

# Report



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## ACOUSTIC SERVICES

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### **Illawarra Elective Surgery – Acoustic Assessment Health Infrastructure**

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CONFIDENTIAL

Revision: 2.0 - Issue  
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## **1. EXECUTIVE SUMMARY**

This report has been an acoustic assessment for the proposed Illawarra Elective Surgery (IES).

The report discusses the findings of an unattended noise survey conducted to define the acoustic criteria in accordance with the relevant statutory guidelines. This report also recommends criteria for traffic noise impact on noise sensitive locations outside the proposed IES.

Based on these criteria, in-principle acoustic recommendations are considered for mechanical services and traffic volume increases which are related to the development. These are discussed in detail in Section 5 of this report.

It is our opinion that the acoustic treatment required for the development can be implemented with conventional architectural / mechanical components and operational methodologies. Consequently compliance can be achieved with the criteria listed in Section 4 of this report.

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## 1. BACKGROUND

### 1.1. Authorization

Authorization to conduct this project and prepare this report was provided by Troy Harvey of Health Infrastructure dated July 26th 2011.

### 1.2. Information Sources

The following references have been used for this assessment.

- Office of Environment and Heritage *Industrial Noise Policy* (INP, 2000)
- Office of Environment and Heritage *NSW Road Noise Policy*,(NSW RNP, 2011)
- Office of Environment and Heritage *Interim Construction Noise Guideline*, (ICNG, 2009)
- Traffic and Transport Accessibility Report. Taylor Thomson Whitting (TTW) Report No. 101498. July 2011v8.1.
- Drawing IESS – A101 Site A – Level 1 Rev. D, General Arrangement Plan, issued by Hassell on 11/07/11.
- Drawing IESS – A106 Site A – Level 3 Rev. D, General Arrangement Plan, issued by Hassell on 11/07/11.
- Drawing IESS – A111 Site A – Level 6 Rev. C, General Arrangement Plan, issued by Hassell on 20/06/11.

### 1.3. Revision

Rev.	Date Issued	Comment
1.0	8 <sup>th</sup> August 2011	Issue
2.0	23 <sup>rd</sup> August 2011	Comments Included.

## 2. INTRODUCTION

As part of Illawarra Elective Surgery (IES), NDY Sound has been engaged to produce a DA report addressing environmental noise emission.

The site is located to the north of the existing Wollongong Hospital. The existing IES building will be refurbished and new extension added to the building footprint. The proposed building will have a frontage to Loftus Street, between New Dapto Road and Darling Street, as noted on Figure 1.

Nearby residences with direct line of sight to the proposed building are:

- North on Loftus Street.
- South West on New Dapto Road.

These nearest residences are identified as the most noise sensitive receivers on which our acoustic assessment will be conducted.

Other potential noise sensitive locations also considered for the acoustic assessment are:

- South to the existing Wollongong hospital buildings.
- East to the Elouera House building.

All listed noise sensitive locations (both residential and hospital receivers) are shown in Figure 1.

**Figure 1: Noise Sensitive Locations and Noise Logger Location**



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### 3. NOISE MONITORING

#### 3.1. Methodology

Unattended noise measurements were conducted to determine the existing ambient noise levels for the area. Noise measurements were taken for a period of 1 week from the 23<sup>rd</sup> May 2011 until the 31<sup>st</sup> May 2011. The location of noise logging is shown as *Logger 1* in Figure 1. The street address was 42 Loftus Street, Wollongong.

The equipment used to conduct these unattended measurements was an Infobyte Noise Monitor Type iM4 (serial number: SN101). The equipment calibration was checked prior to, and after the noise survey. No significant drift was noted during the calibration procedure. The noise monitor was configured to record all relevant noise indices including background noise (LA90) and equivalent continuous noise levels LAeq. Samples were recorded as continuous 15 minute intervals. The noise monitor responses were set to *fast*.

#### 3.2. Weather Data

In order to verify that noise data was obtained during suitable meteorological conditions, weather data was obtained from the Bureau of Meteorology (BOM). Rain and wind speed data was used from the Wollongong Albion Park meteorological site as representative of the proposed IES site.

