

# Sound Advice

## ACOUSTICS LTD

REPORT REFERENCE:

SA – 6397 Rev1

### ENVIRONMENTAL NOISE IMPACT ASSESSMENT

#### PRoPG Planning and Noise

British Standard 8233: 2014

World Health Organisation (WHO)

British Standard 6472 & 7385

CLIENT:

Aura Gas

SITE:

Aura House

New Road

Bedhampton

Hampshire

PO9 1DE

SURVEY DATES:

21<sup>st</sup> – 25<sup>th</sup> February 2020

Report B

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|          |                                                                                                         |           |
|----------|---------------------------------------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>EXECUTIVE SUMMARY .....</b>                                                                          | <b>5</b>  |
| 1.1      | INSTRUCTION .....                                                                                       | 5         |
| 1.2      | SCOPE OF REPORT.....                                                                                    | 5         |
| 1.3      | SUMMARY OF RESULTS .....                                                                                | 5         |
| 1.3.1    | <i>Background Noise Levels.....</i>                                                                     | 5         |
| 1.4      | POTENTIAL FAÇADE NOISE LEVELS.....                                                                      | 6         |
| 1.4.1    | <i>Daytime (07:00-23:00).....</i>                                                                       | 6         |
| 1.4.2    | <i>Night Time (23:00-07:00).....</i>                                                                    | 6         |
| 1.5      | RISK ASSESSMENT.....                                                                                    | 6         |
| 1.5.1    | <i>Daytime (07:00-23:00) – Position 1 .....</i>                                                         | 6         |
| 1.5.2    | <i>Night Time (23:00-07:00) – Position 1 .....</i>                                                      | 6         |
| 1.6      | GLAZING & VENTILATION SPECIFICATION.....                                                                | 7         |
| 1.7      | WHO GUIDELINES FOR COMMUNITY NOISE .....                                                                | 7         |
| 1.8      | CONCLUSION .....                                                                                        | 7         |
| 1.9      | SUMMARY OF VIBRATION .....                                                                              | 8         |
| <b>2</b> | <b>INTRODUCTION.....</b>                                                                                | <b>9</b>  |
| 2.1.1    | <i>Professional Practice Guidance on Planning &amp; Noise. ....</i>                                     | 10        |
| 2.2      | BRITISH STANDARD 8233: 2014.....                                                                        | 11        |
| 2.3      | NATIONAL PLANNING POLICY FRAMEWORK 2019 (NPPF) AND NOISE POLICY STATEMENT FOR ENGLAND 2010 (NPSE). .... | 11        |
|          | <i>“Significant adverse” and “adverse” .....</i>                                                        | 11        |
|          | <i>NOEL – No Observed Effect Level.....</i>                                                             | 12        |
|          | <i>LOAEL – Lowest Observed Adverse Effect Level .....</i>                                               | 12        |
|          | <i>SOAEL – Significant Observed Adverse Effect Level .....</i>                                          | 12        |
| 2.4      | WORLD HEALTH ORGANISATION ‘GUIDELINES FOR COMMUNITY NOISE’ .....                                        | 12        |
| <b>3</b> | <b>SITE LOCATION.....</b>                                                                               | <b>13</b> |
| 3.1      | PROPOSED DEVELOPMENT.....                                                                               | 14        |
| <b>4</b> | <b>PROCEDURE .....</b>                                                                                  | <b>15</b> |
| <b>5</b> | <b>APPARATUS .....</b>                                                                                  | <b>16</b> |
| 5.1      | 140 NOISE METER S/N 1402941 ENVIRONMENTAL TESTING – POSITION 1.....                                     | 16        |
| 5.2      | 140 NOISE METER S/N 1403140 ENVIRONMENTAL TESTING – POSITION 2.....                                     | 16        |
| <b>6</b> | <b>RESULTS .....</b>                                                                                    | <b>17</b> |
| 6.1      | DOWNLOADED RESULTS, AND AVERAGES. ....                                                                  | 17        |
| 6.1.1    | <i>21<sup>st</sup> – 22<sup>nd</sup> February 2020 – Position 1 .....</i>                               | 17        |
| 6.1.2    | <i>22<sup>nd</sup> – 23<sup>rd</sup> February 2020 – Position 1 .....</i>                               | 17        |
| 6.1.3    | <i>23<sup>rd</sup> – 24<sup>th</sup> February 2020 – Position 1 .....</i>                               | 17        |
| 6.1.4    | <i>24<sup>th</sup> – 25<sup>th</sup> February 2020 – Position 1 .....</i>                               | 17        |
| 6.1.5    | <i>21<sup>st</sup> – 22<sup>nd</sup> February 2020 – Position 2 .....</i>                               | 18        |
| 6.1.6    | <i>22<sup>nd</sup> – 23<sup>rd</sup> February 2020 – Position 2 .....</i>                               | 18        |
| 6.1.7    | <i>23<sup>rd</sup> – 24<sup>th</sup> February 2020 – Position 2 .....</i>                               | 18        |

|           |                                                                                    |           |
|-----------|------------------------------------------------------------------------------------|-----------|
| 6.1.8     | 24 <sup>th</sup> – 25 <sup>th</sup> February 2020 – Position 2 .....               | 18        |
| <b>7</b>  | <b>PROPG PLANNING &amp; NOISE STAGE 1.....</b>                                     | <b>19</b> |
| 7.1       | STAGE 1: INITIAL SITE NOISE RISK ASSESSMENT .....                                  | 19        |
| 7.2       | POTENTIAL FAÇADE NOISE LEVELS.....                                                 | 20        |
| 7.2.1     | Daytime (07:00-23:00) .....                                                        | 20        |
| 7.2.2     | Night Time (23:00-07:00).....                                                      | 20        |
| 7.3       | RISK ASSESSMENT .....                                                              | 20        |
| 7.3.1     | Daytime (07:00-23:00) – Position 1 .....                                           | 20        |
| 7.3.2     | Night Time (23:00-07:00) – Position 1 .....                                        | 20        |
| <b>8</b>  | <b>PROPG PLANNING &amp; NOISE STAGE 2 - ELEMENT 1 – GOOD ACOUSTIC DESIGN .....</b> | <b>21</b> |
| <b>9</b>  | <b>ELEMENT 2 – INTERNAL NOISE LEVEL GUIDELINES .....</b>                           | <b>22</b> |
| 9.1       | DISCUSSION OF RESULTS .....                                                        | 22        |
| 9.2       | EXISTING NOISE LEVELS – DAYTIME (07:00 – 23:00) .....                              | 22        |
| 9.3       | EXISTING NOISE LEVELS – NIGHT TIME (23:00 – 07:00) .....                           | 22        |
| 9.4       | PROPOSED NOISE LEVELS – DAYTIME (07:00 – 23:00) .....                              | 23        |
| 9.5       | PROPOSED NOISE LEVELS – NIGHT TIME (23:00 – 07:00) .....                           | 23        |
| 9.6       | RECOMMENDATIONS .....                                                              | 24        |
| 9.7       | CALCULATION PROCEDURE TO BS 8233: 2014.....                                        | 25        |
| 9.8       | GROUND FLOOR LOUNGE FRONT .....                                                    | 25        |
| 9.9       | GROUND FLOOR BEDROOM FRONT .....                                                   | 26        |
| 9.10      | TOP FLOOR LIVING ROOM FRONT .....                                                  | 27        |
| 9.11      | TOP FLOOR BEDROOM FRONT .....                                                      | 28        |
| 9.12      | GROUND FLOOR LIVING ROOM REAR .....                                                | 29        |
| 9.13      | GROUND FLOOR BEDROOM REAR .....                                                    | 30        |
| 9.14      | TOP FLOOR LIVING ROOM REAR .....                                                   | 31        |
| 9.15      | TOP FLOOR BEDROOM REAR.....                                                        | 32        |
| 9.16      | VENTILATION (DNE) .....                                                            | 33        |
| 9.17      | GLAZING ( $R_{gl}$ ).....                                                          | 33        |
| 9.18      | WALLS (NON-GLAZED ELEMENTS) ( $R_{ew}$ ) .....                                     | 33        |
| 9.19      | ROOF ( $R_{rn}$ ) .....                                                            | 33        |
| 9.20      | GLAZING & VENTILATION ASSESSMENT .....                                             | 34        |
| 9.21      | NIGHT NOISE GUIDELINES EUROPE 2009 .....                                           | 35        |
| 9.22      | REAR BEDROOMS WITH UPGRADED ACOUSTIC VENTS.....                                    | 38        |
| <b>10</b> | <b>VIBRATION ASSESSMENT .....</b>                                                  | <b>39</b> |
| 10.1      | ASSESSMENT CRITERIA.....                                                           | 39        |
| 10.2      | MEASUREMENTS .....                                                                 | 40        |
| 10.3      | RESULTS & ASSESSMENT OF VIBRATION MEASUREMENTS .....                               | 41        |
| 10.4      | IMPLICATIONS.....                                                                  | 46        |
| 10.5      | RECOMMENDATIONS .....                                                              | 46        |

|           |                                                                    |           |
|-----------|--------------------------------------------------------------------|-----------|
| <b>11</b> | <b>ELEMENT 4 – ASSESSMENT OF OTHER RELEVANT ISSUES .....</b>       | <b>47</b> |
| 11.1      | THE NATIONAL PLANNING POLICY FRAMEWORK 2019 (NPPF) .....           | 47        |
| <b>12</b> | <b>CONCLUSION .....</b>                                            | <b>48</b> |
| 12.1.1    | Background Noise Levels.....                                       | 48        |
| 12.2      | POTENTIAL FAÇADE NOISE LEVELS.....                                 | 48        |
| 12.2.1    | Daytime (07:00-23:00).....                                         | 48        |
| 12.2.2    | Night Time (23:00-07:00).....                                      | 48        |
| 12.3      | RISK ASSESSMENT.....                                               | 48        |
| 12.3.1    | Daytime (07:00-23:00) – Position 1 .....                           | 48        |
| 12.3.2    | Night Time (23:00-07:00) – Position 1 .....                        | 48        |
| 12.4      | GLAZING & VENTILATION SPECIFICATION.....                           | 49        |
| 12.5      | WHO GUIDELINES FOR COMMUNITY NOISE .....                           | 49        |
| 12.6      | CONCLUSION .....                                                   | 49        |
| 12.7      | SUMMARY OF VIBRATION.....                                          | 50        |
| <b>13</b> | <b>RESULTS .....</b>                                               | <b>51</b> |
| 13.1      | 21 <sup>ST</sup> – 22 <sup>ND</sup> FEBRUARY 2020 POSITION 1.....  | 51        |
| 13.2      | 22 <sup>ND</sup> – 23 <sup>RD</sup> FEBRUARY 2020 POSITION 1 ..... | 52        |
| 13.3      | 23 <sup>RD</sup> – 24 <sup>TH</sup> FEBRUARY 2020 POSITION 1 ..... | 53        |
|           | 24 <sup>TH</sup> – 25 <sup>TH</sup> FEBRUARY 2020 POSITION 1 ..... | 54        |
| 13.4      | 21 <sup>ST</sup> – 22 <sup>ND</sup> FEBRUARY 2020 POSITION 2.....  | 55        |
| 13.5      | 22 <sup>ND</sup> – 23 <sup>RD</sup> FEBRUARY 2020 POSITION 2 ..... | 56        |
| 13.6      | 23 <sup>RD</sup> – 24 <sup>TH</sup> FEBRUARY 2020 POSITION 2 ..... | 57        |
| 13.7      | 24 <sup>TH</sup> – 25 <sup>TH</sup> FEBRUARY 2020 POSITION 2.....  | 58        |
| <b>14</b> | <b>ENVIRONMENTAL CONDITIONS .....</b>                              | <b>59</b> |

## 1 EXECUTIVE SUMMARY

### 1.1 Instruction

Sound Advice Acoustics Ltd have been instructed by Aura Gas to undertake a background noise survey to British Standard 8233: 2014 to determine the impact of existing noise sources on the proposed accommodation scheme at Aura House, New Road, Bedhampton, Hampshire, PO9 1DE and a vibration assessment to British Standard 6472 & 7385.

### 1.2 Scope of Report

The measurements will be undertaken in accordance with ISO 1996 – Part 2: 2017 to determine the existing background noise levels and British Standard 8233: 2014 will be used to determine the impact of existing traffic on the internal noise environment within the proposed residential dwellings. This report aims to establish the following:

- Existing background noise levels within the area;
- Assess the potential internal noise levels on the proposed rooms;
- Provide specifications for the ventilation and window glazing with the proposed rooms.
- Assess the vibration from the railway.

### 1.3 Summary of Results

#### 1.3.1 Background Noise Levels

A 96 hour background noise survey was undertaken from 21<sup>st</sup> – 25<sup>th</sup> February 2020 at two positions at the front of the site and the rear of the site in order to establish the underlying background noise levels. The maximum day time levels were found to be  $L_{Aeq, 16 \text{ hour}}$  65.4 dB and the maximum night time levels were found to be  $L_{Aeq, 8 \text{ hours}}$  56.8 dB at position 1. The maximum day time levels were found to be  $L_{Aeq, 16 \text{ hour}}$  65.9 dB and the maximum night time levels were found to be  $L_{Aeq, 8 \text{ hours}}$  63.0 dB at position 2.

| Assessment Position | Date Start | Date Finish | Daytime LAeq | Night Time LAeq |
|---------------------|------------|-------------|--------------|-----------------|
| Position 1 Front    | 21/02/2020 | 25/02/2020  | 65.4         | 56.8            |
| Position 2 Rear     | 21/02/2020 | 25/02/2020  | 65.9         | 63.0            |

## 1.4 Potential Façade Noise Levels

### 1.4.1 Daytime (07:00-23:00)

| Time Period                   | Highest Potential Façade Noise Level | Noise Risk Category<br>2 - Medium |
|-------------------------------|--------------------------------------|-----------------------------------|
| Average Daytime (07:00-23:00) | $L_{Aeq, 16\text{ HOUR}}$ 67.0 dB    | 63 – 70 dB                        |

### 1.4.2 Night Time (23:00-07:00)

| Time Period                      | Highest Potential Façade Noise Level    | Noise Risk Category<br>3 - High |
|----------------------------------|-----------------------------------------|---------------------------------|
| Average Night Time (23:00-07:00) | $L_{Aeq, 16\text{ HOUR}}$ 62.0 dB       | > 60 dB                         |
|                                  | Maximum (10 Times) – $L_{Amax}$ 84.8 dB | >80 dB (10 Times in 8 Hours)    |

## 1.5 Risk Assessment

### 1.5.1 Daytime (07:00-23:00) – Position 1

| Risk Assessment Category | Risk Assessment                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 - Medium               | As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. |

### 1.5.2 Night Time (23:00-07:00) – Position 1

| Risk Assessment Category | Risk Assessment                                                                                                                                                                                                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 - High                 | High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. |

The above table demonstrates this site is located within Noise Risk Category 2 which suggests a Medium level of risk for daytime levels and Noise Risk Category 3 which suggests a high of risk for night time levels. Therefore, further mitigation levels will be required at Stage 2.

