

University of Newcastle - HCCD Stage 1A

Construction Noise and Vibration Management Plan

DRAFT

University of Newcastle - HCCD Stage 1A

Construction Noise and Vibration Management Plan

Client: Hansen Yuncken Pty Ltd

ABN: 38 063 384 056

Prepared by

AECOM Australia Pty Ltd

Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia

T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com

ABN 20 093 846 925

15-Apr-2020

Job No.: 60579316

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.


© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

DRAFT**Quality Information**

Document University of Newcastle - HCCD Stage 1A
 Ref 60579316
 Date 15-Apr-2020
 Prepared by Abhinav Konchery
 Reviewed by Gayle Greer

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	15-Apr-2020	Draft for review	Gayle Greer Technical Director - Acoustics	

DRAFT**Table of Contents**

1.0	Introduction	1
1.1	Background	1
1.2	Relevant guidelines	1
1.3	Site description and receivers	1
1.4	Proposed works	2
1.5	Proposed construction hours	2
2.0	Noise criteria	3
2.1	Noise management levels	3
2.2	Maximum noise levels for plant and equipment	3
2.3	Construction road traffic noise criteria	4
2.4	Construction vibration criteria	4
	2.4.1 Structural damage	4
	2.4.2 Human comfort	5
3.0	Noise and vibration management and mitigation strategies	6
3.1	Project specific noise and vibration mitigation measures	6
3.2	Community consultation and complaints handling	8
4.0	Monitoring	9
4.1	Monitoring and reporting	9
4.2	Monitoring procedure	9
4.3	Monitoring of equipment procedure	9
4.4	Equipment	9
4.5	Monitoring & reporting schedule	9
	4.5.1 Construction monitoring schedule	9
4.6	Reporting	10
	4.6.1 Reporting details	10
	4.6.2 Record keeping	10
4.7	Roles and responsibilities	10
5.0	Complaints handling procedure	12
6.0	Review and continual improvement	13
Appendix A		
	Glossary of Acoustic Terminology	A

DRAFT

1.0 Introduction

1.1 Background

AECOM Australia Pty Ltd has been engaged by Hansen Yuncken Pty Ltd (HY) to prepare a Construction Noise and Vibration Management Plan (CNVMP) for the proposed construction of Building 1A at Honeysuckle City Campus Development (HCCD) located at 16B Honeysuckle Drive, Newcastle, NSW.

The purpose of this Construction Noise and Vibration Management Plan is to describe how impact associated with construction noise and vibration are managed throughout the duration of the project. Works are to be implemented in accordance with the management measures and strategies contained within this plan.

A construction noise and vibration impact assessment was undertaken previously and was detailed in the *University of Newcastle - HCCD Stage 1A - SSD Noise and Vibration Impact Assessment* dated 26 February 2020.

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

1.2 Relevant guidelines

- *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change (DECC), 2009
- *Assessing Vibration: A Technical Guideline* (AVATG), Department of Environment and Conservation (DEC), 2006
- *NSW Road Noise Policy* (RNP), Department of Environment, Climate Change and Water (DECCW), 2011.

1.3 Site description and receivers

The site is part of the Honeysuckle City Campus of the University of Newcastle. It is bounded to the north, west and south by Honeysuckle Drive, Worth Place and Wright Lane respectively. It is bounded to the east by other parts of the HCCD.

Land use to the north of the site is predominantly residential with some commercial and tourism. The Honeysuckle Hotel is located beyond this, on the edge of the Hunter River. East of the site is the HCCD with residential, commercial, tourism and Newcastle Museum beyond. South of the site is also the HCCD with low to medium commercial and the NeW Space development on the other side of this. West of the site is predominantly residential and commercial developments.

The site location is shown in Figure 1.

DRAFT

Figure 1 Site location

1.4 Proposed works

HCCD Stage 1A comprises a new building on the Honeysuckle City Campus to accommodate the UoN School of Creative Industries (SOCl) and an Innovation Hub. These facilities will provide learning studios and flexible spaces for co-working, meetings and informal collaboration. HCCD Stage 1A includes:

- Design and construction of a single standing, multi-storey building on the corner of Worth Place and Honeysuckle Drive
- Space for the use of the Innovation Hub, SOCl and building fit out to make these spaces suitable for their uses
- Associated landscaping and infrastructure works.

The construction works would be undertaken in three main stages:

1. Site establishment and enabling works
2. Foundations
3. Frame and facade.

1.5 Proposed construction hours

The construction works are proposed to be scheduled during standard hours, which are as recommended in the ICNG as follows.

