

## Sydney Helicopter Relocation

### Noise Impact Assessment

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Document Title	Noise Impact Assessment
Attention To	Heliport Developers Pty Ltd

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0	21/05/2020	20200346.2/2105A/R0/KB	KB		KB
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## 1 INTRODUCTION

Acoustic Logic Consultancy (ALC) has been engaged to assess the noise impacts associated with the relocation of Sydney Helicopters to a proposed new helipad located in Penrith, NSW. The principal objective of this assessment is to undertake an evaluation of the proposed use of the new helipad and provide an assessment of potential noise impacts to the surrounding receivers. Impacts have been assessed against the recommendations Environmental Protection Authority – Environmental Noise Control Manual.

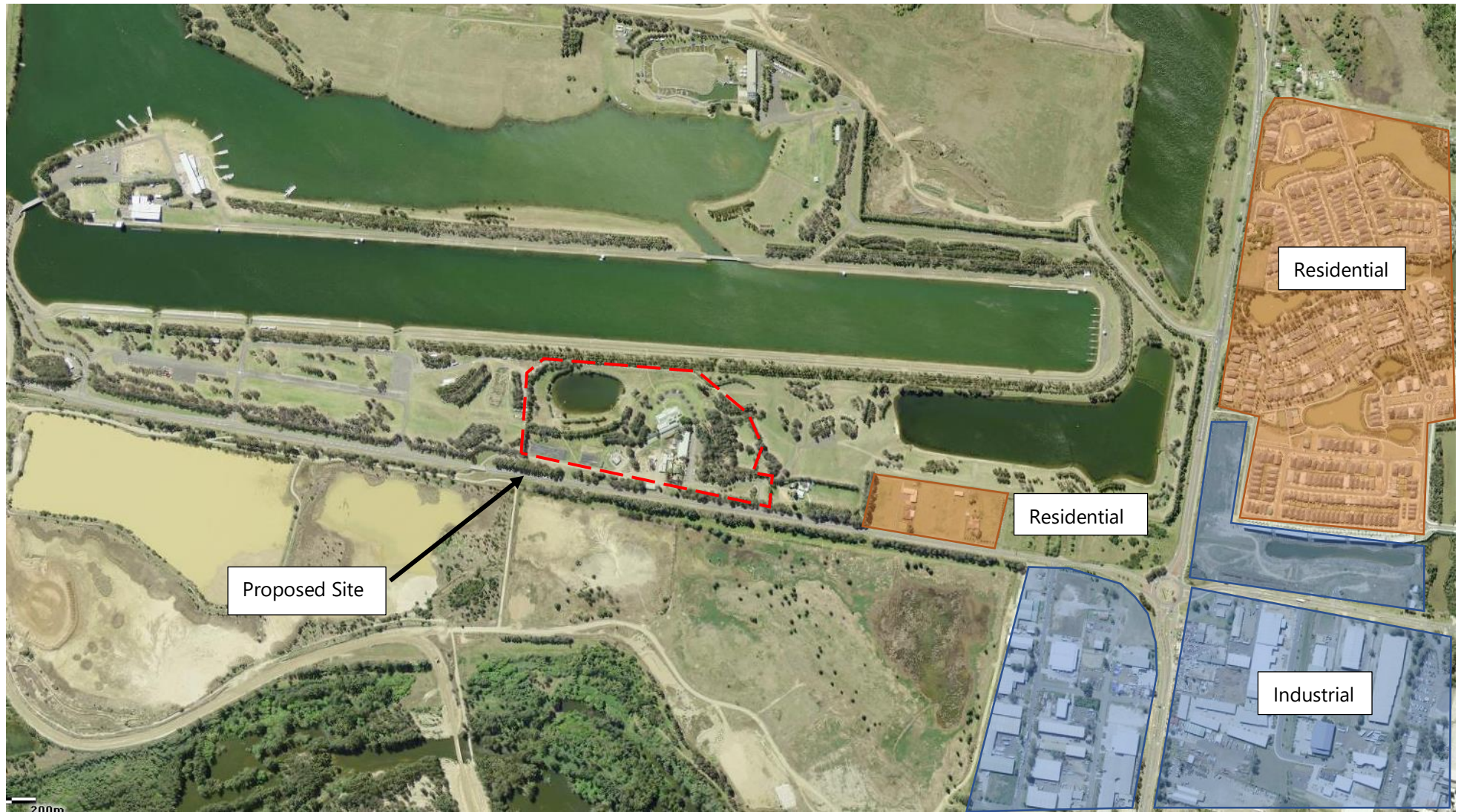
## 2 PROPOSED LOCATION AND OPERATION

The proposed location for the helipad is 89 – 151 Old Castlereagh Road, Castlereagh. The site is immediately surrounded by recreational/sporting facilities, with existing industrial land uses 800m to the south east and existing residential areas 1.2km to the east. The site of the proposed helipad and adjacent recreational facilities is currently not defined by as a specific land zoning within the Penrith Local Environmental Plan 2010. However the Penrith Lakes master plan indicates that land to the north east of the site will be used for urban development.

