

## ENDORSEMENT CITY & SOUTHWEST ACOUSTIC ADVISOR

<b>Review of</b>	<b>Construction Noise and Vibration Impact Statement Addendum: Pitt Street – Crane Lifting and Hoarding works</b>	<b>Document reference:</b>	<b>SYDNEY METRO CITY &amp; SOUTHWEST-TSE WORKS</b> <b>Construction Noise and Vibration Impact Statement Addendum – Pitt Street – Crane Lifting and Hoarding works</b> <i>TH511-02 01.08.05 F04 PS Addendum CNVIS – Hoarding and Lifting works (r1)</i> <i>Dated 9 October 2020</i>
<b>Prepared by:</b>	Larry Clark Alternate Acoustics Advisor		
<b>Date of issue:</b>	22 October 2020		

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed the Construction Noise and Vibration Impact Statement (CNVIS) addendum for the Pitt Street (south) Crane Lifting and Hoarding works, as required under A27 (d) of the project approval conditions.

The CNVIS addendum is for:

- lifting of materials from a mobile crane set up in Bathurst Street between 6pm and 7am on a maximum of 3 shifts per week, not including Sundays after 7am, for 3 weeks between 2 and 20 November; and
- converting hoarding adjacent to the Metrodeck between 10pm and 5am on 2 shifts between 2 and 8 November (not including after 5am on 8 November).

The proposed works will require an EPL variation.

JHCPBG commits to continuing to consult with potentially affected stakeholders, in accordance with Condition of Approval E33. Additional Mitigation Measures include verification monitoring.

JHCPBG has confirmed that:

- Rattle guns are not to be used for the hoarding works after midnight. This is to be confirmed by the TSE supervisor in the pre-start meeting before each shift. The pre-start meeting should also require no use of hammers or other tools generating impact noise unless absolutely necessary;
- the site supervisor will be informed immediately, and appropriate corrective action taken, if rattle guns are heard after midnight during verification monitoring of the works.

With these commitments from JHCPBG I am satisfied that the CNVIS Addendum is technically valid and includes appropriate noise and vibration mitigation and management. On this basis I endorse the CNVIS Addendum.



Larry Clark, City & Southwest Alternate Acoustic Advisor

9 October 2020

TH511-02 01.08.05 F04 PS Addendum CNVIS - Hoarding and Lifting works (r1)

John Holland CPB Ghella JV  
Level 3, 140 Sussex Street,  
Sydney, NSW, 2000

## Sydney Metro Chatswood to Sydenham – TSE Works - Pitt Street - Crane Lifting and Hoarding works - CNVIS Addendum

### 1 Introduction

#### 1.1 Overview of works

This technical memorandum is an addendum to the report Construction Noise and Vibration Impact Statement: Pitt Street Constructions sites<sup>1</sup> (*Pitt Street CNVIS*). It has been prepared on behalf of John Holland CPB Ghella Joint Venture (JHCPBG) in accordance with the Construction Noise and Vibration Management Plan (*CNVMP*)<sup>2</sup> for the Design and Construction of the Tunnel and Station Excavation (TSE) Works of the Sydney Metro City & Southwest Project (the Project).

JHCPBG is proposing to carry out the following works:

Construction activity	Timeframe outside approved hours
Crane lifting works	2 <sup>nd</sup> to 20 <sup>th</sup> of November  Monday to Friday – 18:00 to 07:00. A maximum of 3 shifts of crane lifting works will occur each week for a total of 9 shifts over 3 weeks.
Hoarding works	2 <sup>nd</sup> to 6 <sup>th</sup> November  Monday to Friday – 22:00 to 05:00. A total of 2 shifts of hoarding works is required to be carried out (concurrent with lifting activities).

This memorandum has been prepared to address the potential construction noise and vibration impacts from the proposed construction activities. The works have been assessed in conjunction with all concurrent activities. Construction details are summarised in Section 2.1 below.

