

## **REPORT TITLE:**

**159-161 Iverson Road, NW6 2HE: Noise Assessment relating to Planning Conditions 6 & 15**

## **CLIENT DETAILS:**

**Formation Design and Build**

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**PC-15-0257-RP1**

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# 1. Introduction

Pace Consult Limited has been commissioned by Formation Design and Build to undertake ambient noise assessment at 159 -161 Iverson Road, West Hampstead NW6 2HE

This report assesses internal and external ambient noise levels, with the primary goal to allow planning conditions 6b and 15b to be discharged as applicable. It has been prepared in accordance with the relevant national standards and guidelines including British Standard BS8233: 2014, 'Guidance on sound insulation and noise reduction for buildings' and also WHO document 'Guidelines for Community Noise 1999'

The site is shown in figure 1 and 2 to the rear of this report.

## 2. Assessment Methodology

### 2.1 Perception

Noise is defined as unwanted sound. Human ears are able to respond to sound over the frequency range of about 20 Hz to 20 kHz and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, and is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates to the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear. To help understand the range of noise levels which may be encountered, an indication of the level of some common sounds on the dB(A) scale is given in the table below.

dB(A)	Description
140	Threshold of pain
120	Jet take off at 50 metres
100	Maximum noise levels on an underground platform
80	Kerbside of a busy urban street
60	Busy general office
40	Residential area at night
20	Background in a TV and recording studio
0	Threshold of hearing

Furthermore, the perception of noise may be determined by a number of other factors, both acoustic and non-acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In addition, the time of day and other acoustic features such as tonality may be important, as may the disposition of the affected individual receptor.

Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that corresponds to the response of the human ear is the A-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or  $L_{Aeq}$ ,  $L_{A90}$ , etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) of a steady source is generally regarded as the minimum difference needed to perceive a change.

## 2.2 BS8233:2014 Guidance on sound insulation and noise reduction in buildings

This standard gives guidance on desirable acoustic criteria and limits which are appropriate for domestic rooms for living and sleeping as outlined in table 4 of BS8233:

Table 4 Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

This document also provides the following notes regarding instances when the above levels may not be achieved:

*NOTE 3 These levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.*

*NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.*

*NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or  $L_{Amax,P}$  depending on the character and number of events per night. Sporadic noise events could require separate values.*

Collectively, Table 4 and note 7 from BS8233 provide a 'good' to 'reasonable' design range for indoor ambient noise levels.

In addition to be the above, BS8233 also provides desirable limits for external amenity space:

### **Design criteria for external noise**

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$  with an upper guideline value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

## **2.3 Planning Conditions**

As part of the proposed development, Camden Planning Authority have imposed planning conditions 6b & 15b which are included below. It is understood the sound insulation scheme (6a-15a) has been provided by others.

Planning Condition 6:

- a) *"Before building works commence on the site, a sound insulation scheme shall be submitted to and approved by the Local Planning Authority providing for the insulation of the proposed dwelling unit(s) so that the externally generated noise levels in unoccupied rooms of 30dB $L_{Aeq}$  (1 Hour) and individual noise events shall not exceed 45dB  $L_{Amax}$ ....."*
- b) *"On completion of development, a test on each dwelling shall be carried out to verify compliance with this condition (6a). A report shall be produced containing all raw data and showing how calculation have been made. The development shall not be occupied until a copy of the report has been submitted to and approved in writing by the Local Planning Authority."*

Planning Condition 15:

- a) *“Before building works commence on the site, a scheme shall be submitted to and approved by the Local Planning Authority providing full details of the acoustic measures to be incorporated to ensure that the steady noise level does not exceed 50dB  $L_{Aeq,T}$  in open spaces (including balconies) and open communal areas. The development shall be carried out in such a manner to ensure that the above noise levels (from railway and road traffic) are to be retained (including maintenance) for the next 15 years.”*
  
- b) *“Prior to occupation a survey of each open communal amenity area including balconies shall be carried out to verify compliance with condition 15(a). A report shall be produced containing all raw data and showing how calculations have been made. A copy of such report shall be submitted to the Local Planning Authority for its approval in writing. The report shall include details of standards used, measurements locations, raw tabulated and graphically represented data, date, time etc.”*

Regarding planning condition no.6, it is assumed the target level of 30dB $L_{Aeq}$  (1 Hour) relates to bedroom type rooms for the night time hours 23:00 - 07:00, in keeping with table no.4 of BS8233. It is also understood a deviation from the above planning requirements is permitted, in that noise level measurements on each façade is acceptable to demonstrate reasonable internal ambient noise levels within habitable rooms.

