS 6801:1991</b>	New Zealand Standard NZS 6801:1991 " <i>Measurement of Sound</i> "
<b>NZS 6801:2008</b>	New Zealand Standard NZS 6801:2008 " <i>Acoustics – Measurement of environmental sound</i> "
<b>NZS 6802:1991</b>	New Zealand Standard NZS 6802:1991 " <i>Assessment of Environmental Sound</i> ".
<b>NZS 6802:2008</b>	New Zealand Standard NZS 6802:2008 " <i>Acoustics – Environmental Noise</i> "
<b>NZS 6803:1999</b>	New Zealand Standard NZS 6803: 1999 " <i>Acoustics - Construction Noise</i> "

## APPENDIX B NOISE SURVEY DETAILS

### B1 Location of Survey

In the vicinity of:  
Mercy Hospital,  
Newington Avenue  
Dunedin

### B2 Date of Surveys

18 January 2008 and 29 November 2011

### B3 Personnel Present During Survey

2008 Rob Hay, Marshall Day Acoustics Ltd.  
2011 Jon Farren and Aaron Staples, Marshall Day Acoustics Ltd.

### B4 Instrumentation

Brüel & Kjær Type 2260 Investigator sound level meter  
Brüel & Kjær Type 4321 acoustic calibrator

### B5 Procedure

Before and after the survey the measurement apparatus was check calibrated to an accuracy of  $\pm 0.3\text{dB}$  using the Type 4231 Sound Level Calibrator. The noise survey was conducted generally in accordance with NZS 6801:1991 "*Measurement of Sound*".

### B6 Weather

2008: Overcast, negligible breeze at ground level but sufficient breeze at approx 20m to generate some leaf rustle in trees surrounding the site. 15°C  
2011: Overcast, occasional light breeze and 8°C.