Noise data has been excluded from the results if:

- Rain was observed during the fifteen minute noise measurement period and/or
- The wind speed exceeded 5 m/s at the measurement height of 1.5 m above ground. Wind data obtained from the BOM is presented as the value at 10m above ground, and the measured values are halved for the purpose of assessing wind speed at 1.5 m above ground.

#### 3.3. Measured Noise Levels

For the purpose of assessment, the measured data was processed into time periods as follows:

- Daytime: 0700 to 1800
- Evening: 1800 to 2200
- Night-time: 2200 to 0700

The measured background (LA90) and equivalent continuous (LAeq) noise levels during these defined time periods are presented in Table 1.

The LA90 noise levels presented are *Rating Background Levels* (RBLs), being the median of the lowest 10<sup>th</sup> percentile of the background LA90 samples in each daytime, evening and night-time measurement period, for each 24 hour period during the noise survey.

The LAeq noise levels presented are the logarithmic average of all the LAeq samples taken in each of the daytime, evening and night-time periods.

**Table 1. Measured Noise Levels – Logger 1**

Date	LA90 Background Noise Levels			LAeq Ambient Noise Levels		
	Daytime	Evening	Night-time	Daytime	Evening	Night-time
Monday 23 May, 2011	41	40	34	51	51	45
Tuesday 24 May, 2011	42	42	43	52	51	53
Wednesday 25 May, 2011	47	44	39	56	53	48
Thursday 26 May, 2011	42	41	36	52	50	45
Friday 27 May, 2011	41	41	37	52	51	46
Saturday 28 May, 2011	40	39	36	50	49	45
Sunday 29 May, 2011	39	39	38	50	50	52
<b>RBL / LAeq</b>	<b>41</b>	<b>41</b>	<b>37</b>	<b>52</b>	<b>51</b>	<b>49</b>

The noise logging data was visually inspected for erroneous noise events. Any erroneous noise data was manually excluded from the measurement data.

A summary of the noise logging data is provided in Appendix A.

## 4. ACOUSTIC CRITERIA

### 4.1. Operational Noise Level Criteria

Based on the unattended noise survey discussed in Section 3, the operational noise level criteria for nearest residences have been derived in accordance with the NSW Industrial Noise Policy (NSW INP). This was issued by NSW Environmental Protection Authority which is now part of the NSW Office of Environment and Heritage.

The NSW INP provides assessment methodologies, criteria and detailed information on the assessment of stationary mechanical plant items in NSW.

The NSW INP criteria for industrial noise sources address two (2) components:

- Controlling **intrusive** noise impacts for residential receivers. Assessing intrusiveness generally requires noise measurements to quantify background ( $L_{A90}$ ) noise levels at a location considered representative of the most potentially affected residential receiver(s). The intrusiveness criterion essentially means that the equivalent continuous noise level ( $L_{Aeq}$ ) of the source(s) under consideration should be controlled to within 5 dB of the background noise level.
- Maintaining noise **amenity** for various categories of land use (including residential receivers and other sensitive receivers). The amenity criterion is based on the sensitivity of a particular land use to industrial-type noise. The cumulative effect of noise from industrial sources needs to be considered. The existing noise level from industrial sources is measured. If it approaches the amenity value for the land use, noise levels from new industrial-type noise sources need to be controlled so that the cumulative effect does not result in aggregate noise levels that would significantly exceed the criterion.

Nearby noise sensitive receivers are considered to be *urban* according to the definitions in the NSW INP for the purposes of assessing the amenity criteria.

**Table 2. Operational Noise Level Criteria - Residential Properties**

Type of Receiver	Noise Level dB re 20 $\mu$ Pa		
	Daytime 0700 to 1800	Evening 1800 to 2200	Night-time 2200 to 0700
<b>Intrusiveness Assessment <math>L_{Aeq,15min}</math></b>			
Residential Premises	46	46	42
<b>Amenity Assessment <math>L_{Aeq,Period}</math></b>			
Residential Premises	60	42	39

For buildings within the premises of the Wollongong Hospital we have used the hospital amenity criteria discussed in the NSW INP and as recommended in the *Application Notes* for this policy. These criteria are listed in the table below and include the Elouera House building.

