

Memorandum

To	Ivan Ip (Architectus)	Page	1
CC	Robert Ousey (Architectus) Patrick Martinez (AECOM)		
Subject	AIN - Noise Survey Final Results		
From	Sean Holmes		
File/Ref No.	60224807.MEM07.01	Date	29-Jul-2012

1.0 Background

This memo outlines the acoustic findings from a noise survey for the Australian Institute of Nanoscience (AIN) development.

1.1 Site layout

The site layout, including existing buildings, proposed building and nearest residential receivers (proposed St Pauls student accommodation development) is presented in Figure 1.

Figure 1 Site layout



2.0 Unattended noise measurements

Noise monitoring was conducted in the vicinity of the proposed development site to determine prevailing ambient noise levels, for example industrial type noise (building services plant equipment), traffic noise, etc. A SVAN 949 noise logger was located on the roof top of the Physics Annex building. During the attended noise measurements, it was noted that the main noise sources consisted primarily of mechanical plant from various existing building locations. A significant, but intermittent noise source was the oil refinery located between the existing Physics Building and the Physics Annex. Other mechanical noise sources were noted from a number of directions on the University campus. The noise logger monitored noise levels continuously from Friday 9 March to Friday 16 March 2012.

A second SVAN 949 noise logger was located in the north western corner of the field area. Notable noise sources in this location were from the nearby car park, City Road traffic noise and mechanical services from the Physics Building. The noise logger monitored noise levels continuously from Friday 9 March to Sunday 18 March 2012.

Both logging locations are presented in Figure 1. Logging results are presented in Table 1.

Table 1 Existing background (L_{A90}) and ambient (L_{Aeq}) noise levels

Measurement Date	L _{A90} Background Noise Levels, dB(A)			L _{Aeq} Ambient Noise Levels, dB(A)		
	Day	Evening	Night	Day	Evening	Night
Logger 1 – Physics Annex Building Rooftop						
Friday 09 March, 2012	50	50	47	56	55	50
Saturday 10 March, 2012	47	47	46	52	55	48
Sunday 11 March, 2012	46	49	47	51	56	52
Monday 12 March, 2012	50	49	46	56	55	50
Tuesday 13 March, 2012	50	51	47	54	55	50
Wednesday 14 March, 2012	50	51	47	54	58	52
Thursday 15 March, 2012	51	53	47	56	56	51
Friday 16 March, 2012	50	51	48	56	53	51
RBL	50	50	47	-	-	-
Log Average	-	-	-	55	56	51
Logger 2 – North West Corner of Field						
Friday 09 March, 2012	48	48	48	57	56	54
Saturday 10 March, 2012	45	48	46	56	56	50
Sunday 11 March, 2012	44	47	46	51	54	51
Monday 12 March, 2012	46	48	46	58	55	51
Tuesday 13 March, 2012	46	50	48	56	53	52
Wednesday 14 March, 2012	47	50	47	54	60	51
Thursday 15 March, 2012	48	50	46	56	54	50
Friday 16 March, 2012	47	49	46	55	52	50
Saturday 17 March, 2012	49	48	46	54	53	51
Sunday 18 March, 2012	46	47	-	51	56	-
RBL	46	48 (46)⁴	46	-	-	-
Log Average	-	-	-	55	56	51

Notes:

- 1) Day is defined as 7:00 am to 6:00 pm Monday to Saturday and 8:00 am to 6:00 pm Sundays and Public Holidays.
- 2) Evening is defined as 6:00 pm to 10:00 pm Monday to Sunday and Public Holidays.
- 3) Night is defined as 10:00 pm to 7:00 am Monday to Saturday and 10:00 pm to 8:00 am Sundays and Public Holidays.
- 4) The NSW *Industrial Noise Policy* (INP) (EPA, 2000) application notes recommends that when higher background noise levels (RBL) occur in the evening assessment periods, that the criteria are generally set to the lower daytime criteria in accordance with community expectations.

3.0 Operational noise criteria

The Department of Planning and Infrastructure have advised under the Director General's Requirements (DGRs) that the OEH's NSW Industrial Noise Policy (INP) should be used to assess noise emission from developments. The NSW INP sets out guidelines for the assessment and control of industrial noise (i.e. building services). These guidelines will apply to all mechanical plant installed at the proposed development.

The assessment procedure for industrial noise sources has two components:

- Controlling intrusive noise impacts in the short term for residences; and
- Maintaining noise level amenity for particular land uses including residences.

3.1 Intrusive noise impacts

The INP states that the noise from any single source should not intrude greatly above the prevailing background noise level. Industrial noise sources are generally considered to be acceptable if the equivalent continuous (energy-averaged) A-weighted level of noise from the source (L_{Aeq}), measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB(A). This is often termed the Intrusiveness Criterion.