Dealing with the  $L_{max}$  levels, the current version of BS8233 lacks definitive guidance on what can cause sleep disturbance for the end user in terms of number of external events. Therefore, direction has been taken the World Health Organisation (WHO) document ‘Guidelines for Community Noise- April 1999’, where the following is stated:

*‘For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB  $L_{Amax}$  more than 10-15 times per night.....’*

## 3. Noise Survey Details

### 3.1 Survey Information

A noise survey was carried out on site between 20<sup>th</sup>-21<sup>st</sup> & 23<sup>rd</sup> - 25<sup>th</sup> January 2016. The sound level meters were positioned 1.5 m above ground level (tripod mounted), and within bedroom type rooms, all trickle ventilators were open during the internal course of the survey. The noise levels measured are representative of the existing noise climate at the facades of nearest sensitive receptors.

External levels were also measured in the open communal area between Block A & B within level 1 and on the Iverson road side façade within outdoor private balcony space.

Measurements were taken in accordance with the principles of BS 7445:2003 Parts 1 (2003) & 2-3(1991), 'Description and Measurement of Environmental Noise'.

Measurements were made with calibrated precision grade sound level meters which achieve the requirements of BS EN 61672: 2003. The sound level meters were calibrated before and after each survey. No significant drift was noted between the two reference checks

The noise parameters  $L_{Aeq}$ ,  $L_{A90}$  and  $L_{Amax(fast)}$  have been monitored and the relevant values obtained for daytime, evening and night periods. Measurements were taken in third octave bands, but noise limits later in this report are to be set as single figure 'A' weighted values rather than octave or third octave levels. The measurement positions (MP) are shown in figure 1.

### 3.2 Equipment Details

- Svan971 Precision grade sound level meter. Serial number: 34927 (Calibration due: October 2017).
- Svan 971 Precision grade sound level meter. Serial number: 34931 (Calibration due: October 2017).
- Svan971 Precision grade sound level meter. Serial number: 34937 (Calibration due: October 2017)
- Norsonic 1251 class 1 calibrator. Serial number 31326 (Calibration due: October 2016)
- Environmental wind shields.



### 3.3 Weather

In order to evaluate the weather conditions two weather check measurements were undertaken on site. During the weather checks, it was noted that the climatic conditions were stable during the whole survey period. There was around 50% cloud cover during the survey.

Table 2 : Weather conditions				
Time	Location	°C	Wind speed m/s	Relative Humidity %
13:30 (23/01/16)	MP1	7.9	0.5	51.4
08:40 (25/01/16)	MP2	8.7	0.8	55.2

The weather conditions were measured using a Pocket weather tracker KESTREL 4500.

## 4. Summary of Noise Level Measurements

Please see below a summary of noise measurements recorded at the various monitoring locations measured across the site within bedroom spaces. The acoustic parameter  $L_{Amax}$  dB, is displayed as the 90<sup>th</sup> percentile for the measurement period, which is deemed to provide a robust assessment.

### 4.1 Results

The tables below show the measured indoor ambient noise levels.

<b>Table 3: MP1 Noise Measurements</b>		
Time	$L_{Aeq,T}$ dB (Log Average)	$L_{Amax}$ dB (90 <sup>th</sup> Percentile)
Night (23:00-7:00)	25	44

<b>Table 4: MP2 Noise Measurements</b>		
Time	$L_{Aeq,T}$ dB (Log Average)	$L_{Amax}$ dB (90 <sup>th</sup> Percentile)
Night (23:00-7:00)	35	57

<b>Table 5: MP3 Noise Measurements</b>		
Time	$L_{Aeq,T}$ dB (Log Average)	$L_{Amax}$ dB (90 <sup>th</sup> Percentile)
Night (23:00-7:00)	27	49

<b>Table 6: MP4 Noise Measurements</b>		
Time	L <sub>Aeq,T</sub> dB (Log Average)	L <sub>Amax</sub> dB (90 <sup>th</sup> Percentile)
Night (23:00-7:00)	27	55

The tables below show the measured external ambient noise levels.