- Standard hours: 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday;
- Out of hours: before 7 am and after 6 pm Monday to Friday, before 8 am and after 1 pm Saturday, and all Sunday and public holidays.

No work is generally expected to be required outside of standard hours.

DRAFT

2.0 Noise criteria

Construction noise and vibration criteria were established in the *University of Newcastle - HCCD Stage 1A - SSD Noise and Vibration Impact Assessment* dated 26 February 2020 and have been reproduced in the following sections.

2.1 Noise management levels

The NSW Environment Protection Authority's (EPA) *Interim Construction Noise Guideline* (ICNG) is the principal guidance for the assessment and management of construction noise in NSW.

The project specific Noise Management Levels (NML) for residential receivers are summarised in Table 1.

Table 1 Construction noise management levels – Residential receivers

Residential receivers	Standard Hours NML L_{Aeq} dB(A)	Highly Noise Affected Level L_{Aeq} dB(A)
Honeysuckle development precinct	60	75

The NMLs for non-residential sensitive receivers located adjacent to the site are presented in Table 2.

Table 2 Noise at sensitive land uses (other than residences) and commercial buildings

Land Use	External noise levels, $L_{Aeq,15min}$ (applies when properties are in use)
Educational institutions	65 dB(A) ¹
Theatre	60 dB(A) ¹
Museum	65 dB(A) ¹
Commercial premises (including cafes, bars, restaurants, hotels and retail stores)	70 dB(A)

Notes:

- Assumes an external to internal noise level reduction through a close window of 20 dB(A)

2.2 Maximum noise levels for plant and equipment

All plant and equipment used throughout the works should have an operating Sound Power Level less than or equal to those in Table 3.

DRAFT

Table 3 Equipment sound power levels

Equipment	Maximum allowable Sound Power Level, dB(A)
Backhoe	104
Concrete truck	108
Concrete pump	108
Crane	105
Dump Truck	110
Excavator - large	107
General hand tools (electric)	102
Grader	110
Piling rig - rotary	111
Truck - large	107
Vibratory roller	108
Water Cart	107
Pneumatic jackhammer	113

2.3 Construction road traffic noise criteria

The noise from construction traffic on public roads is not covered by the ICNG. However the ICNG does refer to the Environmental Criteria for Road traffic Noise (ECRTN), now superseded by the NSW Road Noise Policy (RNP), for the assessment of noise arising from construction traffic on public roads.

To assess noise impacts from construction traffic, an initial screening test should be undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB(A). Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion then noise mitigation should be considered for those receivers affected. An increase of up to 2 dB(A) represents a minor impact that is considered barely perceptible to the average person.

The RNP does not require assessment of noise impact to commercial or industrial receivers.

2.4 Construction vibration criteria

2.4.1 Structural damage

Vibration criteria for structural damage have been established with consideration to:

- British Standard BS 7385:1993 *Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground Borne Vibration* for guidance on cosmetic damage to residential/commercial buildings
- German Standard DIN 4150-3:1999-02 *Structural Vibration – Part 3: Effects of vibration on structures* for guidance on cosmetic damage to heritage buildings.

BS 7385:1993 provides recommended maximum levels of vibration that are likely to cause residential/commercial building damage. These maximum levels are presented in Table 4.

DRAFT**Table 4 Transient vibration guide for cosmetic damage (BS 7385:1993)**

Type of building	Peak component particle velocity in frequency range of predominant pulse ¹	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	

Notes:

1. Values referred to are at the base of the building

DIN 4150 provides guidance for recommended maximum levels of vibration for heritage structures that reduce the likelihood of building damage caused by vibration. These maximum levels are presented in Table 5.

Table 5 Structural damage safe limits (DIN 4150) for building vibration (Vibration peak particle velocity)

Type of structure	At foundation – Less than 10 Hz	At foundation – 10 Hz to 50 Hz	At foundation – 50 Hz to 100 Hz ¹	Vibration at the horizontal plane of the highest floor for all frequencies
Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values

2.4.2 Human comfort

The assessment of intermittent vibration outlined in the NSW EPA guideline *Assessing Vibration: A Technical Guideline (AVTG)* is based on Vibration Dose Values (VDVs). The VDV accumulates the vibration energy received over the daytime and night-time periods.

VDV criteria for intermittent vibration arising from construction activities are listed in Table 6. The VDV criteria are based on the likelihood that a person would comment adversely on the level of vibration over the entire assessment period.