<sup>1</sup> TH511-02 01.08.05 F01 PS CNVIS, dated 3 May 2018, revision 4

<sup>2</sup> Sydney Metro City & Southwest – TSE Works Construction Noise and Vibration Management Plan (SMCSTSE-JCG-TPW-EN-PLN-002012)

## 1.2 Justification for out of hours construction works

### 1.2.1 Crane lifting works

Out of hours crane lifting works are required to be carried out at PSS worksite as part of the demobilisation of the site. This will include materials such as reinforcement material and crib sheds from the tunnel, the pieces of the Metrodeck and any other equipment needing to be removed from site prior to completion of works. Currently, construction materials are delivered to the site by lifting off the Metrodeck at PSS into the shaft below during the standard construction hours. As the Metrodeck demolition is commencing in mid-October, the only alternative method of demobbing equipment will be to setup a mobile crane at the parking bay along Bathurst Street and lift from the shaft over the hoarding to trucks parked in a lane closure along Bathurst Street. This setup will require the setup of traffic control and footpath closures along Bathurst Street.

Due to the completion date of the project, these works cannot be delayed and will need to occur within the timeframe described.

To minimise impacts on the surrounding community, the priority will be to concentrate the lifts into a limited number of nights. This will mean a maximum of 3 nights of lifts will occur in each week for a total of 9 nights planned.

### 1.2.2 Hoarding works

To complete the final stage of hoarding surrounding the PSS Shaft, the portion of hoarding adjacent to the Metrodeck, including the 2 sliding doors, will be converted to A Class hoarding with internal crash barriers. The hoarding works would require a Road Occupancy Licence (ROL) which would only be issued outside of standard hours between 10:00pm and 05:00am.

These works will occur concurrent with the crane lifting works so that the total number of nights the surrounding receivers will be exposed to the proposed construction activities will be reduced.

## 2 Construction noise assessment

### 2.1 Construction activities

For the crane lifting works, a mobile crane will be setup in the parking bay along Bathurst Street adjacent to the PSS worksite. Materials will be lifted from the PSS shaft to idling trucks on Bathurst Street and removed from site. The work area for the crane lifting works is shown in Figure 2.1.

For the hoarding works, the installation and alteration of A Class hoardings is required as part of the site demobilisation along the Pitt Street side of the PSS shaft worksite. The work area for the hoarding works is shown in Figure 2.1.

Figure 2.1 – Crane lifting and hoarding works at PSS



Table 2-1 presents the list of plant and equipment that are proposed to be used during these works and the associated sound power levels.

Table 2-1: Construction activities and associated sound power levels

Construction Work Area	Key plant and equipment	Assessment periods		Sound power level, dB(A)	
		Evening (6pm-10pm)	Night (10pm-7am)	L <sub>Aeq</sub>	L <sub>A1</sub>
<b>Crane lifting works</b>					
Materials will be lifted from the PSS shaft to idling trucks on Bathurst Street and	Hand tools	1	1	107	115
	Mobile crane	1	1	104	108
	Telehandler	1	1	99	103

Construction Work Area	Key plant and equipment	Assessment periods		Sound power level, dB(A)	
		Evening (6pm-10pm)	Night (10pm-7am)	L <sub>Aeq</sub>	L <sub>A1</sub>
removed from site (as shown in Figure 2.1).	Delivery trucks	Approximately 3 per period	Approximately 7 per period	106	111
	Traffic control	1	1	89	100
	Site lighting	1	1	99	102
<b>Hoarding works</b>					
Along the Pitt Street side of the PSS shaft site (as shown in Figure 2.1).	Hiab truck	1	1	98	102
	Traffic control Ute	1	1	89	100
	Power tool including rattle gun	1	1	107	115
	Site lighting	1	1	99	102

## 2.2 Predicted noise levels

Noise results are summarised in Table 2-2 and Table 2-3 below.