See Figure 2-1 below for site location.

ALC has been advised of the following proposed operation for the helipad.

- Approximately 25 flights per day
- Approximately 5 night flights (night flights are classified as flights that occur after last light, based on the time of year this can vary from 6pm to 8pm)
- The following helicopters have the potential to use the helipad
  - AS350 squirrel helicopter (most common type used)
  - Bell 206
  - Bell 407
  - Robinson R44
  - Robinson R66
  - AW139 (emergency services helicopter)
  - Bell 412 (emergency services helicopter)
  - Bell 429 (emergency services helicopter)



**Figure 2-1: Proposed Helipad Location**

### 3 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely  $L_{max}$ ,  $L_{90}$  and  $L_{eq}$ .

The  $L_{max}$  and  $L_{90}$  measurement parameters are statistical levels that represent the maximum and average minimum noise levels respectively, over the measurement intervals.

The  $L_{max}$  parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the maximum sound pressure level measured over the measurement period.

Conversely, the  $L_{90}$  level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The  $L_{90}$  parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the  $L_{90}$  level.

The  $L_{eq}$  parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15-minute period.  $L_{eq}$  is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.



## 5 NOISE EMISSION GOALS

The EPA Noise Control Manual has been used to establish the noise emission goals for the assessment of the proposed helipad. Whilst the document has been superseded by the EPA Noise Policy for Industry the Noise Control Manual requirements for helicopters has been used in the absence of any specific acoustic criteria in relation to the operation of helipads within the Penrith City Council Development Control Plan and the EPA Noise Policy for Industry.

The noise control manual presents the following requirements for helicopters:

- (i) The measured  $L_{Aeq,T}$  (assessed over the entire daily operating time of the helipad) should not exceed 55 dB(A) at a residence or 65 dB(A) at a commercial property. Where the existing ambient  $L_{eq}$  is greater than the criteria an increase of 2dB(A) above the existing ambient  $L_{eq}$  is acceptable.
- (ii) The measured maximum noise level  $L_{Amax}$  should not exceed 82 dB(A) at the nearest residential premises or 85 dB(A) at the nearest commercial building.
- (iii) Operation outside the hours of 7am to 10pm should not be permitted expect for emergency flights

Noise emission goals are summarised below.

**Table 1 – Noise Emission Goals**

<b>Receiver</b>	<b><math>L_{eq, 15hour}</math></b>	<b><math>L_{max}</math></b>
Residential	55 dB(A)	82 dB(A)
Commercial/Industrial	65 dB(A)	85 dB(A)

## 6 NOISE IMPACT ASSESSMENT

### 6.1 PREDICTED NOISE IMPACTS

Noise levels associated with typical helicopter movements have been assessed using the SoundPlan™ noise modelling software. The following flight path information, provided by Sydney Helicopters, and the proposed operation detailed in section 2 of this report has been used to model the predicted noise impacts. The assessment has been based on a worst case scenario for a Bell 412, with a sound power level of 135 dB(A), for all flights and a typical use scenario for a AS350, with a sound power level of 131 dB(A), for all flights. Sound power levels and spectrums for the helicopters have been taken from data obtained by Acoustic Logic.



Figure 6-1: Typical Flight Paths



The following impacts for typical use (AS350) and worst case use (Bell 412) were predicted at 1.5m above ground level. Grid noise maps of the Bell 412, Bell 429, Bell 206, AW 139 and AS350 have been included in the Appendix A.

**Table 2 – Typical Use Predicted Noise Levels – AS350**

<b>Receiver</b>	<b>L<sub>eq, 15hour</sub></b>	<b>L<sub>max</sub></b>
Residential (east Castlereagh Road)	42 dB(A)	<65 dB(A)
Commercial/Industrial (south Old Castlereagh Road)	47 dB(A)	68 dB(A)
Sydney International Regatta Centre	47 dB(A)	68 dB(A)
PLDC Lot 4 (north Penrith Whitewater Stadium)	37 dB(A)	<65 dB(A)

**Table 3 – Worst Case Predicted Noise Levels – Bell 412**

<b>Receiver</b>	<b>L<sub>eq, 15hour</sub></b>	<b>L<sub>max</sub></b>
Residential (east Castlereagh Road)	46 dB(A)	<65 dB(A)
Commercial/Industrial (south Old Castlereagh Road)	50 dB(A)	68 dB(A)
Sydney International Regatta Centre	50 dB(A)	68 dB(A)
PLDC Lot 4 (north Penrith Whitewater Stadium)	40 dB(A)	<65 dB(A)

Predicted noise levels from the typical use of the helipad (based on an AS350) indicates that the highest impact to the PLDC Lot 4 site from the entire daily operation ( $L_{eq, 15hour}$ ) is 18dB(A) below the recommended criteria. The maximum noise impact ( $L_{max}$ ), representing the highest single noise impact from a helicopter pass-by, is at least 17dB(A) below the recommended criteria.