<b>Table 7: MP5 Noise Measurements</b>		
Time	L <sub>Aeq,T</sub> dB (Log Average)	L <sub>Amax</sub> dB (90 <sup>th</sup> Percentile)
Daytime (7:00-23:00)	63	N/A

<b>Table 8: MP6 Noise Measurements</b>		
Time	L <sub>Aeq,T</sub> dB (Log Average)	L <sub>Amax</sub> dB (90 <sup>th</sup> Percentile)
Daytime (7:00-23:00)	52	N/A

## **4.2 Uncertainty**

All possible efforts to reduce uncertainty in this assessment have been taken. There will always be an element of uncertainty in the noise measurements and calculations.

The following steps were taken to reduce the level of uncertainty within the sound level measurements:

- The sound level meters were immediately calibrated before and after the survey, the difference between the initial calibration value, and the final calibration check on completion of measurements did not exceed  $\pm 0.5$  dB
- The external noise measurements were undertaken during favourable weather conditions.

## 5. Discussion

Indoor ambient noise levels demonstrate, that under the guidance of BS8233:2014 a 'reasonable' level of amenity is achievable within habitable rooms, with the majority surpassing the 30dB  $L_{Aeq,T}$  target level.

As can be seen in section 4, some exceedances have occurred regarding maximum internal noise levels. Monitoring Position 2 for example shows results taken over Saturday 23<sup>rd</sup> January had a concentration level of between 49-55dB  $L_{Amax}$  before midnight, however levels dropped noticeably during the remainder of the measurement period. During the survey, it was noted the building was still partially under construction, for example with communal stairwells unfinished. It is anticipated that once the building envelope is complete, these transient levels maybe reduced further.

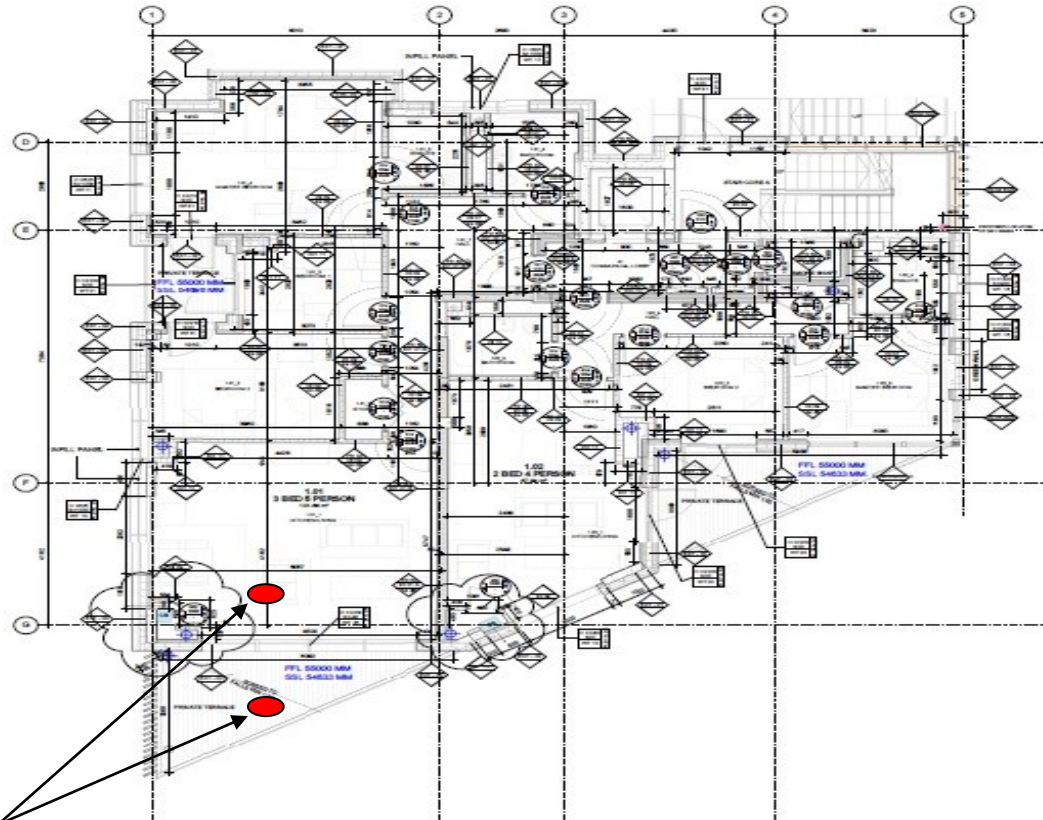
Measured external levels in open spaces are in exceedance of 50dB  $L_{Aeq,T}$ . This is particularly evident at the road side façade (MP5). The following text should be noted from report ref: NA/IR/20140925-RK, completed by NRG Consulting, dated October 2014:

*“The assessment for Planning Condition 15 shows that best practicable means have been employed to give provision for protection against external levels. Without possibility of further feasible attenuation measures it is recommended that noise levels higher than the requirements of Planning Condition 15 are accepted for both communal and private external amenity spaces.”*

## 6. Conclusions

Noise levels have been assessed at 159-161 Iverson Road, West Hampstead NW6 2HE in accordance with relevant guidelines. Where exceedances have occurred, possible explanations have been provided.

Figure 1 – Site Layout (Block A):



MP1 & MP5:  
2.01 Bedroom & Balcony

Figure 2: Site Layout (Block B)

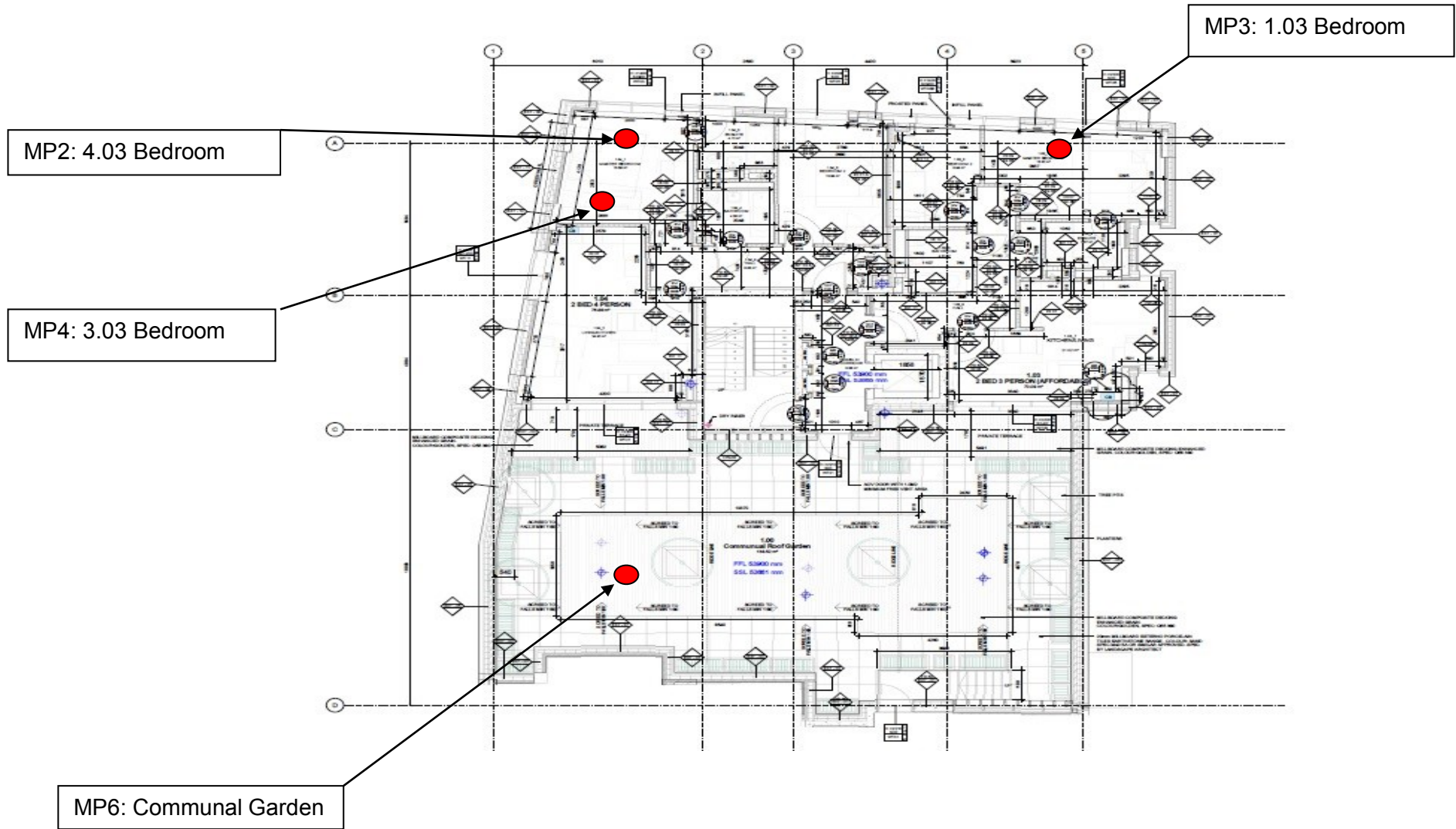




Figure 3: Summary Internal Noise Data (MP3)