Table 2-2: Predicted construction noise levels at the closest noise sensitive receivers during evening period (6:00pm to 10:00pm)

NCA	Address	Type of receiver	ICNG NMLs ( <i>reference only</i> )	Assumed façade loss, dB(A)	External equivalent NML, PPA Condition E37 (6:00pm to 8:00pm)	External equivalent NML, PPA Condition E41 (8:00pm to 10:00pm)	Predicted level $L_{Aeq}$ 15 minute	
					$L_{Aeq}$ 15 minute	$L_{Aeq}$ 15 minute	Crane lifting works	
PS_05	308 Pitt Street, Sydney	Residential	62	20	80	65	62	
PS_05	209 Castlereagh Street, Sydney	Residential	62	20	80	65	<b>68</b>	
PS_05	137-139 Bathurst Street, Sydney	Residential	62	20	80	65	<b>70</b>	
OSR	284-292 Pitt Street, Sydney	Fire Brigade	60	20	80	-	66	
OSR	294-294B Pitt Street, Sydney	Commercial	70	20	80	-	73	
OSR	339 Pitt Street, Sydney	Hotel/Motel/Hostel	60	20	80	-	59	
OSR	284-292 Pitt Street, Sydney	Commercial	70	20	80	-	74	

Notes: Residential receivers predicted to be above the external equivalent NML of PPA condition E41 are highlighted in **bold**

5

Table 2-3: Predicted construction noise levels at the closest noise sensitive receivers during night-time period (10:00pm to 7:00pm)

NCA	Address	Type of receiver	ICNG NMLs ( <i>reference only</i> )	Assumed façade loss, dB(A)	External equivalent NML, PPA Condition E41	Predicted level $L_{Aeq}$ 15 minute	
					$L_{Aeq}$ 15 minute	Crane lifting and hoarding works (cumulative impact)	Crane lifting works
PS_05	308 Pitt Street, Sydney	Residential	58	20	65	<b>73</b>	62
PS_05	209 Castlereagh Street, Sydney	Residential	58	20	65	<b>68</b>	<b>68</b>
PS_05	137-139 Bathurst Street, Sydney	Residential	58	20	65	<b>70</b>	<b>70</b>
OSR	284-292 Pitt Street, Sydney	Fire Brigade	60	20	-	72	65
OSR	294-294B Pitt Street, Sydney	Commercial	70	20	-	73	73
OSR	339 Pitt Street, Sydney	Hotel/Motel/Hostel	60	20	-	74	59
OSR	284-292 Pitt Street, Sydney	Commercial	70	20	-	74	74

Notes: Residential receivers predicted to be above the external equivalent NML of PPA condition E41 are highlighted in **bold**

The results in Table 2-2 and Table 2-3 above indicate that noise levels are predicted to be above the external equivalent NMLs in PPA Condition E41 at following receivers:

- 308 Pitt Street, Sydney
- 209 Castlereagh Street, Sydney
- 137-139 Bathurst Street, Sydney

Measures to minimise and manage noise impacts are outlined in Section 2.3

### 2.2.1 Sleep disturbance

The predicted  $L_{Amax}$  noise levels associated with these works are expected to be above the sleep awakening reaction level at the nearest residential receivers.

Potential sleep disturbance impacts will be managed as outlined in Section 2.3. Toolbox talks will be used to advise all personnel of the need to follow quiet work practices during OOHW periods and of the need to respect the residential receivers surrounding the work site.

## 2.3 Noise management and mitigation measures

### 2.3.1 Noise control measures

The following standard noise control measures are recommended to reduce potential noise impacts.