An analysis of a worst case scenario was also conducted. This scenario assumed that a Bell 412 would be used for all flights throughout the day. The Bell 412 is the largest of the helicopters that could use the helipad and is used for emergency services flights only. The use of the helipad by this type of helicopter at this frequency during the day is highly unlikely, however has been included to show that compliance is achieved with the worst case scenario. Predicted noise levels indicate that the highest impact to the PLDC Lot 4 site from the entire daily operation ( $L_{eq, 15hour}$ ) of a Bell 412 is 15dB(A) below the recommended criteria. The maximum noise impact ( $L_{max}$ ), representing the highest single noise impact from a helicopter pass-by, is at least 17dB(A) below the recommended criteria.

## **6.2 MEASURED NOISE IMPACTS**

ALC conducted attended noise measurements on site on the 8<sup>th</sup> of May 2020. Measurements were conducted of an AS350 Squirrel typical flight movements around the proposed helipad, these included:

- Approach from the south east
- Approach from the south west
- Hovering/landing at the proposed site location indicated in Figure 6-2
- Take off to the south east
- Take off to the south west
- Flyover

### **6.2.1 Measurement Locations**

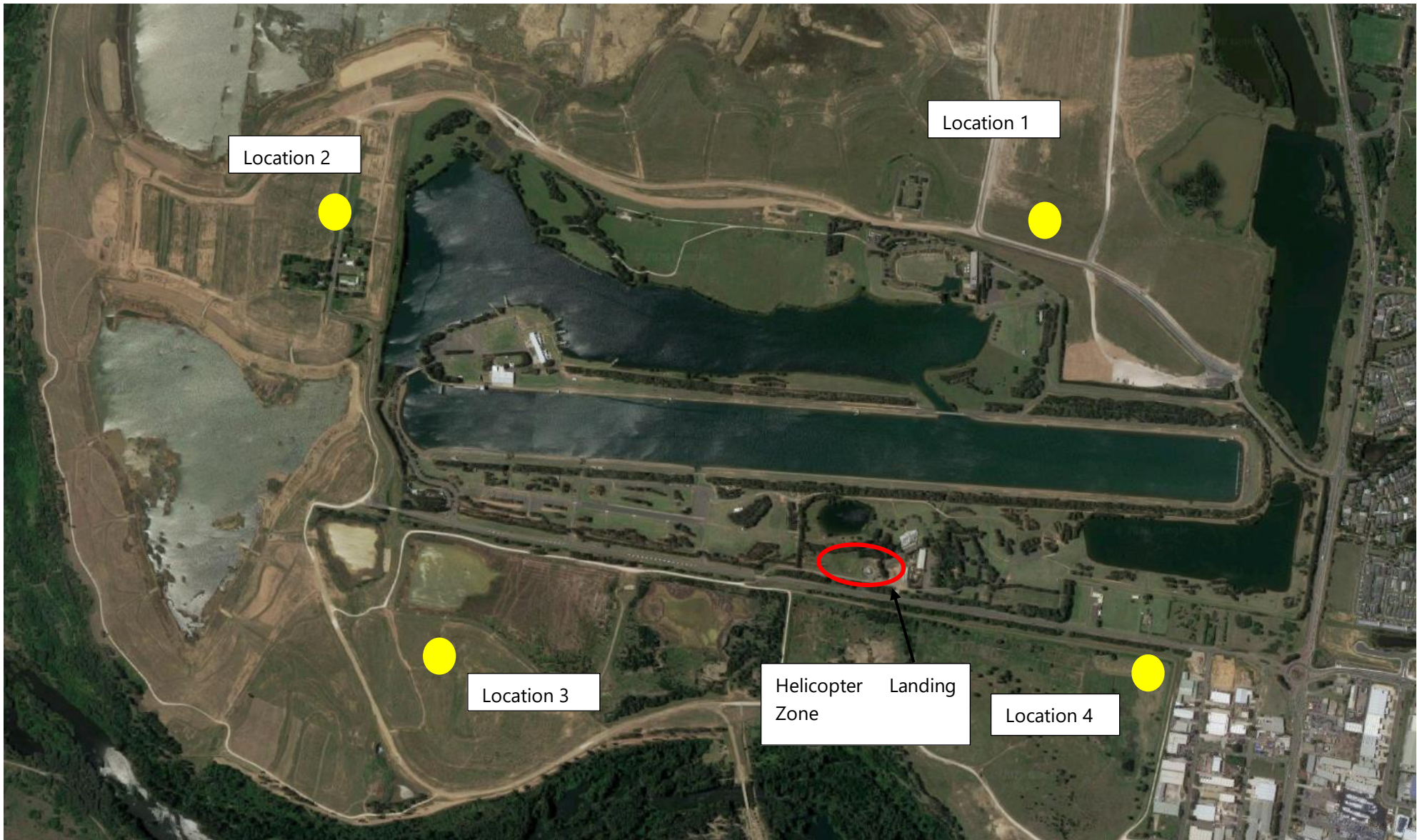
Measurements were conducted at 3 locations across the Penrith Lakes Development site, as indicated in the figure below.