The 'Rating Background Level' (RBL) is the background noise level to be used for assessment purposes and is determined by the methods given in the INP. Using the rating background noise level approach results in the intrusiveness criterion being met for 90% of the time. Adjustments are to be applied to the level of noise produced by the source that is received at the assessment point where the noise source contains annoying characteristics such as tonality or impulsiveness.

3.2 Protecting noise amenity

To limit continuing increases in noise levels, the maximum ambient noise level within an area from industrial noise sources should not normally exceed the acceptable noise levels specified in the INP. That is, the background noise level should not exceed the level appropriate for the particular locality and land use. This is often termed the Background Creep or Amenity Criterion.

For a residential receiver in an urban area, the recommended amenity criteria are shown in Table 1.

Table 2 Recommended L_{Aeq} noise levels

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level, dB(A)	
			Acceptable	Recommended Maximum
Residential	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
School classroom - internal	All	Noisiest 1-hour period when in use	35 (40) ¹	40
Commercial	When in use		65	70

Note:

- 1) In the case where existing schools are affected by noise from existing industrial noise sources, the acceptable L_{Aeq} noise level may be increased to 40 dB $L_{Aeq}(1hr)$.

When the existing noise level from *industrial noise sources* is close to the "Acceptable Noise Level" (ANL) given above, noise from the new source must be controlled to preserve the amenity of the area in line with the requirements of the INP.

Attended noise measurements were undertaken at the site and industrial noise has been identified as a feature of the area. Based on the measurements and logging results, the contribution from industrial noise is presented in Table 3.

Table 3 Existing industrial noise contribution

Location	Logged Ambient Noise Levels			Industrial Contribution		
	L_{Aeq}			L_{Aeq}		
	Day	Evening	Night	Day	Evening	Night
Logger 1 – Physics Annex Building rooftop	55	56	51	52	53	51

Location	Logged Ambient Noise Levels L _{Aeq}			Industrial Contribution L _{Aeq}		
	Day	Evening	Night	Day	Evening	Night
Logger 2 – North west corner of field	55	56	51	52	53	51

Adjustments to the “Acceptable noise level” have been made in accordance with Table 2.2 of the INP.

3.3 Project-specific noise levels

The project-specific noise levels (PSNL) for the various assessment periods, are shown in Table 4. These criteria must be applied at the most affected boundary. In this case, the most affected boundary is the proposed St Pauls development to the south of the AIN development.

For relatively constant noise emissions (as would be expected from building services plant and equipment) during the various assessment periods, the PSNL becomes the lower of either the intrusiveness or amenity criterion, this represents a conservative approach.

Based on the PSNL presented in Table 4 for the day, evening and night-time periods, the night-time criterion is the most stringent. Compliance with the night-time criteria will therefore ensure compliance with the day and evening criteria.

Table 4 Project-specific noise levels

Period	RBL L _{A90}	Intrusiveness Criterion RBL + 5 L _{Aeq, 15 minute}	Ambient L _{Aeq}	Industrial Contribution L _{Aeq}	Amenity Criterion, L _{Aeq, period}	Final Environmental Criterion L _{Aeq, 15 minute}
Day	46	51	55	52	51 ¹	51
Evening	46	53	56	53	43 ¹	43
Night	46	51	51	51	41 ¹	41

Notes:

- 1) Modifications to the amenity criteria have been made in accordance with Table 2.2 of the INP.

These criteria apply to environmental noise emissions from the development including mechanical services and other plant noise.

4.0 Noise measurements

Noise measurements of existing mechanical plant rooms, servicing laboratories within the University of Sydney buildings, have been undertaken. Results of the survey are presented in Table 5. These noise measurements will inform the acoustic design of grey spaces on the AIN building (e.g. separation requirements between grey space and laboratories).

Table 5 Mechanical plant room noise survey (attended noise measurements)

Measurement number	Location	Room dimensions (m)	Construction	Equipment	Measured L _{Aeq} dB(A)
1	Basement, Physics Building	10x2.2x2	50% Plasterboard, 50% brickwork	2 Cooling towers 1 Condenser unit	68

Measurement number	Location	Room dimensions (m)	Construction	Equipment	Measured L _{Aeq} dB(A)
2	Level 1, Physics Annex	4.4x3.1x3.0	50% Perforated metal, 50% smooth concrete	2 A/C compressor units	75
3	Ground floor, Chemistry building	15x10x2.8	Smooth concrete	2 pumps	75
4	Level 2, Madsen Building ¹	3x3x2	Covered in thermal insulation	1 Air handling unit	66
5	Level 1, Madsen Building ²	10x10x4	Smooth Concrete	1 Chiller 4 Pumps 2 Air handling units	87

Note: 1. Mechanical plant room located adjacent to the transmission electron microscopy facility. Mechanical plant also services the transmission electron microscopy facility.

2. Mechanical plant room located adjacent to the electron microscopy unit. Mechanical plant services the Madsen Building.

Please do not hesitate to contact the undersigned regarding this memorandum.

Regards,



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