**Table 2-4: Site noise control measures**

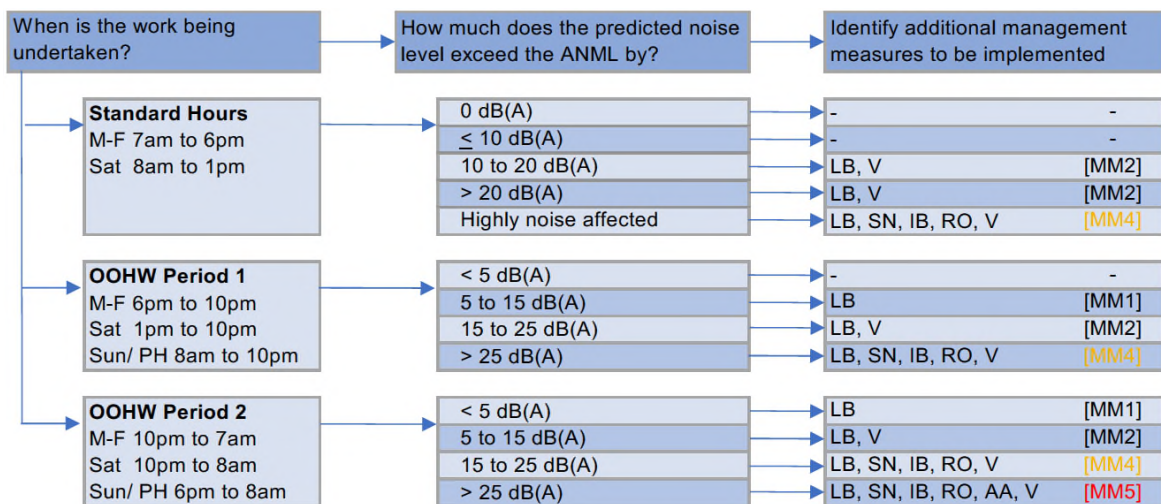
Control type	Control measure	Typical use
At-Source Control Measures	Limit equipment in use	Only the equipment necessary during each stage of the OOHW will be used.
	Timing of equipment in use	Where practicable, activities and plant will be limited as outlined in Table 2-1
	Limit activity duration	Any equipment not in use for extended periods shall be switched off. For example, heavy vehicles should switch engines off when not in use.
	Use and siting of plant	Avoid/ limit simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver. Direct noise-emitting plant away from sensitive receivers where practicable. Locate fixed location plant items as far from sensitive receivers as practicable.
	Equipment selection	Use quieter and less noise/ vibration emitting construction methods where feasible and reasonable.
	Non-tonal reversing alarms	Alternative reverse alarms, such as 'quackers' will be installed on all plant and equipment, where practicable.

Control type	Control measure	Typical use
Noise Management Measures	Site inductions & Toolbox Talks	All employees, contractors and subcontractors will receive a Project induction. The environmental component, including quiet work practices may be covered in toolboxes and should include: <ul style="list-style-type: none"> <li>• location of nearest sensitive receivers</li> <li>• relevant project specific and standard noise and vibration mitigation measures;</li> <li>• permitted hours of work;</li> <li>• OOHW Procedure and Form</li> <li>• construction employee parking areas.</li> </ul>
	Community consultation	Inform community of construction activity and potential impacts.
	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.
	Noise monitoring	Noise monitoring is to be carried out as detailed in Section 2.3.4

### 2.3.2 Additional noise mitigation measures

Table 2-5 should be used to advise the appropriate additional mitigation during construction, as outlined in Section 8.2 of the CNVMP. These measures are consistent with the approach outlined in the SMCSNVS.

**Table 2-5: Additional airborne noise mitigation measures**



Notes: Use the abbreviation codes in the table above to confirm management measures required  
Code in square brackets [] refers to noise management code for affected receivers identified in each CNVIS

LB = Letter box drops  
V = Verification monitoring  
SN = Specific notifications  
IB = individual briefing  
RO = Project specific respite offer  
AA = Alternative accommodation

Table 2-6 presents a summary of the additional noise mitigation measures applicable for construction activities where, after application of all reasonable and feasible mitigation options, construction noise levels are still above the NMLs.



**Table 2-6: Additional airborne noise mitigation measures during concrete pours**

NCA	Address	Evening period	Night-time period	
		Crane lifting works (in isolation)	Crane lifting and hoarding works (cumulative impacts)	Crane lifting works (in isolation)
PS_05	308 Pitt Street, Sydney	-	MM2	MM1
PS_05	209 Castlereagh Street, Sydney	MM1	MM2	MM2
PS_05	137-139 Bathurst Street, Sydney	MM1	MM2	MM2

Prior to the commencement of works, residential receivers around the site, identified in Table 2-6 above will be notified to advise that noise from the works may at times be audible. All potentially impacted receivers will be kept informed of the nature of works to be carried out, expected noise levels and duration, as well as given appropriate enquiries and complaints contact details (see Section 2.3.5).