DRAFT**Table 6 VDs for intermittent vibration with low probability of adverse comment (m/s^{1.75})**

Location	Daytime 7am – 10pm	Night-time 10pm – 7am
Residences	0.2 - 0.4	0.13 - 0.26
Offices, schools, educational institutions and places of worship	0.4 - 0.8	0.4 - 0.8

3.0 Noise and vibration management and mitigation strategies

3.1 Project specific noise and vibration mitigation measures

The *University of Newcastle - HCCD Stage 1A - SSD Noise and Vibration Impact Assessment* noted that potential construction noise impacts within the vicinity of the project may be high, in some cases the construction noise levels may exceed 75 dB(A) at the nearest receivers.

Table 7 presents the recommended project specific mitigation measures.

Table 7 Project specific noise mitigation measures

Action required	Safeguard details
Management measures	
Implement community consultation measures	Periodic notification (monthly letterbox drop or equivalent), website, Project Infoline, Construction Response Line, email distribution list and community and stakeholder meetings.
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must include all relevant noise and vibration mitigation measures, construction hours, any limitations on high noise generating activities.
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors. No excessive revving of plant and vehicle engines.
Monitoring	A noise monitoring program should be considered in accordance with the CNVMP.
Attended vibration measurements	Attended vibration measurements are recommended at the commencement of vibration generating activities to determine site specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective.
Construction hours and scheduling	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods. Consideration should be given to avoiding examination periods.

DRAFT

Action required	Safeguard details
Construction respite period	High noise and vibration generating activities (eg rock breaking) may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block. Respite periods would be negotiated with the community for construction activities expected to generate high levels of vibration.
Source controls	
Equipment selection and maintenance	Use quieter and less vibration emitting construction methods where feasible and reasonable. Equipment would be regularly inspected and maintained to ensure it is in good working order.
Maximum noise levels	The noise levels of plant and equipment must have operating sound power levels compliant with Table 3.
Rental plant and equipment	Noise emissions should be considered as part of the selection process.
Use and siting of plant	Avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Plant and vehicles to be turned off when not in use. Noise-emitting plant to be directed away from sensitive receivers.
Plan works site and activities to minimise noise and vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.
Construction related traffic	Schedule and route vehicle movements away from sensitive receivers and during less sensitive times. Limit the speed of vehicles and avoid the use of engine compression brakes. Maximise on-site storage capacity to reduce the need for truck movements during sensitive times.

DRAFT

Action required	Safeguard details
Silencers on Mobile Plant	Where possible reduce noise from mobile plant through additional fittings including: <ul style="list-style-type: none"> Residential grade mufflers Damped hammers such as “City” Model Rammer Hammers Air parking brake engagement is silenced
Alternative methods	The use of less vibration-intensive methods of construction or equipment is preferred where practical to reduce the potential for cosmetic damage. All equipment should be maintained and operated in an efficient manner, in accordance with manufacturer’s specifications, to reduce the potential for adverse vibration impacts
Path controls	
Shield stationary noise sources such as pumps, compressors, fans etc.	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.
Shield sensitive receivers from noisy activities	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when siting plant.

3.2 Community consultation and complaints handling

All residents and other sensitive receivers impacted by noise and/or vibration from the proposed works which is expected to exceed the NML/vibration criteria should be informed about the project prior to the commencement of the particular activity, with the highest consideration given to those that are predicted to be most affected as a result of the works.

The information provided to the residents/building occupants should include:

- programmed times and locations of construction work
- the hours of proposed works
- construction noise and vibration impact predictions
- construction noise and vibration mitigation measures being implemented on site.

Community consultation regarding construction noise and vibration should be detailed in a Community Liaison Plan for the construction of the project and should include a 24 hour hotline and complaints management process.

DRAFT

4.0 Monitoring

4.1 Monitoring and reporting

A monitoring program should be developed and include recommendations to complete attended measurements at the commencement of construction stages and in response to any complaints. The sections below outline items to be considered for inclusion in the program.

4.2 Monitoring procedure

The measurements should be conducted in accordance with the procedures outlined in Australian Standard AS 1055 *Acoustics – Description and measurement of environmental noise* and in accordance with methods outlined in the NSW Noise Policy for Industry (NPfI). The following points should be followed when conducting noise monitoring:

- a field calibration should be conducted before and after measurements
- the sound level meters must be set to an A-weighting and Fast
- the sound level meters sample period should be set to 15 minutes
- the following descriptors should be measured as a minimum: L_{A1} , L_{Aeq} and L_{A90}
- measurements should be conducted a minimum of 3 metres from the nearest façade and/or solid fence/wall. If it is not possible to do this, corrections for façade reflection should be applied to the measurement results.