**Table 3. External Noise Level Criteria - Hospital Premises**

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended LAeq Noise Level dB	
			Acceptable	Recommended Maximum
Hospital ward – Internal	All	Noisiest 1 hour period	35	40
Hospital ward – External	All	Noisiest 1 hour period	50	55

#### 4.2. Traffic Noise Criteria

Traffic noise impacts on the nearby residential dwellings due to the use of the proposed loading dock have been assessed in accordance with the *NSW Road Noise Policy* (NSW RNP) issued by the NSW Office of Environment and Heritage.

Section 3.4 of the NSW RNP states the following:

*“For existing residences and other sensitive land uses affected by **additional traffic on existing roads generated by land use developments**, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding ‘no build option’.*

Consequently, for this development an increase on traffic noise levels related to the increase in traffic due to the new development should be limited to a maximum of 2 dB.

#### 4.3. Construction Noise Management Levels (NML)

The Interim Construction Noise Guideline (ICNG) is aimed at managing noise from construction works regulated by the NSW Office of Environment and Heritage. It is also the *de facto* guideline for acoustic practitioners and other interested parties, used to assist in the assessment of noise emission from construction activities.

With reference to Section 1.3 of the ICNG, the main objectives of the Guideline are to:

- Use *Noise Management Levels* (NML's) to identify demolition, excavation and construction noise sources or scenarios that require engineering controls or administrative management (The term *criteria* is specifically not used in the ICNG).
- Promote a clear understanding of ways to identify and minimise noise from construction works.
- Focus on applying all *feasible* and *reasonable* work practices to minimise construction noise impacts.
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage.
- Provide flexibility in selecting site-specific and reasonable work practices in order to minimise noise impacts.

The measured RBLs as given in Table 1 have been used to define the *Noise Management Levels* (NMLs) for the construction works associated with the IES development. No work is typically permitted for this type of project outside of normal work hours so only daytime NMLs are provided.

A summary of the construction noise management levels as per the ICNG are shown in Table 4.

**Table 4. Summary of the Construction Noise Management Levels.**

Noise Sensitive Receiver	Daytime		Where Assessed
	Measured RBL LA90(15min) (dB)	Noise Management Level LAeq(15min) (dB)	
Residential	41	51	Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level.
Hospital	-	45	Noise levels to be determined at any <i>internal</i> location.

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## 5. ACOUSTIC ASSESSMENT

### 5.1. Mechanical Services

An upper plant area, containing cooling tower equipment and boilers are proposed at level 6, some 50 m from the nearest residential receivers on Loftus Street and 5 m from the nearest hospital receivers.

NDY Sound has used typical noise data of common plant items to predict the environmental noise emission from the site to the nearest noise sensitive receivers – which have been determined to be the hospital buildings to the south of the site. Assessing the worst case scenario the shortest offset distance between the mechanical plant and the receivers is approximately 5 m. In order to achieve the environmental noise emission criteria (see Table 3) the development should achieve the following limiting aggregate sound power levels:

- 72 dB L<sub>WA</sub> from plant room(s) on Level 6.
- 70 dB L<sub>WA</sub> from the plant room at the west side of the building on Level 3 (facing onto Loftus Street).

The limiting aggregate sound power levels for the plant, is the summation of the emitting sound power level contributions from all mechanical plant items in each plant room or plant area. These plant items include chillers, cooling towers, pumps, fans, AHUs, boilers, condensers and outdoor split units.