## **1.6 Glazing & Ventilation Specification**

The development should be designed with a 6mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Titon V75 / C75 as shown above in blue in section 9.20 and a 10mm glass / 16mm air gap / 8.8mm glass & Greenwood MA-3051 wall vent as shown in red in section 9.20 in order to comply with the LA<sub>max</sub> criteria in section 9.22 or similarly approved to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

## **1.7 WHO Guidelines for Community Noise**

The development does not propose external living areas and therefore an assessment to the World Health Organisation's 'Guidelines for Community Noise' has not been carried out.

## **1.8 Conclusion**

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed residential dwellings and satisfy the local council's requirements.

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2019, NPPF & NPSE.

## 1.9 Summary of Vibration

The following vibration levels have been assessed over a typical period between 21<sup>st</sup> – 25<sup>th</sup> February 2020. The following table summarises these results:-

| Time Period                                              | Vibration Dose Value<br>m/s <sup>1.75</sup> |       |       | Peak Particle Velocity<br>mm/s |
|----------------------------------------------------------|---------------------------------------------|-------|-------|--------------------------------|
|                                                          | L                                           | T     | V     | Resultant Vector               |
| 21 <sup>st</sup> February 2020 – 12 Hr                   | 0.031                                       | 0.04  | 0.234 | 6.33mm/s                       |
| 22 <sup>nd</sup> February 2020 – 16 Hr                   | 0.03                                        | 0.039 | 0.232 | 5.80mm/s                       |
| 23 <sup>rd</sup> February 2020 – 16 Hr                   | 0.028                                       | 0.036 | 0.175 | 3.35mm/s                       |
| 24 <sup>th</sup> February 2020 – 16 Hr                   | 0.031                                       | 0.038 | 0.234 | 6.73mm/s                       |
| 21 <sup>st</sup> – 22 <sup>nd</sup> February 2020 – 8 Hr | 0.026                                       | 0.032 | 0.162 | 4.40mm/s                       |
| 22 <sup>nd</sup> – 23 <sup>rd</sup> February 2020 – 8 Hr | 0.025                                       | 0.031 | 0.097 | 2.50mm/s                       |
| 23 <sup>rd</sup> – 24 <sup>th</sup> February 2020 – 8 Hr | 0.025                                       | 0.031 | 0.121 | 3.65mm/s                       |
| 24 <sup>th</sup> – 25 <sup>th</sup> February 2020 – 8 Hr | 0.026                                       | 0.033 | 0.158 | 4.88mm/s                       |
| Table 3 Summary of daily VDV and PPV                     |                                             |       |       |                                |

The vibration results indicate that vibration dose values (vdv) at the measurement locations are below 0.2 – 0.4 for daytime and night time periods. These values are below the range associated with ‘low probability of adverse comment’.

The maximum peak particle velocity recorded was found to be 6.73 mm/s at Location 2 (closest to the railway). In accordance with the guidance in BS7385, this value is below the limit at which cosmetic damage to building is likely.

The results of this vibration survey indicate that in accordance with the advice given in the appropriate standards, there is likely to be no concern of adverse comments from future occupants of their properties and no concern of cosmetic damage to buildings arising from vibration at this measurement location.

## **2 INTRODUCTION**

Sound Advice Acoustics Ltd have been instructed by Aura Gas to undertake a background noise survey to British Standard 8233: 2014 to determine the impact of existing noise sources on the proposed accommodation scheme at Aura House, New Road, Bedhampton, Hampshire, PO9 1DE.

Ambient noise levels were measured between 21<sup>st</sup> – 25<sup>th</sup> February 2020. This report by Sound Advice Acoustics Ltd gives the results of these measurements and an assessment in accordance with government planning guidelines and relevant standards together with mitigation measures as required.

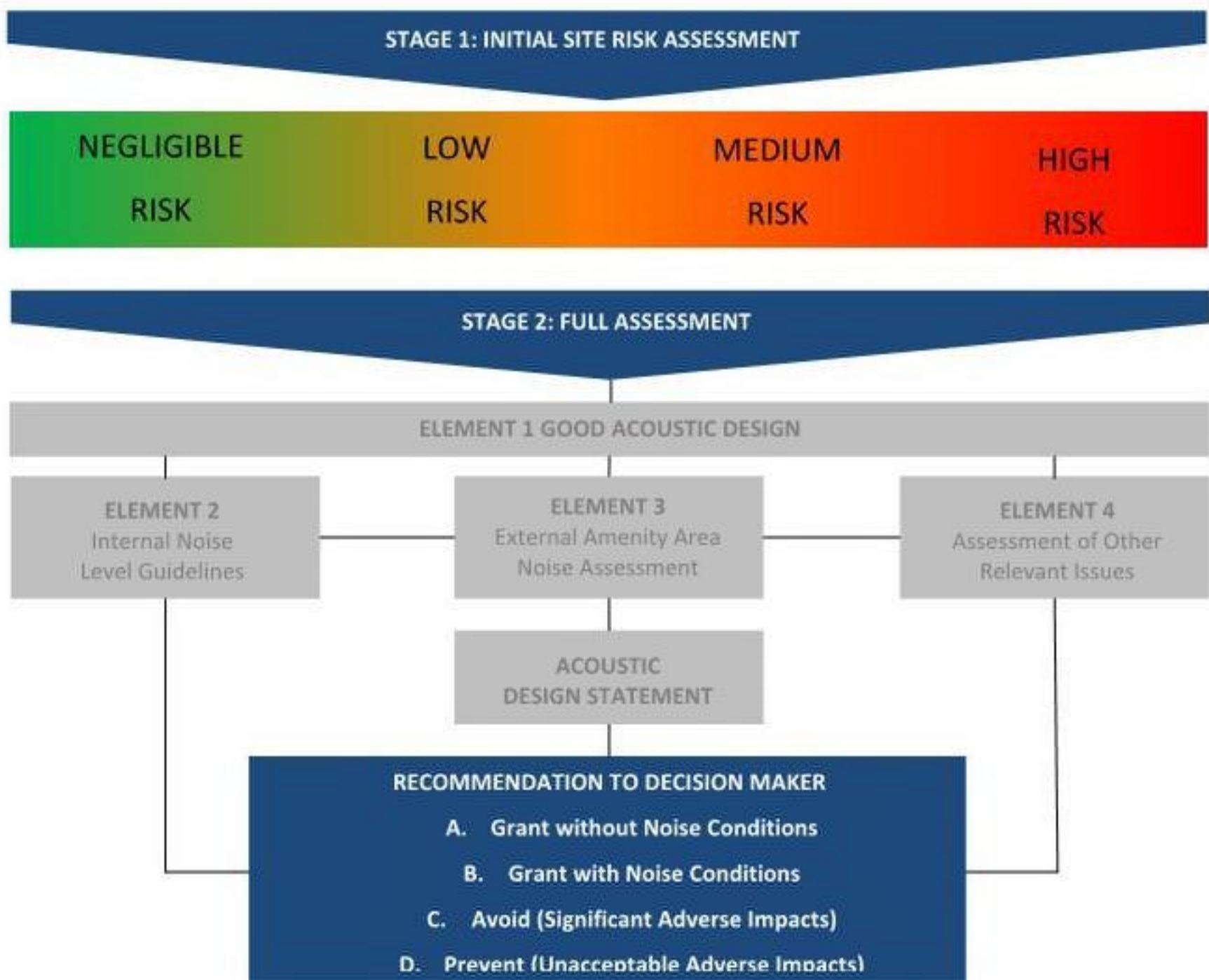
With regards to external ambient noise, environmental noise levels are be monitored at the site in accordance with British Standard 7445: 2003 'Description and measurement of environmental noise assessments and assessments made in-line with PProPG: Planning and Noise.

### 2.1.1 Professional Practice Guidance on Planning & Noise.

The Professional Practice Guidance (PRoPG) on Planning and Noise for New Residential Development was published in May 2017 by the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH). This document was developed in order to offer professional guidance on recommended strategies to the management of noise for use in the associated planning applications for specific sites. This furthermore, provides a numerical acoustic standard in accordance with the Government's planning and noise policies.

This document has been developed to ensure the developer adopts a good acoustic design process to ensure protection for future residents from the potential harmful effects from noise. The PRoPG denotes that it '*does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate*'.

The PRoPG adopts a twin-stage approach, firstly providing an 'Initial Noise Risk Assessment' of the proposed development site before undertaking a detailed approach of a noise impact assessment. The results from the initial noise risk assessment are an indication of the general acoustic environment of the proposed development and demonstrate how detailed the noise impact assessment will need to be in order to mitigate any acoustic issues.



## 2.2 British Standard 8233: 2014

Calculations are to be made in accordance with BS 8233: 2014 Sound Insulation and Noise Reduction for Buildings Code of Practice.

BS 8233: 2014 set the following parameters as target levels that should be designed to within rooms such as Living Rooms and Bedrooms.

| Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important |                    |                                |
|----------------------------------------------------------------------------------------------|--------------------|--------------------------------|
| Objective                                                                                    | Typical situations | Design Range<br>$L_{Aeq,T}$ dB |
| Typical noise levels for acoustic privacy in shared spaces                                   | Living room        | 35 – 40                        |
| NOTE: See Noise control in building services [28] and BS EN ISO 3382.                        |                    |                                |

| Indoor ambient noise levels for dwellings |                    |                                  |                                 |
|-------------------------------------------|--------------------|----------------------------------|---------------------------------|
| Activity                                  | Location           | 07:00 – 23:00                    | 23:00 – 07:00                   |
| Resting                                   | Living Room        | 35 dB $L_{Aeq, 16 \text{ HOUR}}$ | --                              |
| Dining                                    | Dining Room / Area | 40 dB $L_{Aeq, 16 \text{ HOUR}}$ | --                              |
| Sleeping (daytime resting)                | Bedroom            | 35 dB $L_{Aeq, 16 \text{ HOUR}}$ | 30 dB $L_{Aeq, 8 \text{ HOUR}}$ |

Calculations and assessments are therefore to be carried out in order to satisfy the above requirements of BS8233: 2014.

## 2.3 National Planning Policy Framework 2019 (NPPF) and Noise Policy Statement for England 2010 (NPSE).

References and evaluations are to be made to the National Planning Policy Framework 2019 (NPPF) and the Noise Policy Statement for England 2010 (NPSE). The purpose of this document is to include all aspects of environmental noise within assessments i.e. environmental noise, neighbour noise and neighbourhood noise. Noise is to be considered alongside other relevant issues relating to the site and should not be considered in isolation, according to the NPSE.

There are several key phrases within the NPSE aims and these are discussed below.

“Significant adverse” and “adverse”

*There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:*

**NOEL – No Observed Effect Level**

*This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

**LOAEL – Lowest Observed Adverse Effect Level**

*This is the level above which adverse effects on health and quality of life can be detected.*

*Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*

**SOAEL – Significant Observed Adverse Effect Level**

*This is the level above which significant adverse effects on health and quality of life occur.*

*It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.*

## **2.4 World Health Organisation ‘Guidelines for Community Noise’**

In addition, calculations are to be made for the predicted daytime noise levels within the outdoor living area and assessments made against the recommended levels within the World Health Organisation’s ‘Guidelines for Community Noise’. In order to evaluate these levels accurately, the 3D modelling software CADNA A is to be adopted for the purpose of this assessment.

Finally, assessments and references are to be made to the World Health Organisation Night Time Noise Guidance 2009.

### 3 SITE LOCATION

#### Position of Site in Wider Area

The site is located in Bedhampton, Hampshire. The dominant noise source is road traffic noise.



### 3.1 Proposed Development

The proposed development is shown below.



#### 4 PROCEDURE

External noise levels were recorded over a typical period and analysis date extrapolated between 07:00 hrs 21<sup>st</sup> and 07:00 hrs on 25<sup>th</sup> February 2020 at positions 1 & 2 as detailed within this report.

Position 1 was located at the Front boundary of the site in order to capture the noise levels associated with the local roads and Position 2 was located at the Rear boundary of the site in order to capture the railway and background noise levels. Sample measurements were recorded over continuous 15 minute samples and from this data the hourly LAeq daytime values have been evaluated. Sound Pressure Levels were recorded on the following setting along with a full octave band frequency analysis measured simultaneously and between 31.5 Hz and 16.0 kHz.

| Daytime 07:00 – 23:00 |                | Night Time 23:00 – 07:00 |                    |
|-----------------------|----------------|--------------------------|--------------------|
| LAeq 1 HOUR dB        | LA10 1 HOUR dB | LAeq 15 MINUTES dB       | LA10 15 MINUTES dB |
| LAMAX 1 HOUR dB       | LA50 1 HOUR dB | LAMAX 15 MINUTES dB      | LA50 15 MINUTES dB |
| LAMIN 1 HOUR dB       | LA90 1 HOUR dB | LAMIN 15 MINUTES dB      | LA90 15 MINUTES dB |

Calculations have been made in accordance with BS 8233: 2014 ‘Sound Insulation and Reduction of Buildings - Code of Practice’. Recommendations were made for any additional acoustics measures to conform to these standards.

From the downloaded recorded results, the daytime and night time periods were assessed and used within the above calculations as LAeq 16 HOUR dB levels for daytime and LAeq 8 HOUR dB levels for night time. These are detailed within this report. All data averaged throughout the day has been done so on a logarithmic basis to give accurate LAeq 16 Hour dB daytime and LAeq 8 Hour dB night time noise levels.

Finally, it should be noted that calculations are carried out with façade levels corrected from the recorded noise levels to the calculated façade levels.

## 5 APPARATUS

The equipment was calibrated using a sound pressure level of 114.0 dB at an octave band centre frequency of 1000Hz with reference to  $2 \times 10^{-5} \text{ Nm}^{-2}$  before and after the tests and the equipment set to have no inaccuracy greater than 0.2dB.

All the following equipment was calibrated in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates. Calibration schedules are implemented within Sound Advice Acoustics Ltd in accordance with UKAS directive LAB 23.

### 5.1 140 noise meter s/n 1402941 environmental testing – Position 1

| Description                         | Make     | Type      | Serial No.     | Calibration Intervals | Last Calibrated | Next Due Calibration |
|-------------------------------------|----------|-----------|----------------|-----------------------|-----------------|----------------------|
| Integrated Sound Level Meter        | Norsonic | 140       | <u>1402941</u> | 2 YEARS               | 12.06.2018      | 12.06.2020           |
| 12.5mm Microphone (with windshield) | Norsonic | GRAS 40AF | <u>179711</u>  | 2 YEARS               | 12.06.2018      | 12.06.2020           |
| Microphone Pre – Amplifier          | Norsonic | 1209      | <u>30479</u>   | 2 YEARS               | 12.06.2018      | 12.06.2020           |

### 5.2 140 noise meter s/n 1403140 environmental testing – Position 2

| Description                         | Make     | Type             | Serial No.     | Calibration Intervals | Last Calibrated | Next Due Calibration |
|-------------------------------------|----------|------------------|----------------|-----------------------|-----------------|----------------------|
| Integrated Sound Level Meter        | Norsonic | 140              | <u>1403140</u> | 2 YEARS               | 05.04.2019      | 05.04.2021           |
| 12.5mm Microphone (with windshield) | Norsonic | <u>GRAS 40AF</u> | <u>114650</u>  | 2 YEARS               | 05.04.2019      | 05.04.2021           |
| Microphone Pre – Amplifier          | Norsonic | 1201             | <u>30327</u>   | 2 YEARS               | 05.04.2019      | 05.04.2021           |

Full calibration certificates are available upon request.