### 2.3.3 Consultation with affected receivers (PPA Condition E33)

As outlined in Section 5.4.1 of the *Pitt Street CNVIS*, consistent with requirements in PPA Conditions E33, JHCPBG has commenced and will continue to consult with potentially affected stakeholders including business and residential receivers regarding specific mitigation measures applicable to the construction works at the Pitt St site.

Site specific mitigation measures will include:

- To minimise the total number of nights the local receivers are exposed to OOH works, the hoarding works would be planned to be carried out on the same night as the crane lifting works.

### 2.3.4 Attended noise monitoring

Attended noise monitoring will be undertaken to verify that noise levels resulting from construction works are not higher than the levels predicted in this report, subject to obtaining the property owner/occupier's consent to access the property (where required).

Attended noise monitoring will be undertaken during works at monitoring location shown in Table 2-7. Nominated attended measurement location has been selected with the best opportunity to verify the predicted noise levels.

**Table 2-7: Nominated verification monitoring locations**

NCA	Nominated receiver address	Activity
PS_05	308 Pitt Street, Sydney	Hoarding works
PS_05	137-139 Bathurst Street, Sydney	Crane lifting works

Note: Monitoring on private property is subject to owner consent and where relevant, occupier consent. If property access is denied, monitoring will still be carried out outside property boundaries.

If verification monitoring shows that the external noise levels from the construction works are consistently above the predicted levels (i.e. for 2 or more consecutive monitoring nights), investigation will be undertaken to understand the cause of the exceedance and relevant reasonable and feasible mitigation measures will be implemented.

All noise monitoring will follow the procedures outlined in Appendix D of the CNVMP.

### **2.3.5 Complaints handling**

Noise complaints received and responded to will be managed in accordance with the CNVMP and TSE Community Communication Strategy (SMCSWTSE-JCG-TPW-SH-PLN-002040).

Transport for NSW operate a 24-hour construction complaints line (1800 171 386). Enquiries/ complaints may also be received through the Sydney Metro project email (sydneymetro@transport.nsw.gov.au).

## **3 Other assessments**

### **3.1 Cumulative impacts**

All concurrent work activities have been assessed in this report.

### **3.2 Construction related road traffic assessment**

The proposed number of delivery trucks are specified in Table 2-1. It is noted that the maximum combined number of heavy and light vehicles will not be greater than what has been already assessed in the *Pitt St CNVIS*. Therefore, consistent with the conclusions of the *Pitt St CNVIS*, construction traffic due to the proposed works is expected to have minor noise impact on surrounding public roads.

### **3.3 Vibration and ground-borne noise assessment**

The proposed works are not vibration intensive and so construction vibration or ground-borne noise impacts are considered to be negligible and have not been considered further in this addendum assessment.

## 4 Conclusion

This technical memorandum is an addendum to the report *Pitt St CNVIS* to review the potential noise and vibration impacts for the proposed crane lifting and hoarding works at PSS worksite.

### **Construction noise**

As the predicted cumulative noise levels are expected to be above the PPA Conditions E41 external equivalent NMLs, additional noise mitigation and management measures will be implemented during the works.

### **Cumulative impacts**

All concurrent work activities have been assessed in this report.

### **Vibration and ground-borne noise assessment**

The proposed works are not vibration intensive and so construction vibration or ground-borne noise impacts are considered to be negligible.

### **Construction related road traffic assessment**

Construction traffic due to the proposed works is expected to have minor noise impact on surrounding public roads.

## Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
09.10.2020	Initial issue	0	1	R. Zhafranata	-	M. Tabacchi

File Path: \\SYD-SERVER\rtagroupsyd\AssocSydProjects\TH501-TH550\TH511 pk Sydney Metro City & Southwest\T2 Design\1 Docs\08 PS\05 CNVIS\TH511-02 01.08.05 F04 PS Addendum CNVIS - Hoarding and Lifting works (r1).docx

### Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

## APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L <sub>Max</sub>	The maximum sound pressure level measured over a given period.
L <sub>Min</sub>	The minimum sound pressure level measured over a given period.

L <sub>1</sub>	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L <sub>10</sub>	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L <sub>90</sub>	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L <sub>eq</sub>	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L <sub>eq</sub> sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.