In order to achieve the recommended limiting sound power levels, the following in principle measures will be considered:

- Main mechanical plant items should be fully contained in plant rooms whose walls achieve a minimum weighted sound reduction index of 50 dB R<sub>w</sub>. Plant rooms should not be accessible from outside the building. Louvres are not recommended in these plant rooms.
- All plant room walls and roofs should be internally lined with insulation which achieves a minimum NRC rating of 0.8. Insulation should include a perforated metal facing with more than 20 % perforated area, or woven cloth facing.
- All plant room construction should be fully sealed (air tight), fully closed and free of gaps.
- Install internally lined return air / outside air mixed boxes behind AHUs.
- Install acoustic louvers in the plant room external air intakes and outlets.
- Install silencers on external air inlets or outlets (especially for fans).
- Implement variable speed drive units whenever possible.

### 5.2. Generator Set

Additionally, a generator set is proposed on Level 1, approximately 30 m to the nearest residence on Loftus Street and 6 m to the nearest hospital receiver on Elouera House. NDY Sound has used typical noise data from a generator set of the required characteristics to predict the environmental noise emission from the site to the nearest noise sensitive receivers – which have been determined to be the Elouera House receivers to the east of the site. Assessing the worst case scenario the shortest offset distance between the mechanical plant and the receivers is approximately 6 m. In order to achieve the environmental noise emission criteria (see Table 3) the generator set should achieve the following limiting aggregate sound power level:

- 77 dB L<sub>WA</sub> from generator set on Level 1.

The limiting aggregate sound power levels for the generator set is the summation of the emitting sound power level contributions from all generator set items. These items include the generator (casing, intake,

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discharge and exhaust) radiator fan, pumps and all the associated ductwork and attenuators (including regenerated noise).

In order to achieve the recommended limiting sound power levels, the following in principle measures will be considered:

- Generator should be fully contained in a room whose walls achieve a minimum weighted sound reduction index of 50 dB  $R_w$ . Generator room should not be accessible from outside the building. Louvres are not recommended in this room.
- All walls and roofs should be internally lined with insulation which achieves a minimum NRC rating of 0.8. Insulation should have include a perforated metal facing with more than 20 % perforated area, or woven cloth facing.
- Room construction should be fully sealed (air tight), fully closed and free of gaps.
- Proprietary acoustic door with a minimum performance of 50 dB  $R_w$ .
- Install internally lined ductwork.
- Enclose all internal duct work with plasterboard cladding.
- Enclose all internal pipes and exhaust ducting with metal cladding.
- Install silencers on external air intakes, outtakes.
- Primary and secondary exhaust mufflers (if necessary).
- Vibration and structure borne noise isolation mounts.

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### 5.3. Traffic Noise Impact

NDY Sound has reviewed the traffic information contained in the traffic report for the proposed buildings as prepared by Taylor Thomson Whitting (TTW). The overall traffic impact on the site is reported as an additional 375 per hour during the peak traffic period. Table below summarises the existing and future vehicle movements and the associated change in noise level as a result of the traffic increase. This table is based on the worst case scenario expected during peak-hour traffic.

**Table 7. Summary of traffic vehicle increases and noise impacts**

Road	Existing vehicles per hour	Future vehicle per hour	Noise increase (dB)	Complies with NSW RNP criterion
New Dapto Road	992	1278	1.1	Yes
Loftus Street	484	652	1.3	Yes
Darling Street	295	416	1.5	Yes

All of the traffic increases (during the peak hour traffic scenario) give rise to an increase in noise of less than 2 dB and therefore satisfy the NSW RNP.

### 5.4. Construction Noise

A detailed Construction Noise and Vibration Management Plan (CNVMP) shall be provided by the builder in accordance with the requirements of the ICNG using the construction noise management levels as defined in Section 4.3 of this report.

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## **6. CONCLUSION**

It is our opinion that the acoustic treatment discussed in Section 5 of this report are feasible and can be implemented with conventional architectural / mechanical components and operational methodologies.

Provided that at the detailed design stage the acoustic recommendations discussed in this report are considered and developed further, it is our opinion that compliance will be achieved with the acoustic criteria discussed in Section 4 of this report.

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## **APPENDIX A**

Graphical summary of noise logging data.



# Illawarra Cancer Care Centre (ICCC)

Monday 23 May 2011  
to  
Sunday 29 May 2011