- Location 1: Lot 4 near the Penrith Whitewater Stadium – proposed urban development site
- Location 2: Upper Castlereagh Area near school camp site
- Location 3: proposed golf course/wetlands
- Location 4: 39 Old Castlereagh Road (residential properties)

Locations 1, 2 and 4 were chosen as these were representative of the closest sensitive receivers to the proposed helipad location.

### **6.2.2 Measurement Equipment**

Measurements were conducted using Norsoinc Nor140 sound analysers, set to A-weighted slow response. The equipment was calibrated at the beginning and end of the measurement, no drift was noted.



**Figure 6-2: Measurement Location**

### 6.2.3 Measured Noise Levels

The following noise levels were measured at the receiver locations.

**Table 4 – Measured Noise Levels**

<b>Location</b>	<b>Measured Helicopter Noise dB(A)<math>L_{max, slow}</math></b>	<b>Criteria dB(A)<math>L_{max, slow}</math></b>	<b>Complies</b>
Location 1 Lot 4 PLD	58	82	Yes
Location 2 UCA	60	82	Yes
Location 3 Golf course*	73	82	Yes
Location 4 39 Old Castlereagh Road	72	82	Yes

\*helicopter flight path directly overhead of measurement position

As detailed above all measured noise levels from the operation of typical helicopter movements comply with the formulated criteria.

## 7 OPERATIONAL VIBRATION ASSESSMENT

The EPA (formally DECC) “Assessing Vibration: A Technical Guideline” (Feb 2006) will be used to assess human discomfort caused by vibration generated by the operation of the helicopters. We note this standard for assessing vibration is based on the guidelines contained in British Standard BS6472-1992.

**Table 5 – – EPA Recommended Vibration Criteria**

		RMS acceleration (m/s <sup>2</sup> )		RMS velocity (mm/s)		Peak velocity (mm/s)	
Receiver	Time	Preferred	Maximum	Preferred	Maximum	Preferred	Maximum
<b>Continuous Vibration</b>							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Commercial		0.02	0.04	0.4	0.8	0.56	1.1
Industrial		0.04	0.08	0.8	1.6	1.1	2.2
<b>Impulsive Vibration</b>							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Commercial		0.64	1.28	13	26	18	36
Industrial		0.64	1.28	13	26	18	36

**Note 1:** Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g. continuous construction or maintenance activity. (DECC, 2006)

**Note 2:** Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g. helicopter movements

All predicted vibration levels associated with the helicopter movements are predicted to be less than 0.2mm/s peak particle velocity (PPV) and are therefore compliant with the recommended vibration criteria of the EPA (formally DECC) “Assessing Vibration: A Technical Guideline” (Feb 2006)



## 8 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

There is a small amount of construction work associated with the development as follows:

- Demolition of 2x single storey sheds
- Demolition of 1 small single storey shed and associated pavement
- Removal of 1 inground tank
- Removal of 1 flood light
- Removal of fewer than 10 trees
- Reinstatement of grass turf in locations of removed hardstands and pavement
- New concrete hardstand in location of existing concrete hardstands
- New lighting as required for the FATO

It is anticipated that the complete scope of the minor works will be completed within 7 days.

As the construction works are less than three weeks in duration, the scope of works is considered to be "short term" as defined within the EPA Interim Construction Noise Guideline (ICNG). Short term works are defined as: *Short-term means that the works are not likely to affect an individual or sensitive land use for more than three weeks in total.... Small construction projects in rural areas may not generate significant noise at surrounding residences due to the typically large distances involved*

As such, and in accordance with EPA ICNG the qualitative method for assessing potential noise impacts is triggered in accordance with Section 5.1 of the ICNG

Given the short-term duration of the works and the distance between the works and residential receivers on Old Castlereagh Road (over 450m) we recommend the following:

### 8.1.1 Hours of Construction

- Monday to Friday 7 am to 6 pm
- Saturday 8 am to 1 pm
- No work on Sundays or public holidays

### 8.1.2 Site recommendations and Consultation

- Where practicable, any excavation required should be completed using rock saws as opposed to pneumatic hammers.
- If piling is required for the hardstand, use of augured, CFA or bored piling should be used rather than impact piling.
- Turn off plant that is not being used.
- Locate noisy plant away from potentially noise affected neighbours or behind barriers, such as sheds or walls.