## 6 RESULTS

|             |                                                                                                                            |
|-------------|----------------------------------------------------------------------------------------------------------------------------|
| $L_{Aeq,T}$ | The equivalent A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime. |
| $L_{A90,T}$ | The A weighted sound pressure level that is exceeded for 90% of the time period 5 minutes night time and 1 hourly daytime. |
| $L_{A50,T}$ | The A weighted sound pressure level that is exceeded for 50% of the time period 5 minutes night time and 1 hourly daytime. |
| $L_{A10,T}$ | The A weighted sound pressure level that is exceeded for 10% of the time period 5 minutes night time and 1 hourly daytime. |
| $L_{Amax}$  | The maximum A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.    |
| $L_{Amin}$  | The minimum A weighted sound pressure level recorded over a time interval of 5 minutes night time and 1 hourly daytime.    |

### 6.1 Downloaded results, and averages.

#### 6.1.1 21<sup>st</sup> – 22<sup>nd</sup> February 2020 – Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 64.4 | 89.3  | 72.8                              | 70.1 | 65.0 | 62.6 | 60.0 | 60.3 | 57.9 | 47.4 | 38.7 | 29.7  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 56.7 | 88.5  | 76.4                              | 70.2 | 62.1 | 55.9 | 52.5 | 51.6 | 48.8 | 40.5 | 33.9 | 29.5  |

#### 6.1.2 22<sup>nd</sup> – 23<sup>rd</sup> February 2020 – Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 64.1 | 88.7  | 71.9                              | 68.8 | 63.4 | 60.8 | 58.9 | 60.3 | 58.2 | 48.4 | 41.5 | 32.9  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 56.0 | 80.7  | 75.1                              | 69.1 | 60.8 | 53.9 | 50.8 | 51.1 | 49.0 | 41.7 | 35.5 | 25.8  |

#### 6.1.3 23<sup>rd</sup> – 24<sup>th</sup> February 2020 – Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 63.1 | 87.5  | 74.5                              | 69.8 | 63.4 | 59.7 | 57.9 | 59.1 | 56.9 | 47.2 | 39.1 | 28.8  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 56.8 | 85.5  | 66.8                              | 61.9 | 56.5 | 54.7 | 51.7 | 52.6 | 50.7 | 42.7 | 35.5 | 25.7  |

#### 6.1.4 24<sup>th</sup> – 25<sup>th</sup> February 2020 – Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 65.4 | 91.4  | 74.4                              | 70.5 | 64.0 | 61.7 | 59.6 | 60.9 | 59.8 | 52.6 | 45.4 | 36.4  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 56.6 | 82.5  | 62.8                              | 61.7 | 56.3 | 54.4 | 52.1 | 52.6 | 50.1 | 40.1 | 31.7 | 22.5  |

The following noise levels have been corrected for the highest recorded façade levels and used within the BS 8233: 2014 calculations

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 65.4 | 91.4  | 74.4                              | 70.5 | 64.0 | 61.7 | 59.6 | 60.9 | 59.8 | 52.6 | 45.4 | 36.4  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 56.8 | 85.5  | 66.8                              | 61.9 | 56.5 | 54.7 | 51.7 | 52.6 | 50.7 | 42.7 | 35.5 | 25.7  |

6.1.5 21<sup>st</sup> – 22<sup>nd</sup> February 2020 – Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 65.9 | 88.4  | 75.6                              | 69.1 | 62.6 | 61.0 | 60.1 | 62.3 | 59.9 | 51.8 | 46.9 | 37.8  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 63.0 | 94.3  | 80.8                              | 74.2 | 66.1 | 60.2 | 57.2 | 58.2 | 56.5 | 49.6 | 50.3 | 45.8  |

6.1.6 22<sup>nd</sup> – 23<sup>rd</sup> February 2020 – Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 65.5 | 92.2  | 73.0                              | 67.0 | 61.7 | 60.7 | 59.5 | 61.4 | 59.6 | 51.5 | 52.7 | 46.3  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 60.5 | 89.9  | 78.3                              | 71.5 | 63.5 | 57.8 | 54.4 | 55.7 | 54.3 | 46.9 | 45.1 | 34.3  |

6.1.7 23<sup>rd</sup> – 24<sup>th</sup> February 2020 – Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 63.5 | 89.4  | 73.3                              | 67.2 | 61.3 | 59.0 | 57.9 | 59.9 | 57.5 | 49.5 | 41.6 | 33.2  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 60.0 | 88.2  | 70.7                              | 64.2 | 58.4 | 56.4 | 54.0 | 55.6 | 54.3 | 46.9 | 46.1 | 35.2  |

6.1.8 24<sup>th</sup> – 25<sup>th</sup> February 2020 – Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 65.2 | 87.5  | 76.7                              | 70.4 | 63.5 | 60.8 | 59.6 | 61.4 | 59.0 | 51.1 | 44.0 | 35.2  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 60.5 | 89.4  | 53.8                              | 55.5 | 55.5 | 55.9 | 55.0 | 56.7 | 54.5 | 46.7 | 39.2 | 32.5  |

The following noise levels have been corrected for the highest recorded façade levels and used within the BS 8233: 2014 calculations

| NOISE LEVEL SUMMARY ASSESSMENT                                                          |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small>  | 65.9 | 88.4  | 75.6                              | 69.1 | 62.6 | 61.0 | 60.1 | 62.3 | 59.9 | 51.8 | 46.9 | 37.8  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 63.0 | 94.3  | 80.8                              | 74.2 | 66.1 | 60.2 | 57.2 | 58.2 | 56.5 | 49.6 | 50.3 | 45.8  |

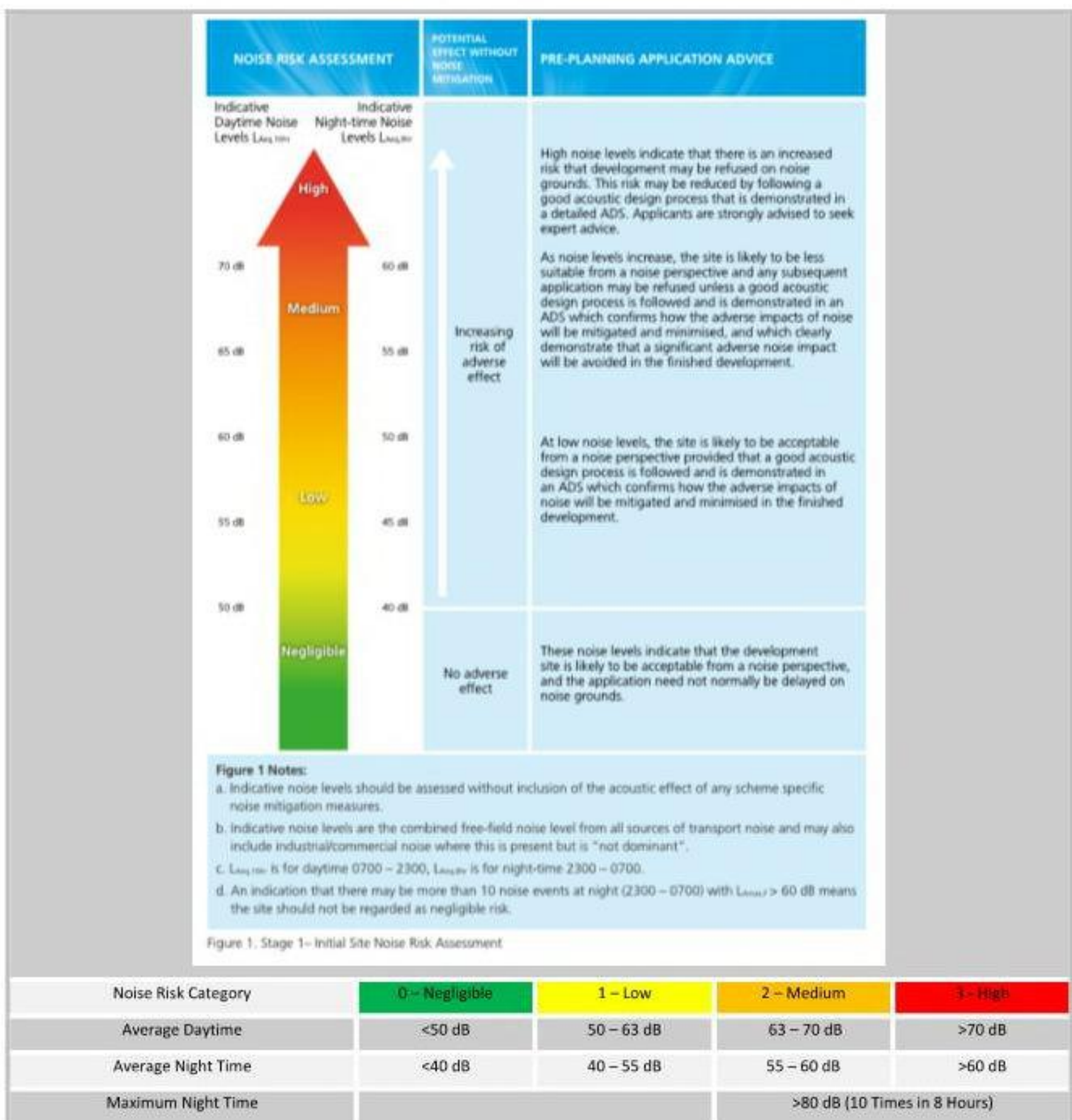
## 7 PROPG PLANNING & NOISE STAGE 1

### 7.1 Stage 1: Initial Site Noise Risk Assessment

The Stage 1, Initial Noise Risk Assessment, compares the recorded ambient noise levels obtained from the acoustic survey and correlates these against the risk scale within the Pro PG Document in order to evaluate any potential adverse effects the site is currently exposed to with regards to noise.

The outcome of the Stage 1 assessment will determine the level of detail required within Stage 2 in order to demonstrate suitable mitigations can be introduced to ensure continuing compliance with the relevant standards, local planning policies and PROPG.

The following table demonstrates the Initial Risk Assessment Noise Levels as detailed within PROPG Figure.1:-



Based on the data collected from the aforementioned noise survey, the following PROPG Stage 1 assessments can be made:-

## 7.2 Potential Façade Noise Levels

### 7.2.1 Daytime (07:00-23:00)

| Time Period                   | Highest Potential Façade Noise Level | Noise Risk Category<br>2 - Medium |
|-------------------------------|--------------------------------------|-----------------------------------|
| Average Daytime (07:00-23:00) | $L_{Aeq, 16\text{ HOUR}}$ 67.0 dB    | 63 – 70 dB                        |

### 7.2.2 Night Time (23:00-07:00)

| Time Period                      | Highest Potential Façade Noise Level    | Noise Risk Category<br>3 - High |
|----------------------------------|-----------------------------------------|---------------------------------|
| Average Night Time (23:00-07:00) | $L_{Aeq, 16\text{ HOUR}}$ 62.0 dB       | > 60 dB                         |
|                                  | Maximum (10 Times) – $L_{Amax}$ 84.8 dB | > 60 dB (10 Times in 8 Hours)   |

## 7.3 Risk Assessment

### 7.3.1 Daytime (07:00-23:00) – Position 1

| Risk Assessment Category | Risk Assessment                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 - Medium               | As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. |

### 7.3.2 Night Time (23:00-07:00) – Position 1

| Risk Assessment Category | Risk Assessment                                                                                                                                                                                                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 - High                 | High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. |

The above table demonstrates this site is located within Noise Risk Category 2 which suggests a Medium level of risk for daytime levels and Noise Risk Category 3 which suggests a high of risk for night time levels. Therefore, further mitigation levels will be required at Stage 2.

## **8 PROPG PLANNING & NOISE STAGE 2 - ELEMENT 1 – GOOD ACOUSTIC DESIGN**

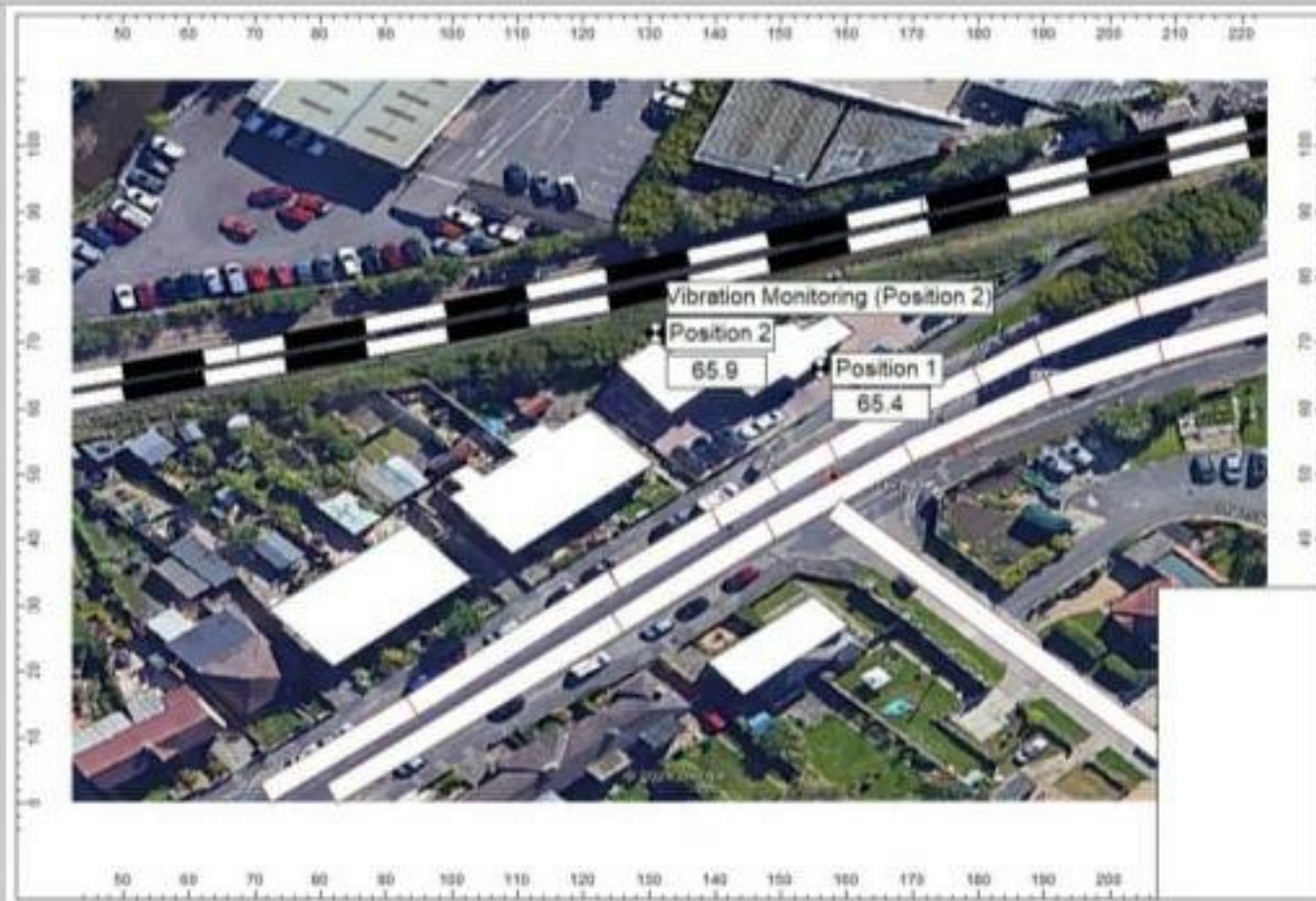
Given the size and orientation of the proposed site, it is recommended that the developer adopt, where practically possible, a good acoustic design which should include careful consideration of the positioning of the proposed properties together with thoughts being taken as to internal layouts to minimise noise sensitive rooms facing onto dominant noise sources within the local areas. Given the size of this development, every effort has already been made to minimise the acoustic impact from the surrounding areas.