4.3 Monitoring of equipment procedure

In addition to the residential noise monitoring procedures described above, the following equipment measurements should be undertaken:

- noise emission levels of all critical items of mobile plant and equipment should be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service
- for equipment and mobile plant used for construction works, L_{Aeq} measurements should be taken at an appropriate distance, normally 7m and converted to a Sound Power Level
- an Equipment Noise Certificate, presenting relevant sound levels of the equipment tested, should be issued within the first week of the equipment commencing at the construction site.

The equipment sound power levels should be compared to the levels presented in Table 3. If noise checks on any equipment result in a prediction of non-compliance, noise mitigation strategies to achieve compliance should be developed.

4.4 Equipment

All acoustic instrumentation employed throughout the monitoring programme should comply with the requirements of AS IEC 61672.1-2004 *Electroacoustics - Sound level meters – Specifications*. All sound level meters must have current calibration certificate from a NATA accredited laboratory in accordance with NATA guidelines. Instrument calibration should be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ± 0.5 dB.

4.5 Monitoring & reporting schedule

4.5.1 Construction monitoring schedule

Table 8 below provides a preliminary monitoring schedule for construction.

DRAFT

Table 8 Construction noise monitoring schedule

Schedule Day	Action
During first month of each construction stage	Complete one round of operator-attended 15 minute noise monitoring on separate days at closest noise sensitive receivers to the north, south, east and west.
	Carry out equipment noise level checks on all critical items of plant and issue Equipment Noise Certificates
During subsequent months of construction period	Carry out equipment noise level checks on any new (untested) items of critical plant and issue Equipment Noise Certificates

4.6 Reporting

4.6.1 Reporting details

The following information must be included in the quarterly reports:

- Field calibration results (before and after measurements);
- Measurement times and dates;
- Qualitative description of the noise environment during the measurements;
- L_{A1} , L_{Aeq} and L_{A90} levels;
- Meteorological conditions during the measurements; and
- Estimation of or recorded noise contribution from other major noise sources.

A summary of the results of the quarterly reports should be included in the annual environmental report.

4.6.2 Record keeping

The Site Environmental Officer shall establish and maintain a system of records which provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances. The Site Environmental Officer shall establish and maintain procedures for the collection, indexing, filing, storage and maintenance of the records.

4.7 Roles and responsibilities

Roles for the CNVMP are consistent with the overarching CEMP. Responsibilities for the implementation of the CNVMP are summarised in Table 9.

DRAFT**Table 9 Roles and Responsibilities**

Role	Responsibilities
Site Environmental Manager	<ul style="list-style-type: none"> • Overall implementation of the CNVMP • Implement methodology for avoiding excessive noise emissions • Authorise and confirm the implementation of mitigation measures
Site Environmental Manager	<ul style="list-style-type: none"> • Coordinate monitoring and compile reports • Maintain internal records of monitoring • Collate and maintain records of complaints, respond to complainant • Identify Non Conformances • Review and update the Noise Management Plan as required
Site Environmental Officer	<ul style="list-style-type: none"> • Undertake monitoring required by the CNVMP • Communication with EPA, as required

DRAFT

5.0 Complaints handling procedure

A complaint handling procedure should be developed and documented. The following section outlines items to be considered for inclusion in the procedure.

If complaints are received, an Environmental Incident Report Form should be completed to record details of the occurrence and actions taken. Where applicable, completed forms should detail the following:

- the date and time of the complaint
- the method by which the complaint was made
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect
- the nature of the complaint
- description of noise source that is the subject of complaint, duration of event
- location of complainant during time of incident, and general area in which the noise source was located
- identification of project related noise activities and locations that could have or are known to have contributed to the incident
- if known, identification of non-project related noise emission activities and location at time of incident
- meteorological conditions at the time of the incident
- the action taken in relation to the complaint
- any follow-up contact with the complainant
- if no action was taken, the reason why no action was taken.

All records are to be kept in a legible form, or in a form that can readily be reduced to a legible form and kept for at least 4 years after the complaint or event to which they relate took place.

The Site Environmental Officer will make available a report on complaints received to the relevant Government Agencies upon request. A summary will be included in the annual environmental report.