## 9 CONCLUSION

This report presents the noise impact assessment of the proposed helipad location at Penrith Lakes. The assessment has reviewed impacts from typical flight movements from various helicopters that are proposed to use the facility. Impacts have been assessed with reference to the Environmental Protection Authority – Environmental Noise Control Manual.

Sample measurements of typical helicopter movements were conducted on site. Additionally, impacts from typical helicopter movements have been modelled using SoundPlan™ noise modelling software and noise data for all proposed helicopters held by this office.

Results of the assessment indicates that noise impacts will be compliant with the noise emission goals, based on the recommendations of the Environmental Protection Authority – Environmental Noise Control Manual.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,



Acoustic Logic Consultancy Pty Ltd  
Katherine Beeston

## APPENDIX A – GRID NOISE MAPS

# Sydney Helicopters

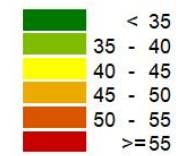
## Grid Noise Map - Penrith

Leq, 15 Hour AS350

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

$L_{eq}$   
in dB(A)





# Sydney Helicopters

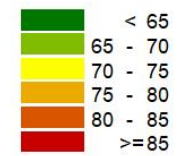
## Grid Noise Map - Penrith

Lmax AS350

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

**L<sub>max</sub>**  
in dB(A)





# Sydney Helicopters

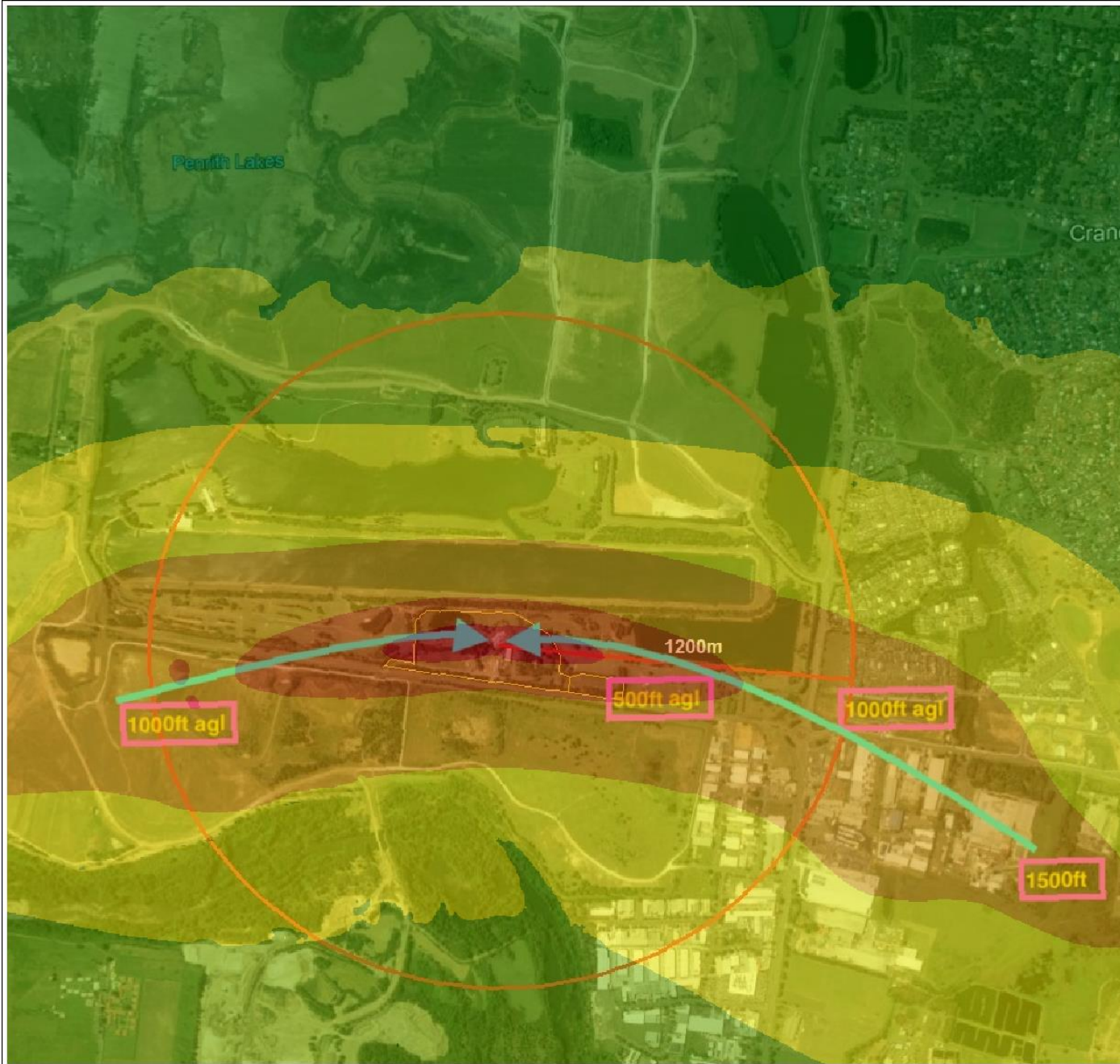
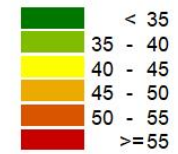
## Grid Noise Map - Penrith