## 9 ELEMENT 2 – INTERNAL NOISE LEVEL GUIDELINES

### 9.1 Discussion of Results

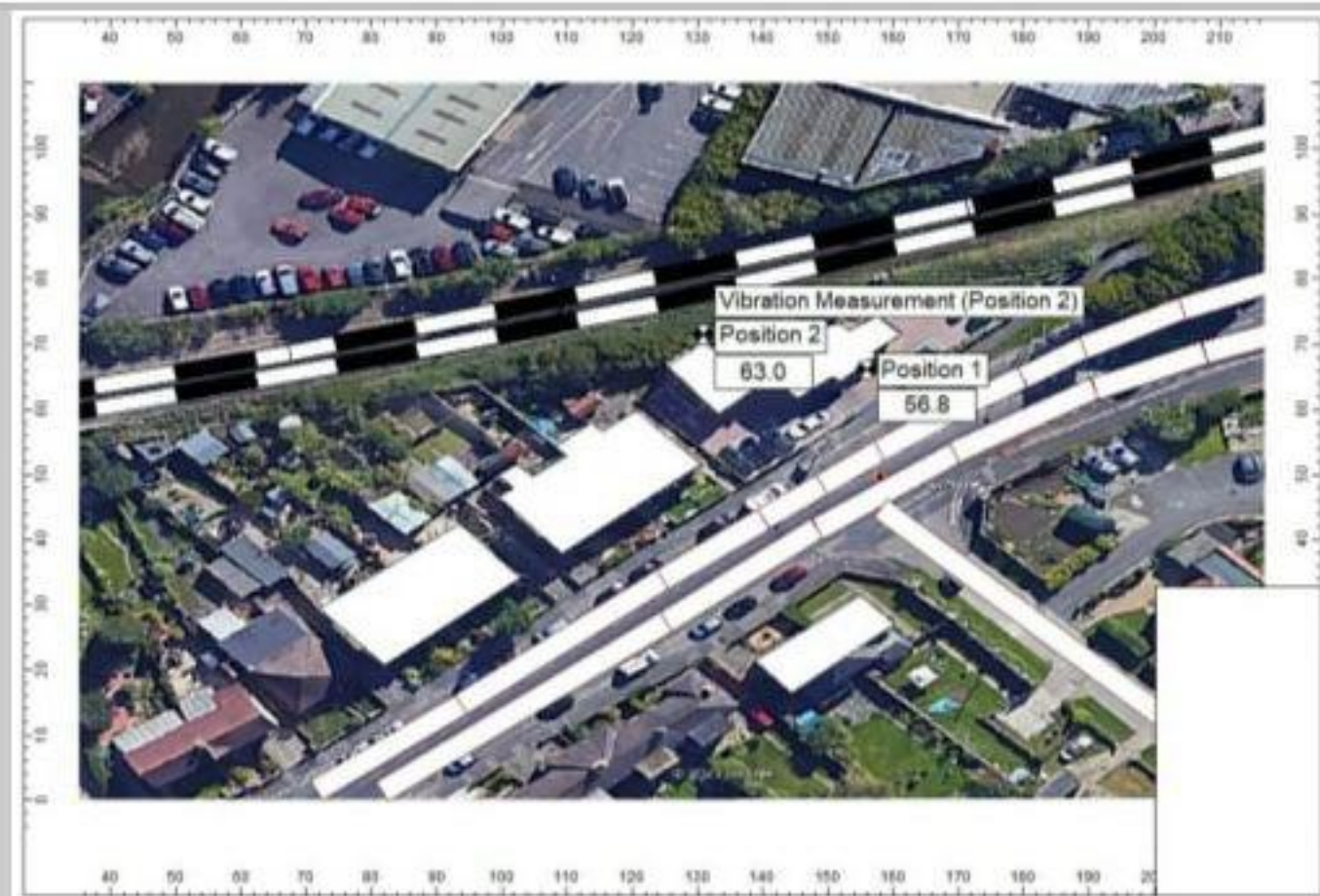
It can be seen from the attached graph and downloaded results that the external noise levels have followed the expected path and remained fairly constant throughout the day. The levels then gradually dropped off as the evening progressed and began to rise when morning traffic levels increased.

### 9.2 Existing Noise Levels – Daytime (07:00 – 23:00)



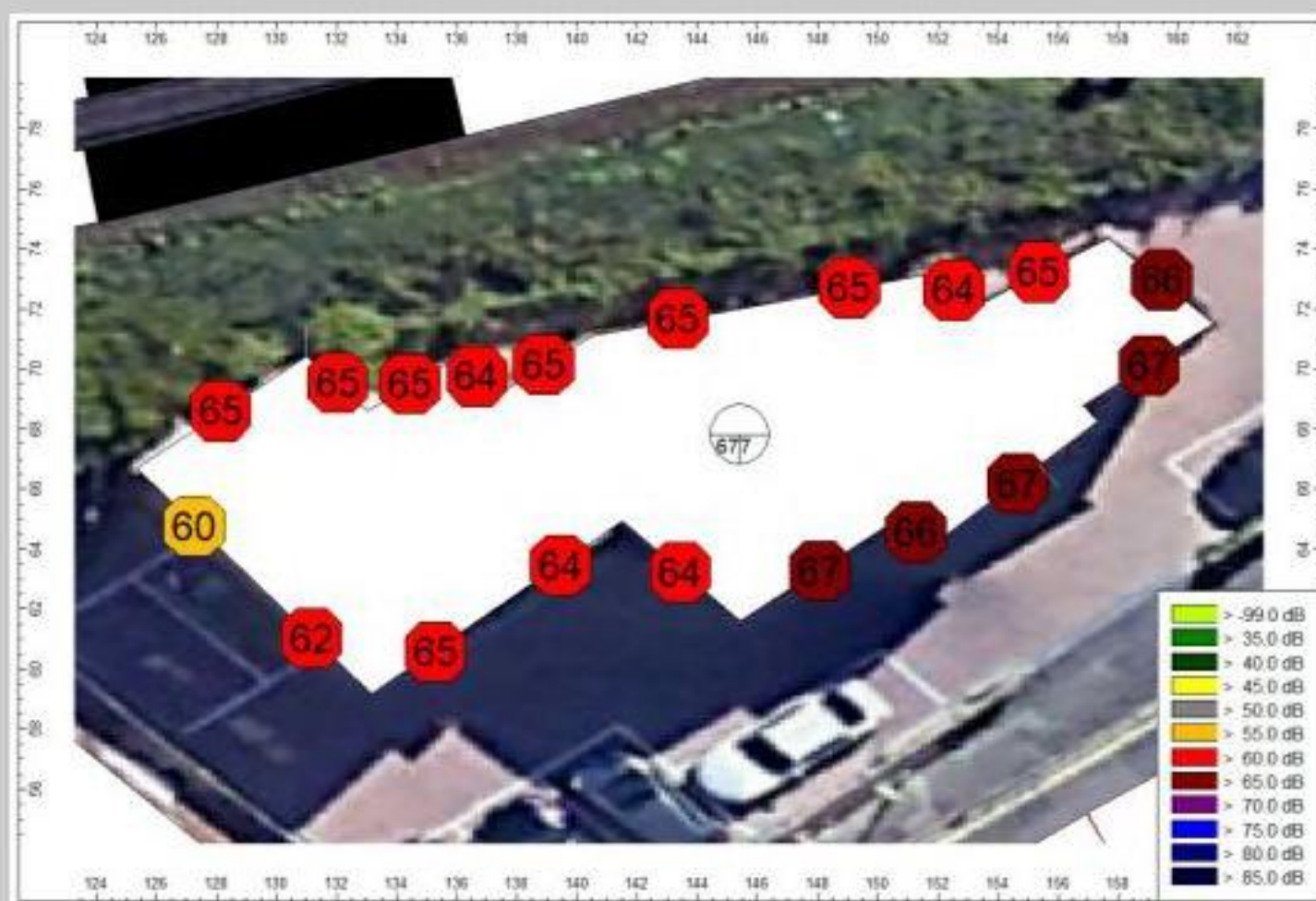
Daytime prior to development

### 9.3 Existing Noise Levels – Night Time (23:00 – 07:00)



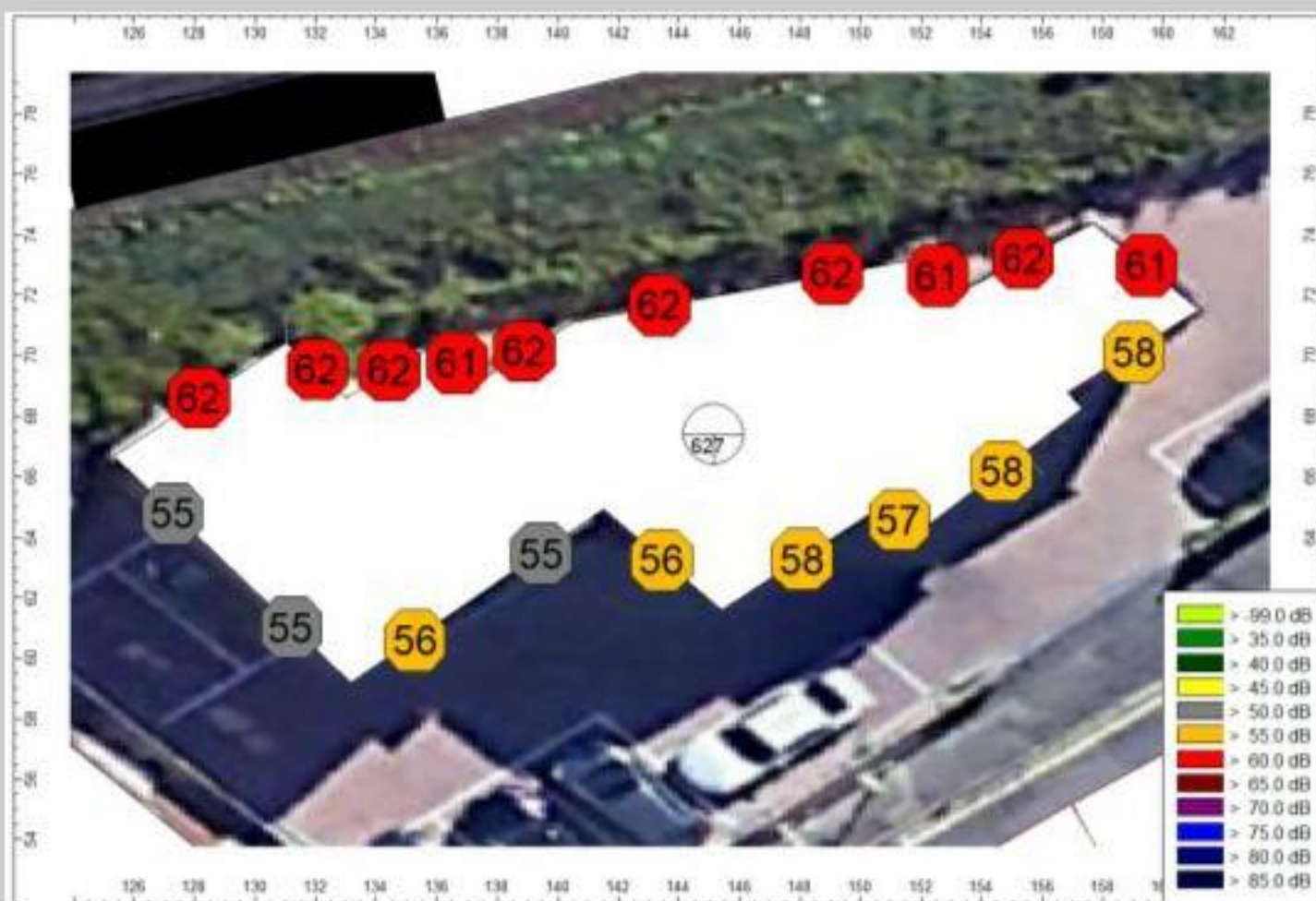
Night time prior to development

#### 9.4 Proposed Noise levels – Daytime (07:00 – 23:00)



Daytime post development

#### 9.5 Proposed Noise levels – Night Time (23:00 – 07:00)



Night time post development

## 9.6 Recommendations

For the purpose of this assessment, the corresponding façade levels will be used within the BS 8233: 2014 calculations in order to evaluate the worst case scenario and select the correct window specification.

Therefore, in order to achieve the required noise levels of  $L_{Aeq\ 16\ HOUR}$  35 dB for habitable rooms daytime and  $L_{Aeq\ 8\ HOUR}$  30 dB for Bedroom at night within the proposed, the following additional acoustic measures have been calculated.

It should be noted that the calculations have been made with the proposed windows closed. Additional calculations were made for the top floor due to the influence of sound transmission into the various rooms via the roof / ceiling i.e. an increased impeding façade. Inputted levels into the calculation sheets have been corrected for distance attenuation and free field in accordance with the aforementioned British Standard.

## 9.7 Calculation Procedure to BS 8233: 2014

The following calculations have been carried out in order to determine the required window and ventilation specification in order to meet the requirements of BS 8233: 2014.