A response should be provided to the complainant within 24 hours. Corrective actions may involve supplementary monitoring to identify any non-compliances, and/or may involve modification of construction or operational techniques to avoid any recurrence or minimise impacts.

DRAFT

6.0 Review and continual improvement

A regular review (quarterly) and update to the CNVMP shall be conducted taking into account:

- complaints regarding noise
- results of the community consultation
- any significant changes to operations
- changes in land use
- incidents related to noise emission exceedance.

The CNVMP should be viewed as a live document and updated as necessary.

DRAFT

Appendix A

Glossary of Acoustic Terminology

DRAFT

Appendix A Glossary of Acoustic Terminology

The following is a brief description of acoustic terminology used in this report.

<i>Sound power level</i>	The total sound emitted by a source																						
<i>Sound pressure level</i>	The amount of sound at a specified point																						
<i>Decibel [dB]</i>	The measurement unit of sound																						
<i>A Weighted decibels [dB(A)]</i>	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).																						
<i>Decibel scale</i>	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows: <table> <tr> <td>0dB(A)</td> <td>Threshold of human hearing</td> </tr> <tr> <td>30dB(A)</td> <td>A quiet country park</td> </tr> <tr> <td>40dB(A)</td> <td>Whisper in a library</td> </tr> <tr> <td>50dB(A)</td> <td>Open office space</td> </tr> <tr> <td>70dB(A)</td> <td>Inside a car on a freeway</td> </tr> <tr> <td>80dB(A)</td> <td>Outboard motor</td> </tr> <tr> <td>90dB(A)</td> <td>Heavy truck pass-by</td> </tr> <tr> <td>100dB(A)</td> <td>Jackhammer/Subway train</td> </tr> <tr> <td>110 dB(A)</td> <td>Rock Concert</td> </tr> <tr> <td>115dB(A)</td> <td>Limit of sound permitted in industry</td> </tr> <tr> <td>120dB(A)</td> <td>747 take off at 250 metres</td> </tr> </table>	0dB(A)	Threshold of human hearing	30dB(A)	A quiet country park	40dB(A)	Whisper in a library	50dB(A)	Open office space	70dB(A)	Inside a car on a freeway	80dB(A)	Outboard motor	90dB(A)	Heavy truck pass-by	100dB(A)	Jackhammer/Subway train	110 dB(A)	Rock Concert	115dB(A)	Limit of sound permitted in industry	120dB(A)	747 take off at 250 metres
0dB(A)	Threshold of human hearing																						
30dB(A)	A quiet country park																						
40dB(A)	Whisper in a library																						
50dB(A)	Open office space																						
70dB(A)	Inside a car on a freeway																						
80dB(A)	Outboard motor																						
90dB(A)	Heavy truck pass-by																						
100dB(A)	Jackhammer/Subway train																						
110 dB(A)	Rock Concert																						
115dB(A)	Limit of sound permitted in industry																						
120dB(A)	747 take off at 250 metres																						
<i>Frequency [f]</i>	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.																						
<i>Equivalent continuous sound level [L_{eq}]</i>	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.																						
<i>L_{max}</i>	The maximum sound pressure level measured over the measurement period																						
<i>L_{min}</i>	The minimum sound pressure level measured over the measurement period																						
<i>L₁₀</i>	The sound pressure level exceeded for 10 per cent of the measurement period. For 10 per cent of the measurement period it was louder than the L ₁₀ .																						

DRAFT

<i>L₉₀</i>	The sound pressure level exceeded for 90 per cent of the measurement period. For 90 per cent of the measurement period it was louder than the L ₉₀ .
<i>Ambient noise</i>	The all-encompassing noise at a point composed of sound from all sources near and far.
<i>Background noise</i>	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L ₉₀ sound pressure level is used to quantify background noise.
<i>Traffic noise</i>	The total noise resulting from road traffic. The L _{eq} sound pressure level is used to quantify traffic noise.
<i>Day</i>	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
<i>Evening</i>	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
<i>Night</i>	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
<i>Assessment background level [ABL]</i>	The overall background level for each day, evening and night period for each day of the noise monitoring.
<i>Rating background level [RBL]</i>	The overall background level for each day, evening and night period for the entire length of noise monitoring.
<i>Weighted sound reduction index [R_w]</i>	A single figure representation of the air-borne sound insulation of a partition based upon the R values for each frequency measured in a laboratory environment.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 "Acoustics – Glossary of terms and related symbols", the EPA's *Noise Policy for Industry and Road Noise Policy*.