Leq, 15 Hour Bell 206

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

$L_{eq}$   
in dB(A)



# Sydney Helicopters

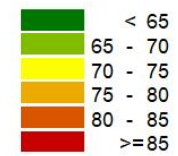
## Grid Noise Map - Penrith

Lmax Bell206

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

**L<sub>max</sub>**  
in dB(A)







# Sydney Helicopters

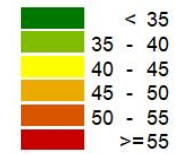
## Grid Noise Map - Penrith

Leq,15 Hour AW139

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

$L_{eq}$   
in dB(A)



# Sydney Helicopters

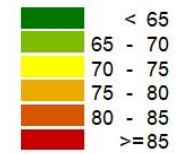
## Grid Noise Map - Penrith

Lmax AW139

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

**L<sub>max</sub>**  
in dB(A)





# Sydney Helicopters

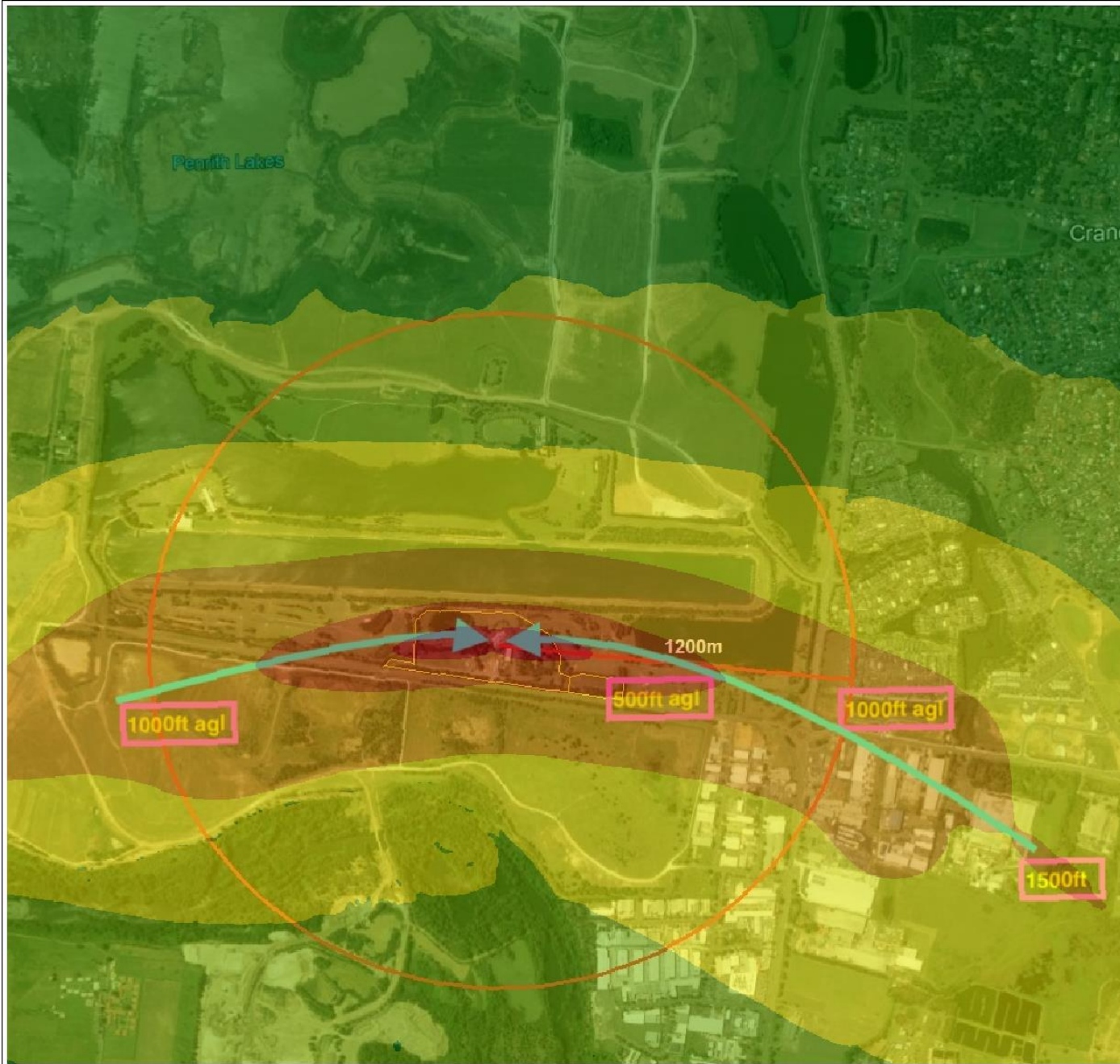
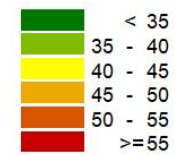
## Grid Noise Map - Penrith