## 9.8 Ground Floor Lounge Front

| Proposed Window Configuration                                                     |                                                                                                                        | 6 / 6 - 16 / 4 with Titon V75 / C75 |                          |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|------|-------|------|
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                     |                          |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                     |                          |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                     |                          |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                     |                          |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                     |                          |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                     |                          |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                     |                          |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                     |                          |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                     |                          |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                     |                          |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                     |                          |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                     |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                     |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                     |                          |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                 | 500                      | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Sf                                                                                | 10                                                                                                                     | 10                                  | 10                       | 10   | 10    | 10   |
| Sr                                                                                | 0                                                                                                                      | 0                                   | 0                        | 0    | 0     | 0    |
| Swi                                                                               | 3                                                                                                                      | 3                                   | 3                        | 3    | 3     | 3    |
| Sew                                                                               | 7                                                                                                                      | 7                                   | 7                        | 7    | 7     | 7    |
| Srr                                                                               | 0                                                                                                                      | 0                                   | 0                        | 0    | 0     | 0    |
| S                                                                                 | 10                                                                                                                     | 10                                  | 10                       | 10   | 10    | 10   |
| A0                                                                                | 10                                                                                                                     | 10                                  | 10                       | 10   | 10    | 10   |
| V                                                                                 | 48                                                                                                                     | 48                                  | 48                       | 48   | 48    | 48   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                | 0.50                     | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                | 16.0                     | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 65.6                                                                                                                   | 63.3                                | 61.2                     | 62.5 | 61.4  | 54.2 |
| Night time Leqff                                                                  | 57.7                                                                                                                   | 55.9                                | 52.9                     | 53.8 | 51.9  | 43.9 |
| Dne                                                                               | 37.0                                                                                                                   | 37.0                                | 36.1                     | 46.9 | 49.2  | 55.2 |
| Rwi                                                                               | 21.0                                                                                                                   | 20.0                                | 26.0                     | 38.0 | 37.0  | 39.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                | 45.0                     | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                | 55.0                     | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                     | L <sub>Aeq</sub> 16 HOUR | 34.6 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                     | L <sub>Aeq</sub> 8 HOUR  | 26.7 | dB(A) |      |

**9.9 Ground Floor Bedroom Front**

| Proposed Window Configuration                                                     |                                                                                                                        | 6 / 6 - 16 / 4 with Titon V75 / C75 |      |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------|------|-------|------|
|                                                                                   |                                                                                                                        |                                     |      |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                     |      |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                     |      |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                     |      |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                     |      |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                     |      |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                     |      |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                     |      |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                     |      |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                     |      |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                     |      |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                     |      |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                     |      |      |       |      |
|                                                                                   |                                                                                                                        |                                     |      |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                     |      |      |       |      |
|                                                                                   |                                                                                                                        |                                     |      |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                     |      |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                 | 500  | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                     |      |      |       |      |
| Sf                                                                                | 7                                                                                                                      | 7                                   | 7    | 7    | 7     | 7    |
| Sr                                                                                | 0                                                                                                                      | 0                                   | 0    | 0    | 0     | 0    |
| Swi                                                                               | 2                                                                                                                      | 2                                   | 2    | 2    | 2     | 2    |
| Sew                                                                               | 5                                                                                                                      | 5                                   | 5    | 5    | 5     | 5    |
| Srr                                                                               | 0                                                                                                                      | 0                                   | 0    | 0    | 0     | 0    |
| S                                                                                 | 7                                                                                                                      | 7                                   | 7    | 7    | 7     | 7    |
| A0                                                                                | 10                                                                                                                     | 10                                  | 10   | 10   | 10    | 10   |
| V                                                                                 | 22                                                                                                                     | 22                                  | 22   | 22   | 22    | 22   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                | 0.50 | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                | 16.0 | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 65.6                                                                                                                   | 63.3                                | 61.2 | 62.5 | 61.4  | 54.2 |
| Night time Leqff                                                                  | 57.7                                                                                                                   | 55.9                                | 52.9 | 53.8 | 51.9  | 43.9 |
| Dne                                                                               | 37.0                                                                                                                   | 37.0                                | 36.1 | 46.9 | 49.2  | 55.2 |
| Rwi                                                                               | 21.0                                                                                                                   | 20.0                                | 26.0 | 38.0 | 37.0  | 39.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                | 45.0 | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                | 55.0 | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                     |      |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        | LAeq 16 HOUR                        |      | 33.1 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        | LAeq 8 HOUR                         |      | 25.2 | dB(A) |      |

## 9.10 Top Floor Living Room Front

| Proposed Window Configuration                                                     |                                                                                                                        | 6 / 6 - 16 / 4 with Titon V75 / C75 |      |      |      |       |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------|------|------|-------|
|                                                                                   |                                                                                                                        |                                     |      |      |      |       |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                     |      |      |      |       |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                     |      |      |      |       |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                     |      |      |      |       |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                     |      |      |      |       |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                     |      |      |      |       |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                     |      |      |      |       |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                     |      |      |      |       |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                     |      |      |      |       |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                     |      |      |      |       |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                     |      |      |      |       |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                     |      |      |      |       |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                     |      |      |      |       |
|                                                                                   |                                                                                                                        |                                     |      |      |      |       |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                     |      |      |      |       |
|                                                                                   |                                                                                                                        |                                     |      |      |      |       |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                     |      |      |      |       |
|                                                                                   | 125                                                                                                                    | 250                                 | 500  | 1000 | 2000 | 4000  |
|                                                                                   |                                                                                                                        |                                     |      |      |      |       |
| Sf                                                                                | 10                                                                                                                     | 10                                  | 10   | 10   | 10   | 10    |
| Sr                                                                                | 20                                                                                                                     | 20                                  | 20   | 20   | 20   | 20    |
| Swi                                                                               | 3                                                                                                                      | 3                                   | 3    | 3    | 3    | 3     |
| Sew                                                                               | 7                                                                                                                      | 7                                   | 7    | 7    | 7    | 7     |
| Srr                                                                               | 20                                                                                                                     | 20                                  | 20   | 20   | 20   | 20    |
| S                                                                                 | 30                                                                                                                     | 30                                  | 30   | 30   | 30   | 30    |
| A0                                                                                | 10                                                                                                                     | 10                                  | 10   | 10   | 10   | 10    |
| V                                                                                 | 48                                                                                                                     | 48                                  | 48   | 48   | 48   | 48    |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                | 0.50 | 0.50 | 0.50 | 0.50  |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                | 16.0 | 16.0 | 15.0 | 14.0  |
| Daytime Leqff                                                                     | 65.6                                                                                                                   | 63.3                                | 61.2 | 62.5 | 61.4 | 54.2  |
| Night time Leqff                                                                  | 57.7                                                                                                                   | 55.9                                | 52.9 | 53.8 | 51.9 | 43.9  |
| Dne                                                                               | 37.0                                                                                                                   | 37.0                                | 36.1 | 46.9 | 49.2 | 55.2  |
| Rwi                                                                               | 21.0                                                                                                                   | 20.0                                | 26.0 | 38.0 | 37.0 | 39.0  |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                | 45.0 | 51.0 | 56.0 | 56.0  |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                | 55.0 | 60.0 | 59.0 | 61.0  |
|                                                                                   |                                                                                                                        |                                     |      |      |      |       |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        | LAeq 16 HOUR                        |      | 34.7 |      | dB(A) |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        | LAeq 8 HOUR                         |      | 26.8 |      | dB(A) |

### 9.11 Top Floor Bedroom Front

| Proposed Window Configuration                                                     |                                                                                                                        | 6 / 6 - 16 / 4 with Titon V75 / C75 |                          |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------|------|-------|------|
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                     |                          |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                     |                          |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                     |                          |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                     |                          |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                     |                          |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                     |                          |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                     |                          |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                     |                          |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                     |                          |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                     |                          |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                     |                          |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                     |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                     |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                     |                          |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                 | 500                      | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Sf                                                                                | 7                                                                                                                      | 7                                   | 7                        | 7    | 7     | 7    |
| Sr                                                                                | 9                                                                                                                      | 9                                   | 9                        | 9    | 9     | 9    |
| Swi                                                                               | 2                                                                                                                      | 2                                   | 2                        | 2    | 2     | 2    |
| Sew                                                                               | 5                                                                                                                      | 5                                   | 5                        | 5    | 5     | 5    |
| Srr                                                                               | 9                                                                                                                      | 9                                   | 9                        | 9    | 9     | 9    |
| S                                                                                 | 16                                                                                                                     | 16                                  | 16                       | 16   | 16    | 16   |
| A0                                                                                | 10                                                                                                                     | 10                                  | 10                       | 10   | 10    | 10   |
| V                                                                                 | 22                                                                                                                     | 22                                  | 22                       | 22   | 22    | 22   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                | 0.50                     | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                | 16.0                     | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 65.6                                                                                                                   | 63.3                                | 61.2                     | 62.5 | 61.4  | 54.2 |
| Night time Leqff                                                                  | 57.7                                                                                                                   | 55.9                                | 52.9                     | 53.8 | 51.9  | 43.9 |
| Dne                                                                               | 37.0                                                                                                                   | 37.0                                | 36.1                     | 46.9 | 49.2  | 55.2 |
| Rwi                                                                               | 21.0                                                                                                                   | 20.0                                | 26.0                     | 38.0 | 37.0  | 39.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                | 45.0                     | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                | 55.0                     | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                     |                          |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                     | L <sub>Aeq</sub> 16 HOUR | 33.2 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                     | L <sub>Aeq</sub> 8 HOUR  | 25.2 | dB(A) |      |

**9.12 Ground Floor Living Room Rear**

| Proposed Window Configuration                                                     |                                                                                                                        | 10 / 6 - 16 / 4 with a Greenwood Wall Vent MA-3051 |                          |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------|------|-------|------|
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                                    |                          |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                                    |                          |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                                    |                          |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                                    |                          |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                                    |                          |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                                    |                          |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                                    |                          |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                                    |                          |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                                    |                          |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                                    |                          |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                                    |                          |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                                    |                          |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                                | 500                      | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Sf                                                                                | 10                                                                                                                     | 10                                                 | 10                       | 10   | 10    | 10   |
| Sr                                                                                | 0                                                                                                                      | 0                                                  | 0                        | 0    | 0     | 0    |
| Swi                                                                               | 3                                                                                                                      | 3                                                  | 3                        | 3    | 3     | 3    |
| Sew                                                                               | 7                                                                                                                      | 7                                                  | 7                        | 7    | 7     | 7    |
| Srr                                                                               | 0                                                                                                                      | 0                                                  | 0                        | 0    | 0     | 0    |
| S                                                                                 | 10                                                                                                                     | 10                                                 | 10                       | 10   | 10    | 10   |
| A0                                                                                | 10                                                                                                                     | 10                                                 | 10                       | 10   | 10    | 10   |
| V                                                                                 | 48                                                                                                                     | 48                                                 | 48                       | 48   | 48    | 48   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                               | 0.50                     | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                               | 16.0                     | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 61.7                                                                                                                   | 60.1                                               | 59.2                     | 61.4 | 59.0  | 50.9 |
| Night time Leqff                                                                  | 65.1                                                                                                                   | 59.2                                               | 56.2                     | 57.2 | 55.5  | 48.6 |
| Dne                                                                               | 48.0                                                                                                                   | 46.0                                               | 49.0                     | 54.0 | 65.0  | 67.0 |
| Rwi                                                                               | 24.0                                                                                                                   | 21.0                                               | 32.0                     | 37.0 | 42.0  | 43.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                               | 45.0                     | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                               | 55.0                     | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                                    | L <sub>Aeq</sub> 16 HOUR | 29.0 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                                    | L <sub>Aeq</sub> 8 HOUR  | 28.3 | dB(A) |      |

### 9.13 Ground Floor Bedroom Rear

| Proposed Window Configuration                                                     |                                                                                                                        | 10 / 6 - 16 / 4 with a Greenwood Wall Vent MA-3051 |                          |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------|------|-------|------|
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                                    |                          |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                                    |                          |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                                    |                          |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                                    |                          |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                                    |                          |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                                    |                          |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                                    |                          |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                                    |                          |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                                    |                          |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                                    |                          |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                                    |                          |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                                    |                          |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                                | 500                      | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Sf                                                                                | 7                                                                                                                      | 7                                                  | 7                        | 7    | 7     | 7    |
| Sr                                                                                | 0                                                                                                                      | 0                                                  | 0                        | 0    | 0     | 0    |
| Swi                                                                               | 2                                                                                                                      | 2                                                  | 2                        | 2    | 2     | 2    |
| Sew                                                                               | 5                                                                                                                      | 5                                                  | 5                        | 5    | 5     | 5    |
| Srr                                                                               | 0                                                                                                                      | 0                                                  | 0                        | 0    | 0     | 0    |
| S                                                                                 | 7                                                                                                                      | 7                                                  | 7                        | 7    | 7     | 7    |
| A0                                                                                | 10                                                                                                                     | 10                                                 | 10                       | 10   | 10    | 10   |
| V                                                                                 | 22                                                                                                                     | 22                                                 | 22                       | 22   | 22    | 22   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                               | 0.50                     | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                               | 16.0                     | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 61.7                                                                                                                   | 60.1                                               | 59.2                     | 61.4 | 59.0  | 50.9 |
| Night time Leqff                                                                  | 65.1                                                                                                                   | 59.2                                               | 56.2                     | 57.2 | 55.5  | 48.6 |
| Dne                                                                               | 48.0                                                                                                                   | 46.0                                               | 49.0                     | 54.0 | 65.0  | 67.0 |
| Rwi                                                                               | 24.0                                                                                                                   | 21.0                                               | 32.0                     | 37.0 | 42.0  | 43.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                               | 45.0                     | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                               | 55.0                     | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                                    | L <sub>Aeq</sub> 16 HOUR | 27.3 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                                    | L <sub>Aeq</sub> 8 HOUR  | 26.6 | dB(A) |      |

**9.14 Top Floor Living Room Rear**

| Proposed Window Configuration                                                     |                                                                                                                        | 10 / 6 - 16 / 4 with a Greenwood Wall Vent MA-3051 |              |      |      |       |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------|------|------|-------|
|                                                                                   |                                                                                                                        |                                                    |              |      |      |       |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                                    |              |      |      |       |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                                    |              |      |      |       |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                                    |              |      |      |       |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                                    |              |      |      |       |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                                    |              |      |      |       |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                                    |              |      |      |       |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                                    |              |      |      |       |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                                    |              |      |      |       |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                                    |              |      |      |       |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                                    |              |      |      |       |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                                    |              |      |      |       |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                                    |              |      |      |       |
|                                                                                   |                                                                                                                        |                                                    |              |      |      |       |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                                    |              |      |      |       |
|                                                                                   |                                                                                                                        |                                                    |              |      |      |       |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                                    |              |      |      |       |
|                                                                                   | 125                                                                                                                    | 250                                                | 500          | 1000 | 2000 | 4000  |
|                                                                                   |                                                                                                                        |                                                    |              |      |      |       |
| Sf                                                                                | 10                                                                                                                     | 10                                                 | 10           | 10   | 10   | 10    |
| Sr                                                                                | 20                                                                                                                     | 20                                                 | 20           | 20   | 20   | 20    |
| Swi                                                                               | 3                                                                                                                      | 3                                                  | 3            | 3    | 3    | 3     |
| Sew                                                                               | 7                                                                                                                      | 7                                                  | 7            | 7    | 7    | 7     |
| Srr                                                                               | 20                                                                                                                     | 20                                                 | 20           | 20   | 20   | 20    |
| S                                                                                 | 30                                                                                                                     | 30                                                 | 30           | 30   | 30   | 30    |
| A0                                                                                | 10                                                                                                                     | 10                                                 | 10           | 10   | 10   | 10    |
| V                                                                                 | 48                                                                                                                     | 48                                                 | 48           | 48   | 48   | 48    |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                               | 0.50         | 0.50 | 0.50 | 0.50  |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                               | 16.0         | 16.0 | 15.0 | 14.0  |
| Daytime Leqff                                                                     | 61.7                                                                                                                   | 60.1                                               | 59.2         | 61.4 | 59.0 | 50.9  |
| Night time Leqff                                                                  | 65.1                                                                                                                   | 59.2                                               | 56.2         | 57.2 | 55.5 | 48.6  |
| Dne                                                                               | 48.0                                                                                                                   | 46.0                                               | 49.0         | 54.0 | 65.0 | 67.0  |
| Rwi                                                                               | 24.0                                                                                                                   | 21.0                                               | 32.0         | 37.0 | 42.0 | 43.0  |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                               | 45.0         | 51.0 | 56.0 | 56.0  |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                               | 55.0         | 60.0 | 59.0 | 61.0  |
|                                                                                   |                                                                                                                        |                                                    |              |      |      |       |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                                    | LAeq 16 HOUR |      | 29.2 | dB(A) |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                                    | LAeq 8 HOUR  |      | 28.6 | dB(A) |