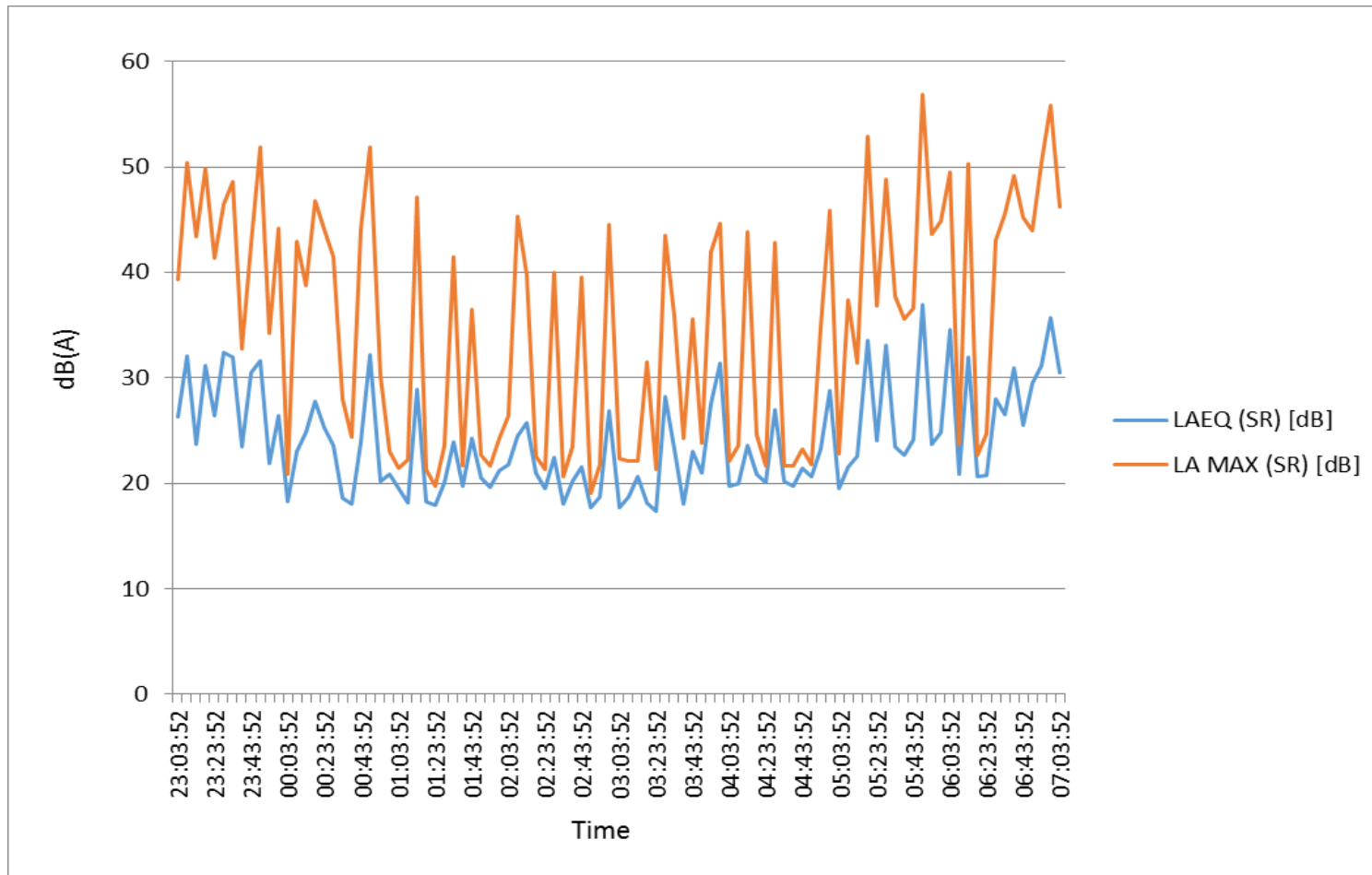
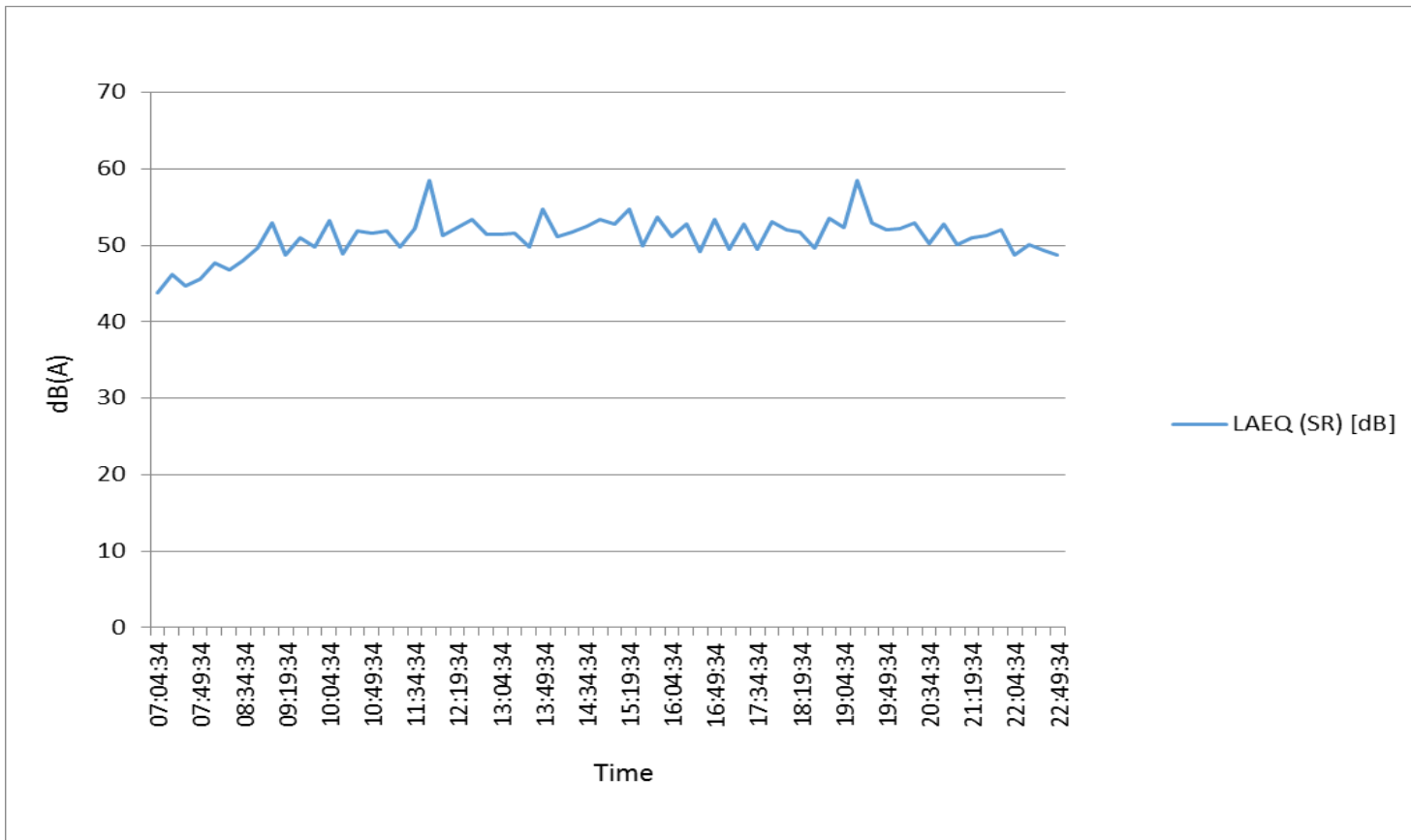


Figure 4: Summary External Noise Data (MP6)



## Appendix 1 – ANC Accreditation