Leq,15 Hour Bell 429

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

$L_{eq}$   
in dB(A)





# Sydney Helicopters

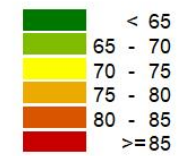
## Grid Noise Map - Penrith

Lmax Bell429

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

**L<sub>max</sub>**  
in dB(A)



# Sydney Helicopters

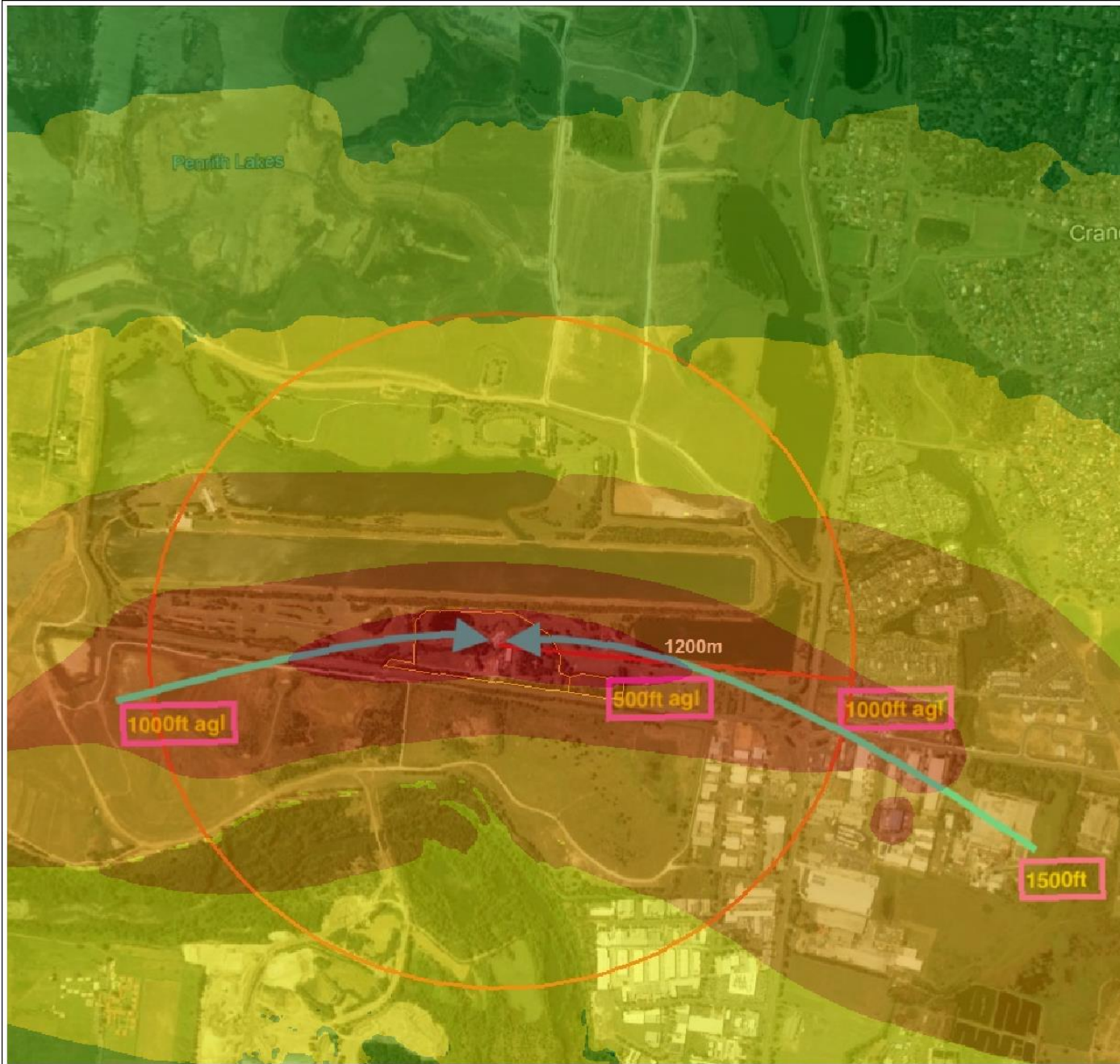
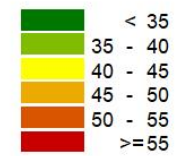
## Grid Noise Map - Penrith