**9.15 Top Floor Bedroom Rear**

| Proposed Window Configuration                                                     |                                                                                                                        | 10 / 6 - 16 / 4 with a Greenwood Wall Vent MA-3051 |                          |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------|------|-------|------|
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                                    |                          |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                                    |                          |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                                    |                          |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                                    |                          |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                                    |                          |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                                    |                          |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                                    |                          |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                                    |                          |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                                    |                          |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                                    |                          |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                                    |                          |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where A=0.163V/T                                                  |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                                    |                          |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                                | 500                      | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Sf                                                                                | 7                                                                                                                      | 7                                                  | 7                        | 7    | 7     | 7    |
| Sr                                                                                | 9                                                                                                                      | 9                                                  | 9                        | 9    | 9     | 9    |
| Swi                                                                               | 2                                                                                                                      | 2                                                  | 2                        | 2    | 2     | 2    |
| Sew                                                                               | 5                                                                                                                      | 5                                                  | 5                        | 5    | 5     | 5    |
| Srr                                                                               | 9                                                                                                                      | 9                                                  | 9                        | 9    | 9     | 9    |
| S                                                                                 | 16                                                                                                                     | 16                                                 | 16                       | 16   | 16    | 16   |
| A0                                                                                | 10                                                                                                                     | 10                                                 | 10                       | 10   | 10    | 10   |
| V                                                                                 | 22                                                                                                                     | 22                                                 | 22                       | 22   | 22    | 22   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                               | 0.50                     | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                               | 16.0                     | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 61.7                                                                                                                   | 60.1                                               | 59.2                     | 61.4 | 59.0  | 50.9 |
| Night time Leqff                                                                  | 65.1                                                                                                                   | 59.2                                               | 56.2                     | 57.2 | 55.5  | 48.6 |
| Dne                                                                               | 48.0                                                                                                                   | 46.0                                               | 49.0                     | 54.0 | 65.0  | 67.0 |
| Rwi                                                                               | 24.0                                                                                                                   | 21.0                                               | 32.0                     | 37.0 | 42.0  | 43.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                               | 45.0                     | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                               | 55.0                     | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                                    | L <sub>Aeq</sub> 16 HOUR | 27.5 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                                    | L <sub>Aeq</sub> 8 HOUR  | 26.8 | dB(A) |      |

#### 9.16 Ventilation (D<sub>ne</sub>)

| Octave Band Frequency       | 125  | 250  | 500  | 1000 | 2000 | 4000 | D <sub>ne,w</sub> |
|-----------------------------|------|------|------|------|------|------|-------------------|
| Greenwood Wall Vent MA-3051 | 48.0 | 46.0 | 49.0 | 54.0 | 65.0 | 67.0 | 55                |
| Titon V75 / C75             | 37.0 | 37.0 | 36.1 | 46.9 | 49.2 | 55.2 | 44                |

#### 9.17 Glazing (R<sub>wl</sub>)

| Octave Band Frequency                                       | 125  | 250  | 500  | 1000 | 2000 | 4000 | R <sub>w (C-ctr)</sub> |
|-------------------------------------------------------------|------|------|------|------|------|------|------------------------|
| 10mm glass / 16mm air gap / 8.8mm Pilkington Optiphon glass | 28.0 | 31.0 | 42.0 | 45.0 | 50.0 | 58.0 | 44 (-2,-6)             |
| 10mm glass / 6 - 16mm air gap / 4mm glass                   | 24.0 | 21.0 | 32.0 | 37.0 | 42.0 | 43.0 | 35 (-2,-5)             |
| 6mm glass / 6 - 16mm air gap / 4mm glass                    | 21.0 | 20.0 | 26.0 | 38.0 | 37.0 | 39.0 | 32 (-2,-4)             |

#### 9.18 Walls (Non-Glazed Elements) (R<sub>ew</sub>)

| Octave Band Frequency             | 125  | 250  | 500  | 1000 | 2000 | 4000 | R <sub>w</sub> |
|-----------------------------------|------|------|------|------|------|------|----------------|
| Minimum External Wall Attenuation | 40.0 | 44.0 | 45.0 | 51.0 | 56.0 | 56.0 | 50             |

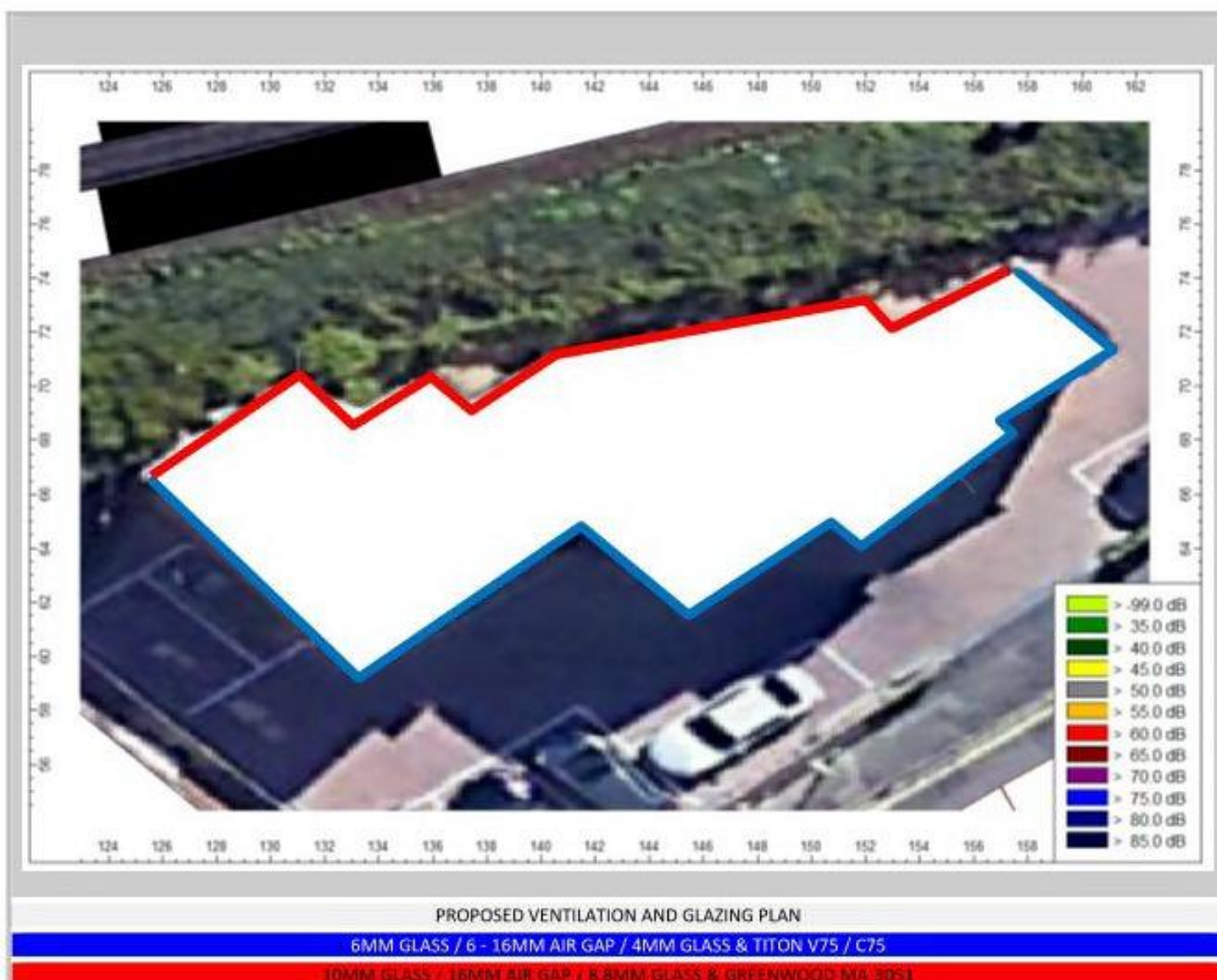
#### 9.19 Roof (R<sub>rr</sub>)

| Octave Band Frequency | 125  | 250  | 500  | 1000 | 2000 | 4000 | R <sub>w</sub> |
|-----------------------|------|------|------|------|------|------|----------------|
| Minimum Value         | 39.0 | 48.0 | 55.0 | 60.0 | 59.0 | 61.0 | 57             |

#### **NOTE:**

The above are minimum construction attenuation values and should alternative methods be selected; these should be equal to or greater than the above corresponding values. Calculations carried out have indicated the following specifications should be installed for this site.

## 9.20 Glazing & Ventilation Assessment



The development should be designed with a 6mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Titon V75 / C75 as shown above in blue and a 10mm glass / 16mm air gap / 8.8mm glass & Greenwood MA-3051 wall vent as shown in red above in order to comply with the L<sub>Amax</sub> levels as shown in section 9.22 or similarly approved to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

## 9.21 Night Noise Guidelines Europe 2009

The Night Noise Guidelines 2009 make direct reference to the World Health Organisations Guidelines for Community Noise 1999 with recommended guideline criteria of  $L_{Aeq}$  30 dB indoors for continuous noise. The document goes on to explain that sleep disturbance correlates best with  $L_{Amax}$  and effects have been observed at 45 dB or less. This is particularly true if the background noise level is low. Noise events exceeding 45 dB(A) should therefore be limited.

Pro PG: Planning and Noise Appendix A 'Dealing with Noise Events' A.17 states that:-

*Various studies have linked the  $L_{Amax}$  from individual noise events to behavioural awakenings. For example one study found that the "Probability of sleep stage changes to wake/S1 from railway noise increased significantly from 6.5% at 35 dB(A) to 20.5% at 80 dB(A)  $L_{Amax,F}$  whilst another study concluded that "noise disturbance of sleep may be expected to become significant once the outdoor  $L_{Aeq}$  exceeds 55 dB provided peak noise levels do not exceed 75 to 80 dB. Higher  $L_{Aeq}$  values up to 60 dB may be allowed providing the peak levels do not exceed 85 dB, and the number of such events is less than about 20 per night". Based on these studies it can be concluded that at night (2300 - 0700 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building with partially open windows is above:*

*85 dB  $L_{Amax,F}$  (where the number of events exceeding this value is  $\leq 20$ );*

*or*

*80 dB  $L_{Amax,F}$  (where the number of events exceeding this value is  $> 20$ ).*

Pro PG: Planning and Noise Appendix A 'Dealing with Noise Events' A.18 goes on to explain that:-

A.18 The main body of sleep research is consistent with a careful interpretation of the viewpoint set out in the World Health Organisation Guidelines which for the ordinary population is that:

- ✓ *Impacts on sleep can be detected from relatively low level maximum noise events, however the degree of resulting harm may not be significant.*
- ✓ *'Effects' on sleep (such as EEG awakenings and sleep stage changes) occur spontaneously in the general population many times per night regardless of any impacts due to noise.*
- ✓ *The smaller the number of noise events, the louder the maximum noise level that can be tolerated without adverse effects upon sleep; subject to an upper limit.*
- ✓ *At relatively low levels e.g. around 45 dB  $L_{Amax,F}$  when sufficient number of such events take place during the night the adverse effects of individual noise events are likely to be limited to sleep disturbance in the form of changes in sleep state or perhaps some EEG awakenings.*
- ✓ *It normally requires noise levels higher than 45 dB  $L_{Amax,F}$  before significant adverse effects such as behavioural awakenings, difficulty getting to sleep, premature awakening or difficulty getting back to sleep generally occur and the latest field research on and aircraft noise suggest that it requires internal  $L_{Amax}$  noise levels of around 65 dB before noise induced awakenings become distinguishable from spontaneous awakenings).*

Therefore the following tabulated results from the worst night have been calculated and demonstrate compliance with the requirements of Pro PG.

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES - Position 2 |                  |                   |                                |                             |
|----------------------------------------------------------------------|------------------|-------------------|--------------------------------|-----------------------------|
| Date / Time                                                          | L <sub>Aeq</sub> | L <sub>Amax</sub> | L <sub>Amax,F</sub> 80 - 85 dB | L <sub>Amax,F</sub> > 85 dB |
| 23:00 - 23:15                                                        | 61.1             | 84.5              | 84.5                           |                             |
| 23:15 - 23:30                                                        | 67.2             | 87.8              | 87.8                           | 87.8                        |
| 23:30 - 23:45                                                        | 62.1             | 82.8              | 82.8                           |                             |
| 23:45 - 00:00                                                        | 64.7             | 85.1              | 85.1                           | 85.1                        |
| 00:00 - 00:15                                                        | 62.6             | 85.4              | 85.4                           | 85.4                        |
| 00:15 - 00:30                                                        | 64.4             | 84.6              | 84.6                           |                             |
| 00:30 - 00:45                                                        | 58.1             | 76.5              |                                |                             |
| 00:45 - 01:00                                                        | 63.9             | 84.8              | 84.8                           |                             |
| 01:00 - 01:15                                                        | 62.6             | 81.4              | 81.4                           |                             |
| 01:15 - 01:30                                                        | 62.1             | 81.8              | 81.8                           |                             |
| 01:30 - 01:45                                                        | 53.6             | 73.3              |                                |                             |
| 01:45 - 02:00                                                        | 51.6             | 70.2              |                                |                             |
| 02:00 - 02:15                                                        | 55.9             | 76.3              |                                |                             |
| 02:15 - 02:30                                                        | 56.3             | 79.0              |                                |                             |
| 02:30 - 02:45                                                        | 53.4             | 70.8              |                                |                             |
| 02:45 - 03:00                                                        | 50.7             | 72.6              |                                |                             |
| 03:00 - 03:15                                                        | 54.8             | 74.3              |                                |                             |
| 03:15 - 03:30                                                        | 55.1             | 75.1              |                                |                             |
| 03:30 - 03:45                                                        | 56.2             | 77.7              |                                |                             |
| 03:45 - 04:00                                                        | 57.3             | 79.0              |                                |                             |
| 04:00 - 04:15                                                        | 54.2             | 75.6              |                                |                             |
| 04:15 - 04:30                                                        | 62.4             | 84.5              | 84.5                           |                             |
| 04:30 - 04:45                                                        | 63.2             | 85.9              | 85.9                           | 85.9                        |
| 04:45 - 05:00                                                        | 64.6             | 85.2              | 85.2                           | 85.2                        |
| 05:00 - 05:15                                                        | 68.8             | 94.3              | 94.3                           | 94.3                        |
| 05:15 - 05:30                                                        | 65.0             | 85.5              | 85.5                           | 85.5                        |
| 05:30 - 05:45                                                        | 66.8             | 88.1              | 88.1                           | 88.1                        |
| 05:45 - 06:00                                                        | 61.7             | 83.9              | 83.9                           |                             |
| 06:00 - 06:15                                                        | 69.3             | 87.2              | 87.2                           | 87.2                        |
| 06:15 - 06:30                                                        | 53.4             | 71.0              |                                |                             |
| 06:30 - 06:45                                                        | 64.6             | 85.9              | 85.9                           | 85.9                        |
| 06:45 - 07:00                                                        | 62.9             | 84.2              | 84.2                           |                             |
| Total Event Count                                                    |                  |                   | 19                             | 10                          |
| Pro PG Annex Event Quantity Criteria                                 |                  |                   | >20                            | <20                         |
| Pro PG Criteria Assessment                                           |                  |                   | Achieved                       | Achieved                    |

With the proposed glazing and ventilation strategies implemented on this site, the following calculated internal levels have been evaluated accordingly:-

|                                                        | Night Time (23:00-07:00) |
|--------------------------------------------------------|--------------------------|
| Recorded External Noise Level                          | 63.0                     |
| Calculated Highest Façade Level                        | 62.0                     |
| Façade Correction                                      | -1.0                     |
| Calculated Façade Attenuation                          | -35.2                    |
| L <sub>Amax</sub> 45 dB Criteria                       | 45.0                     |
| Calculated Façade Level Outside                        | 80.2                     |
| 11 <sup>th</sup> Percentile Recorded L <sub>Amax</sub> | 84.8                     |
| L <sub>Amax</sub> Criteria Achieved                    | NO                       |

The above table demonstrates that the upgraded glazing and ventilation will result in the internal L<sub>Amax</sub> 45 dB criteria not being achieved. Therefore, further BS 8233: 2014 calculations have been undertaken in order to demonstrate the effective required further 4.6 dB(A) reduction from upgrading the glazing to a Pilkington Optiphon 10 / 16 / 8.8.