Leq,15 Hour Bell 412

Prepared by: K. Beeston  
Date: 15/05/2020

### Noise Level

$L_{eq}$   
in dB(A)





# Sydney Helicopters

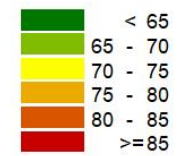
## Grid Noise Map - Penrith

Lmax Bell412

Prepared by: K. Beeston  
Date: 23/04/2020

### Noise Level

**L<sub>max</sub>**  
in dB(A)



## APPENDIX 2 – CALIBRATION CERTIFICATION



# CERTIFICATE OF CALIBRATION

CERTIFICATE No.: **SLM 25767 & FILT 5479**

**Equipment Description:** Sound Level Meter

**Manufacturer:** Norsonic

**Model No:** NOR-140      **Serial No:** 1403428

**Microphone Type:** 40AF      **Serial No:** 347979

**Preamplifier Type:** 46AF      **Serial No:** 362295

**Filter Type:** 1/3 Octave      **Serial No:** 1403428

**Comments:** All tests passed for class 1.  
(See over for details)

**Owner:** Acoustic Logic  
9 Sarah Street  
Mascot NSW 2020

**Ambient Pressure:** 1009 hPa  $\pm 1.5$  hPa

**Temperature:** 23 °C  $\pm 2^\circ$  C      **Relative Humidity:** 41%  $\pm 5\%$

**Date of Calibration:** 21/10/2019      **Issue Date:** 22/10/2019

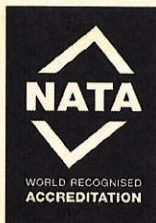
**Acu-Vib Test Procedure:** AVP10 (SLM) & AVP06 (Filters)

**CHECKED BY:** *JKB*

**AUTHORISED SIGNATURE:** *Jack Kieft*

Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



**ACU-VIB**  
ELECTRONICS

HEAD OFFICE

Unit 14, 22 Hudson Ave. Castle Hill NSW 2154  
Tel: (02) 96808133 Fax: (02) 96808233  
Mobile: 0413 809806  
web site: www.acu-vib.com.au

Accredited Lab. No. 9262  
Acoustic and Vibration  
Measurements

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AVCERT10 Rev. 1.3 15.05.18



**CERTIFICATE NO.: SLM 25767 & FILT 5479**

The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013

<b>Tests Performed:</b>	<i>Clause</i>	<i>Result</i>
<i>Absolute Calibration</i>	10	Pass
<i>Acoustical Frequency Weighting</i>	12	Pass
<i>Self Generated Noise</i>	11.1	Entered
<i>Electrical Noise</i>	11.2	Entered
<i>Long Term Stability</i>	15	Pass
<i>Electrical Frequency Weightings</i>	13	Pass
<i>Frequency and Time Weightings</i>	14	Pass
<i>Reference Level Linearity</i>	16	Pass
<i>Range Level Linearity</i>	17	NA
<i>Toneburst</i>	18	Pass
<i>Peak C Sound Level</i>	19	Pass
<i>Overload Indicator</i>	20	Pass
<i>High Level Stability</i>	21	Pass

**Statement of Compliance:** The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.  
A full technical report is available if required.

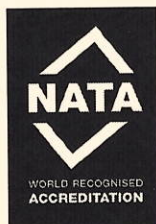
**This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 1260: 1995 and AS/NZS 4476 - 1997 and were conducted to test the following performance characteristics:**

1. Relative attenuation clause 5.3

**Date of Calibration:** 21/10/2019      **Issue Date:** 22/10/2019

**Checked by:** *AKB*

Accredited for compliance with ISO/IEC 17025 - Calibration  
The results of the tests, calibration and/or measurements included in this document are traceable to Australian/national standards.



Accredited Lab. No. 9262  
Acoustic and Vibration  
Measurements



**HEAD OFFICE**  
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154  
Tel: (02) 96808133 Fax: (02)96808233  
Mobile: 0413 809806  
web site: www.acu-vib.com.au