This glazing should achieve the following minimum static insertion losses:-

| Octave Band Frequency                                          | 125  | 250  | 500  | 1000 | 2000 | 4000 | R <sub>w</sub> (C,Ctr) |
|----------------------------------------------------------------|------|------|------|------|------|------|------------------------|
| 10mm glass / 16mm air gap / 8.8mm<br>Pilkington Optiphon glass | 28.0 | 31.0 | 42.0 | 45.0 | 50.0 | 58.0 | 44 (-2,-6)             |

Based on the BS 8233: 2014 calculations, the following table demonstrates the effectiveness of this upgrade and demonstrates compliance with the L<sub>Amax</sub> 45 dB criteria. This upgraded glazing should be installed to those properties facing the railway line as shown in red within section 9.20 of this report.

|                                                        | Night Time (23:00-07:00) |
|--------------------------------------------------------|--------------------------|
| Recorded External Noise Level                          | 63.0                     |
| Calculated Highest Façade Level                        | 62.0                     |
| Façade Correction                                      | -1.0                     |
| Calculated Façade Attenuation                          | -40.9                    |
| L <sub>Amax</sub> 45 dB Criteria                       | 45.0                     |
| Calculated Façade Level Outside                        | 85.9                     |
| 11 <sup>th</sup> Percentile Recorded L <sub>Amax</sub> | 84.8                     |
| L <sub>Amax</sub> Criteria Achieved                    | YES                      |

## 9.22 Rear Bedrooms with Upgraded Acoustic Vents

| Proposed Window Configuration                                                     |                                                                                                                        | 10 / 6 - 16 / 4 with a Greenwood Wall Vent MA-3051 |                          |      |       |      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------|------|-------|------|
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Leqff                                                                             | The equivalent continuous sound pressure level outside the room elements under consideration                           |                                                    |                          |      |       |      |
| A0                                                                                | The reference absorption area of 10m2 and is independent of frequency                                                  |                                                    |                          |      |       |      |
| Sf                                                                                | The total façade area of the room in question                                                                          |                                                    |                          |      |       |      |
| Swi                                                                               | The area of the windows in the room                                                                                    |                                                    |                          |      |       |      |
| Sew                                                                               | The area of the external wall of the room                                                                              |                                                    |                          |      |       |      |
| Srr                                                                               | The area of the ceiling of the room (if applicable)                                                                    |                                                    |                          |      |       |      |
| S                                                                                 | The total area of the elements through which sound enters the room                                                     |                                                    |                          |      |       |      |
| Dne                                                                               | The insulation value of the trickle ventilator (if applicable)                                                         |                                                    |                          |      |       |      |
| Rwi                                                                               | The sound reduction index of the window                                                                                |                                                    |                          |      |       |      |
| Rew                                                                               | The sound reduction index of the external wall                                                                         |                                                    |                          |      |       |      |
| Rrr                                                                               | The sound reduction index of the ceiling/roof (if applicable)                                                          |                                                    |                          |      |       |      |
| A                                                                                 | The equivalent absorption area of the receiving room where $A=0.163V/T$                                                |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Formula                                                                           | $Leq2=Leqff+10\log[A0/S*10^{(-Dne/10)}+Swi/S*10^{(-Rwi/10)}+Sew/10*10^{(-Rew/10)}+Srr/S*10^{(-Rrr/10)}]+10\log(S/A)+3$ |                                                    |                          |      |       |      |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
|                                                                                   | Octave Band Centre Frequency (Hz)                                                                                      |                                                    |                          |      |       |      |
|                                                                                   | 125                                                                                                                    | 250                                                | 500                      | 1000 | 2000  | 4000 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Sf                                                                                | 7                                                                                                                      | 7                                                  | 7                        | 7    | 7     | 7    |
| Sr                                                                                | 9                                                                                                                      | 9                                                  | 9                        | 9    | 9     | 9    |
| Swi                                                                               | 2                                                                                                                      | 2                                                  | 2                        | 2    | 2     | 2    |
| Sew                                                                               | 5                                                                                                                      | 5                                                  | 5                        | 5    | 5     | 5    |
| Srr                                                                               | 9                                                                                                                      | 9                                                  | 9                        | 9    | 9     | 9    |
| S                                                                                 | 16                                                                                                                     | 16                                                 | 16                       | 16   | 16    | 16   |
| A0                                                                                | 10                                                                                                                     | 10                                                 | 10                       | 10   | 10    | 10   |
| V                                                                                 | 22                                                                                                                     | 22                                                 | 22                       | 22   | 22    | 22   |
| T (BS8233)                                                                        | 0.50                                                                                                                   | 0.50                                               | 0.50                     | 0.50 | 0.50  | 0.50 |
| A                                                                                 | 11.0                                                                                                                   | 14.0                                               | 16.0                     | 16.0 | 15.0  | 14.0 |
| Daytime Leqff                                                                     | 61.7                                                                                                                   | 60.1                                               | 59.2                     | 61.4 | 59.0  | 50.9 |
| Night time Leqff                                                                  | 65.1                                                                                                                   | 59.2                                               | 56.2                     | 57.2 | 55.5  | 48.6 |
| Dne                                                                               | 48.0                                                                                                                   | 46.0                                               | 49.0                     | 54.0 | 65.0  | 67.0 |
| Rwi                                                                               | 28.0                                                                                                                   | 31.0                                               | 42.0                     | 45.0 | 50.0  | 58.0 |
| Rew                                                                               | 40.0                                                                                                                   | 44.0                                               | 45.0                     | 51.0 | 56.0  | 56.0 |
| Rrr                                                                               | 39.0                                                                                                                   | 48.0                                               | 55.0                     | 60.0 | 59.0  | 61.0 |
|                                                                                   |                                                                                                                        |                                                    |                          |      |       |      |
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00)    |                                                                                                                        |                                                    | L <sub>Aeq</sub> 16 HOUR | 21.1 | dB(A) |      |
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) |                                                                                                                        |                                                    | L <sub>Aeq</sub> 8 HOUR  | 21.1 | dB(A) |      |

## 10 VIBRATION ASSESSMENT

### 10.1 ASSESSMENT CRITERIA

Ground borne vibration needs to be assessed with regard to the likelihood of disturbance to humans and damage to building structure. With regard to human disturbance, vibration criteria are specified in terms of Vibration Dose Values (VDV) in accordance with BS 64721. The following table shows the VDV with various degrees of adverse comment, which may be expected in residential buildings.

| For residential buildings                                     | Low probability of adverse comment | Adverse comment possible | Adverse comment probable |
|---------------------------------------------------------------|------------------------------------|--------------------------|--------------------------|
| 16 hr day 07:00 to 23:00                                      | 0.2 to 0.4                         | 0.4 to 0.8               | 0.8 to 1.6               |
| Table 1 Vibration Dose Values (given in m/s <sup>1.75</sup> ) |                                    |                          |                          |

The vibration dose reflects the accumulated acceleration vibration value over a given time period, integrated by time on a root mean quad basis, hence the unit m/s<sup>1.75</sup>.

Human beings have different sensitivity to vibration in different directions, and it is relevant to consider vibration in all three axes together as a resultant value.

In terms of the likelihood of damage to buildings, vibration is measured in peak particle velocity (ppv) mm/s and assessed in accordance with BS 73852. In this particular case, the main sources of vibration are trains and these are considered to cause transient vibration. The BS7385 standard states that for transient vibration, guide values at which cosmetic damage could occur to residential buildings are 15 mm/s at 4 Hz, rising to 20 mm/s at 15 Hz and rising further to 50 mm/s at 40 Hz and above for new buildings. These limits can be reduced by 50% for older buildings.

<sup>1</sup> BS 6472: Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)

<sup>1</sup> BS 7385: Evaluation and measurement for vibration in buildings

## 10.2 MEASUREMENTS

### Instrumentation

Vibration levels were recorded using a two-channel Vibrock V901 seismometer, serial number 1006, which was connected with two tri-axial transducers for measuring peak particle velocity and vibration dose value, simultaneously, at one chosen location. The vibration measuring equipment has a current calibration certificate.

### Measurement locations

The site is approximately 7m away from the railway line. Subsequently, one representative measurement location was selected; Location 2 on the Southern boundary of the site.

The measurement sensors were placed on a large concrete slab, approximately 2m by 5m. Although it was not possible to establish the thickness of this slab, it is considered that this slab would be well adhered to the sub-soil.

### Measurement Procedure

Ambient ground borne vibration levels were measured continuously for about 92 hours at the location 1 from approximately 11:30 hrs on 21<sup>st</sup> February to approximately 07:00 hrs on 25<sup>th</sup> February 2020. This period is considered to represent both the periods when the ambient conditions are quietest, i.e. night-time, and periods of peak railway traffic through daytime.

### 10.3 RESULTS & ASSESSMENT OF VIBRATION MEASUREMENTS

The vibration monitor was set to record ppv and vdv and left unattended for the duration of the survey. Full measurement results are given in the appendix of this report.

| 21 <sup>st</sup> February 2020 – DAYTIME |                      |       |       |       |       |       |                        |          |            |
|------------------------------------------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| Ev 000                                   | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
| 12 Hour                                  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|                                          | 0.031                | 0.04  | 0.234 |       |       |       | 6.33mm/s               | 12:32:52 | 21/02/2020 |
|                                          |                      |       |       |       |       |       |                        |          |            |
| 1 Hour                                   | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1                                   | 0.018                | 0.022 | 0.146 | 0.015 | 0.018 | 0.121 | 3.93mm/s               | 11:31:32 | 21/02/2020 |
| Hour 2                                   | 0.016                | 0.022 | 0.131 | 0.018 | 0.025 | 0.151 | 6.33mm/s               | 12:32:52 | 21/02/2020 |
| Hour 3                                   | 0.016                | 0.021 | 0.123 | 0.02  | 0.027 | 0.165 | 4.10mm/s               | 13:54:12 | 21/02/2020 |
| Hour 4                                   | 0.016                | 0.02  | 0.133 | 0.022 | 0.029 | 0.18  | 4.65mm/s               | 14:55:02 | 21/02/2020 |
| Hour 5                                   | 0.015                | 0.019 | 0.109 | 0.023 | 0.03  | 0.186 | 3.38mm/s               | 15:58:12 | 21/02/2020 |
| Hour 6                                   | 0.015                | 0.021 | 0.12  | 0.024 | 0.032 | 0.194 | 4.40mm/s               | 16:33:02 | 21/02/2020 |
| Hour 7                                   | 0.016                | 0.021 | 0.138 | 0.026 | 0.033 | 0.204 | 4.23mm/s               | 17:54:42 | 21/02/2020 |
| Hour 8                                   | 0.015                | 0.019 | 0.102 | 0.026 | 0.034 | 0.208 | 2.55mm/s               | 18:25:42 | 21/02/2020 |
| Hour 9                                   | 0.015                | 0.018 | 0.093 | 0.027 | 0.035 | 0.21  | 2.90mm/s               | 19:32:12 | 21/02/2020 |
| Hour 10                                  | 0.015                | 0.018 | 0.094 | 0.028 | 0.036 | 0.212 | 2.43mm/s               | 20:07:02 | 21/02/2020 |
| Hour 11                                  | 0.015                | 0.019 | 0.099 | 0.028 | 0.036 | 0.214 | 2.63mm/s               | 21:54:22 | 21/02/2020 |
| Hour 12                                  | 0.015                | 0.018 | 0.071 | 0.029 | 0.037 | 0.216 | 1.93mm/s               | 22:42:52 | 21/02/2020 |

21<sup>st</sup> – 22<sup>nd</sup> February 2020 – DAYTIME & NIGHT TIME

| Ev 001  | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
|---------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| 16 Hour | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|         | 0.026                | 0.032 | 0.162 |       |       |       | 4.40mm/s               | 04:18:20 | 22/02/2020 |
|         |                      |       |       |       |       |       |                        |          |            |
| 1 Hour  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1  | 0.015                | 0.019 | 0.109 | 0.015 | 0.019 | 0.109 | 3.40mm/s               | 23:44:20 | 21/02/2020 |
| Hour 2  | 0.015                | 0.018 | 0.067 | 0.018 | 0.022 | 0.112 | 2.03mm/s               | 00:49:10 | 22/02/2020 |
| Hour 3  | 0.015                | 0.018 | 0.04  | 0.02  | 0.024 | 0.113 | 1.93mm/s               | 01:07:10 | 22/02/2020 |
| Hour 4  | 0.015                | 0.017 | 0.026 | 0.021 | 0.026 | 0.113 | 1.63mm/s               | 02:56:50 | 22/02/2020 |
| Hour 5  | 0.015                | 0.017 | 0.027 | 0.023 | 0.027 | 0.113 | 1.73mm/s               | 03:44:20 | 22/02/2020 |
| Hour 6  | 0.015                | 0.021 | 0.13  | 0.024 | 0.029 | 0.145 | 4.40mm/s               | 04:18:20 | 22/02/2020 |
| Hour 7  | 0.015                | 0.019 | 0.091 | 0.025 | 0.031 | 0.151 | 3.55mm/s               | 05:58:10 | 22/02/2020 |
| Hour 8  | 0.016                | 0.019 | 0.114 | 0.026 | 0.032 | 0.162 | 3.13mm/s               | 06:24:20 | 22/02/2020 |

22<sup>nd</sup> February 2020 – DAYTIME

| Ev 002  | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
|---------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| 16 Hour | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|         | 0.03                 | 0.039 | 0.232 |       |       |       | 5.80mm/s               | 12:54:30 | 22/02/2020 |
|         |                      |       |       |       |       |       |                        |          |            |
| 1 Hour  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1  | 0.015                | 0.018 | 0.085 | 0.015 | 0.018 | 0.085 | 2.45mm/s               | 07:59:00 | 22/02/2020 |
| Hour 2  | 0.016                | 0.021 | 0.146 | 0.018 | 0.023 | 0.15  | 5.55mm/s               | 08:24:00 | 22/02/2020 |
| Hour 3  | 0.015                | 0.018 | 0.091 | 0.02  | 0.025 | 0.155 | 2.83mm/s               | 09:32:00 | 22/02/2020 |
| Hour 4  | 0.015                | 0.018 | 0.092 | 0.021 | 0.027 | 0.16  | 2.73mm/s               | 10:24:20 | 22/02/2020 |
| Hour 5  | 0.015                | 0.02  | 0.121 | 0.023 | 0.029 | 0.172 | 4.33mm/s               | 11:35:20 | 22/02/2020 |
| Hour 6  | 0.016                | 0.02  | 0.145 | 0.024 | 0.03  | 0.19  | 5.80mm/s               | 12:54:30 | 22/02/2020 |
| Hour 7  | 0.016                | 0.024 | 0.129 | 0.025 | 0.033 | 0.2   | 5.35mm/s               | 13:25:30 | 22/02/2020 |
| Hour 8  | 0.014                | 0.019 | 0.096 | 0.026 | 0.034 | 0.202 | 2.58mm/s               | 14:31:20 | 22/02/2020 |
| Hour 9  | 0.014                | 0.018 | 0.084 | 0.026 | 0.035 | 0.204 | 2.60mm/s               | 15:53:50 | 22/02/2020 |
| Hour 10 | 0.014                | 0.019 | 0.11  | 0.027 | 0.035 | 0.208 | 3.28mm/s               | 16:31:10 | 22/02/2020 |
| Hour 11 | 0.016                | 0.019 | 0.118 | 0.028 | 0.036 | 0.212 | 3.83mm/s               | 17:24:30 | 22/02/2020 |
| Hour 12 | 0.016                | 0.02  | 0.134 | 0.029 | 0.037 | 0.22  | 3.73mm/s               | 18:12:20 | 22/02/2020 |
| Hour 13 | 0.015                | 0.019 | 0.131 | 0.029 | 0.038 | 0.228 | 3.93mm/s               | 19:54:10 | 22/02/2020 |
| Hour 14 | 0.015                | 0.018 | 0.096 | 0.03  | 0.038 | 0.23  | 2.95mm/s               | 20:43:40 | 22/02/2020 |
| Hour 15 | 0.014                | 0.018 | 0.1   | 0.03  | 0.039 | 0.232 | 2.58mm/s               | 21:14:20 | 22/02/2020 |
| Hour 16 | 0.014                | 0.018 | 0.073 | 0.03  | 0.039 | 0.232 | 2.20mm/s               | 22:48:30 | 22/02/2020 |

22<sup>nd</sup> – 23<sup>rd</sup> February 2020 – DAYTIME & NIGHT TIME

| Ev 003  | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
|---------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| 16 Hour | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|         | 0.025                | 0.031 | 0.097 |       |       |       | 2.50mm/s               | 06:58:20 | 23/02/2020 |
|         |                      |       |       |       |       |       |                        |          |            |
| 1 Hour  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1  | 0.015                | 0.018 | 0.074 | 0.015 | 0.018 | 0.074 | 1.68mm/s               | 23:44:10 | 22/02/2020 |
| Hour 2  | 0.015                | 0.018 | 0.072 | 0.018 | 0.022 | 0.087 | 1.98mm/s               | 00:52:50 | 23/02/2020 |
| Hour 3  | 0.015                | 0.018 | 0.032 | 0.02  | 0.024 | 0.087 | .875mm/s               | 01:22:30 | 23/02/2020 |
| Hour 4  | 0.015                | 0.018 | 0.024 | 0.021 | 0.026 | 0.087 | 1.45mm/s               | 02:20:20 | 23/02/2020 |
| Hour 5  | 0.015                | 0.018 | 0.026 | 0.023 | 0.027 | 0.088 | 1.50mm/s               | 03:13:10 | 23/02/2020 |
| Hour 6  | 0.015                | 0.018 | 0.03  | 0.024 | 0.028 | 0.088 | 1.88mm/s               | 04:16:40 | 23/02/2020 |
| Hour 7  | 0.015                | 0.018 | 0.027 | 0.024 | 0.029 | 0.088 | 1.40mm/s               | 05:01:50 | 23/02/2020 |
| Hour 8  | 0.015                | 0.018 | 0.073 | 0.025 | 0.031 | 0.097 | 2.50mm/s               | 06:58:20 | 23/02/2020 |

23<sup>rd</sup> February 2019 – DAYTIME

| Ev 004  | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
|---------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| 16 Hour | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|         | 0.028                | 0.036 | 0.175 |       |       |       | 3.35mm/s               | 11:41:00 | 23/02/2020 |
|         |                      |       |       |       |       |       |                        |          |            |
| 1 Hour  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1  | 0.014                | 0.019 | 0.106 | 0.014 | 0.019 | 0.106 | 3.20mm/s               | 07:41:10 | 23/02/2020 |
| Hour 2  | 0.014                | 0.018 | 0.069 | 0.017 | 0.022 | 0.111 | 2.75mm/s               | 08:12:50 | 23/02/2020 |
| Hour 3  | 0.014                | 0.018 | 0.072 | 0.019 | 0.024 | 0.116 | 2.28mm/s               | 09:41:40 | 23/02/2020 |
| Hour 4  | 0.014                | 0.018 | 0.097 | 0.02  | 0.026 | 0.128 | 2.70mm/s               | 10:41:00 | 23/02/2020 |
| Hour 5  | 0.014                | 0.018 | 0.1   | 0.021 | 0.028 | 0.139 | 3.35mm/s               | 11:41:00 | 23/02/2020 |
| Hour 6  | 0.014                | 0.018 | 0.077 | 0.022 | 0.029 | 0.142 | 2.13mm/s               | 12:58:40 | 23/02/2020 |
| Hour 7  | 0.014                | 0.017 | 0.062 | 0.023 | 0.03  | 0.143 | 1.60mm/s               | 13:08:00 | 23/02/2020 |
| Hour 8  | 0.014                | 0.018 | 0.095 | 0.024 | 0.031 | 0.15  | 2.65mm/s               | 14:41:00 | 23/02/2020 |
| Hour 9  | 0.014                | 0.018 | 0.084 | 0.025 | 0.032 | 0.153 | 2.48mm/s               | 15:40:50 | 23/02/2020 |
| Hour 10 | 0.014                | 0.018 | 0.086 | 0.025 | 0.033 | 0.157 | 2.53mm/s               | 16:41:10 | 23/02/2020 |
| Hour 11 | 0.014                | 0.018 | 0.066 | 0.026 | 0.033 | 0.158 | 1.80mm/s               | 17:59:00 | 23/02/2020 |
| Hour 12 | 0.014                | 0.018 | 0.088 | 0.026 | 0.034 | 0.162 | 2.15mm/s               | 18:41:20 | 23/02/2020 |
| Hour 13 | 0.014                | 0.018 | 0.104 | 0.027 | 0.035 | 0.169 | 2.98mm/s               | 19:40:40 | 23/02/2020 |
| Hour 14 | 0.014                | 0.018 | 0.074 | 0.027 | 0.035 | 0.17  | 1.55mm/s               | 20:40:40 | 23/02/2020 |
| Hour 15 | 0.014                | 0.018 | 0.074 | 0.028 | 0.036 | 0.172 | 2.15mm/s               | 21:41:10 | 23/02/2020 |
| Hour 16 | 0.014                | 0.018 | 0.09  | 0.028 | 0.036 | 0.175 | 3.25mm/s               | 22:40:40 | 23/02/2020 |

23<sup>rd</sup> – 24<sup>th</sup> February 2020 – DAYTIME & NIGHT TIME

| Ev 005  | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
|---------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| 16 Hour | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|         | 0.025                | 0.031 | 0.121 |       |       |       | 3.65mm/s               | 06:53:20 | 24/02/2020 |
|         |                      |       |       |       |       |       |                        |          |            |
| 1 Hour  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1  | 0.014                | 0.018 | 0.066 | 0.014 | 0.018 | 0.066 | 1.45mm/s               | 23:48:30 | 23/02/2020 |
| Hour 2  | 0.015                | 0.018 | 0.062 | 0.017 | 0.022 | 0.076 | 1.78mm/s               | 00:11:30 | 24/02/2020 |
| Hour 3  | 0.015                | 0.018 | 0.046 | 0.019 | 0.024 | 0.079 | 1.53mm/s               | 01:56:30 | 24/02/2020 |
| Hour 4  | 0.014                | 0.018 | 0.019 | 0.021 | 0.026 | 0.079 | .300mm/s               | 02:09:10 | 24/02/2020 |
| Hour 5  | 0.014                | 0.018 | 0.047 | 0.022 | 0.027 | 0.081 | 1.28mm/s               | 03:11:40 | 24/02/2020 |
| Hour 6  | 0.014                | 0.018 | 0.035 | 0.023 | 0.028 | 0.082 | 1.00mm/s               | 04:37:30 | 24/02/2020 |
| Hour 7  | 0.015                | 0.019 | 0.086 | 0.024 | 0.03  | 0.1   | 2.95mm/s               | 05:35:10 | 24/02/2020 |
| Hour 8  | 0.015                | 0.02  | 0.103 | 0.025 | 0.031 | 0.121 | 3.65mm/s               | 06:53:20 | 24/02/2020 |

24<sup>th</sup> February 2020 – DAYTIME

| Ev 006  | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
|---------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| 16 Hour | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|         | 0.031                | 0.038 | 0.234 |       |       |       | 6.73mm/s               | 15:55:30 | 24/02/2020 |
|         |                      |       |       |       |       |       |                        |          |            |
| 1 Hour  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1  | 0.014                | 0.018 | 0.074 | 0.014 | 0.018 | 0.074 | 2.48mm/s               | 07:38:40 | 24/02/2020 |
| Hour 2  | 0.015                | 0.019 | 0.142 | 0.017 | 0.022 | 0.144 | 3.95mm/s               | 08:53:50 | 24/02/2020 |
| Hour 3  | 0.014                | 0.018 | 0.079 | 0.019 | 0.024 | 0.147 | 2.23mm/s               | 09:53:50 | 24/02/2020 |
| Hour 4  | 0.014                | 0.019 | 0.09  | 0.02  | 0.026 | 0.152 | 2.73mm/s               | 10:32:30 | 24/02/2020 |
| Hour 5  | 0.014                | 0.018 | 0.082 | 0.021 | 0.028 | 0.156 | 2.48mm/s               | 11:24:00 | 24/02/2020 |
| Hour 6  | 0.014                | 0.018 | 0.084 | 0.022 | 0.029 | 0.159 | 2.20mm/s               | 12:55:40 | 24/02/2020 |
| Hour 7  | 0.014                | 0.018 | 0.077 | 0.023 | 0.03  | 0.161 | 1.95mm/s               | 13:24:10 | 24/02/2020 |
| Hour 8  | 0.014                | 0.018 | 0.083 | 0.024 | 0.031 | 0.164 | 2.43mm/s               | 14:23:50 | 24/02/2020 |
| Hour 9  | 0.023                | 0.022 | 0.206 | 0.028 | 0.033 | 0.224 | 6.73mm/s               | 15:55:30 | 24/02/2020 |
| Hour 10 | 0.014                | 0.018 | 0.091 | 0.028 | 0.034 | 0.226 | 3.28mm/s               | 16:50:00 | 24/02/2020 |
| Hour 11 | 0.014                | 0.017 | 0.05  | 0.029 | 0.034 | 0.226 | 1.35mm/s               | 17:25:10 | 24/02/2020 |
| Hour 12 | 0.015                | 0.019 | 0.11  | 0.029 | 0.035 | 0.23  | 3.45mm/s               | 18:25:30 | 24/02/2020 |
| Hour 13 | 0.014                | 0.018 | 0.094 | 0.03  | 0.036 | 0.232 | 2.90mm/s               | 19:17:40 | 24/02/2020 |
| Hour 14 | 0.014                | 0.019 | 0.092 | 0.03  | 0.036 | 0.232 | 2.90mm/s               | 20:53:40 | 24/02/2020 |
| Hour 15 | 0.014                | 0.018 | 0.063 | 0.031 | 0.037 | 0.232 | 2.13mm/s               | 21:31:30 | 24/02/2020 |
| Hour 16 | 0.015                | 0.018 | 0.072 | 0.031 | 0.038 | 0.234 | 1.83mm/s               | 22:42:10 | 24/02/2020 |

| 24 <sup>th</sup> – 25 <sup>th</sup> February 2020 – DAYTIME & NIGHT TIME |                      |       |       |       |       |       |                        |          |            |
|--------------------------------------------------------------------------|----------------------|-------|-------|-------|-------|-------|------------------------|----------|------------|
| Ev 007                                                                   | Vibration Dose Value |       |       |       |       |       | Peak Particle Velocity |          |            |
| 16 Hour                                                                  | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
|                                                                          | 0.026                | 0.033 | 0.158 |       |       |       | 4.88mm/s               | 06:40:00 | 25/02/2020 |
|                                                                          |                      |       |       |       |       |       |                        |          |            |
| 1 Hour                                                                   | X                    | Y     | Z     | X     | Y     | Z     | Max                    | Time     | Date       |
| Hour 1                                                                   | 0.015                | 0.019 | 0.085 | 0.015 | 0.019 | 0.085 | 2.53mm/s               | 23:08:40 | 24/02/2020 |
| Hour 2                                                                   | 0.015                | 0.018 | 0.048 | 0.018 | 0.022 | 0.088 | 1.38mm/s               | 00:14:00 | 25/02/2020 |
| Hour 3                                                                   | 0.015                | 0.018 | 0.019 | 0.02  | 0.024 | 0.088 | .275mm/s               | 01:41:00 | 25/02/2020 |
| Hour 4                                                                   | 0.015                | 0.018 | 0.019 | 0.021 | 0.026 | 0.088 | .325mm/s               | 02:06:00 | 25/02/2020 |
| Hour 5                                                                   | 0.015                | 0.018 | 0.02  | 0.023 | 0.027 | 0.088 | .525mm/s               | 03:23:10 | 25/02/2020 |
| Hour 6                                                                   | 0.015                | 0.018 | 0.031 | 0.024 | 0.028 | 0.088 | 1.15mm/s               | 04:56:20 | 25/02/2020 |
| Hour 7                                                                   | 0.015                | 0.018 | 0.072 | 0.025 | 0.029 | 0.097 | 2.25mm/s               | 05:20:20 | 25/02/2020 |
| Hour 8                                                                   | 0.016                | 0.025 | 0.152 | 0.026 | 0.033 | 0.158 | 4.88mm/s               | 06:40:00 | 25/02/2020 |

The vdv results are summarised in the table below for the daytime and night-time periods.

| Time Period                                              | Vibration Dose Value<br>m/s <sup>1.75</sup> |       |       | Peak Particle Velocity<br>mm/s |
|----------------------------------------------------------|---------------------------------------------|-------|-------|--------------------------------|
|                                                          | L                                           | T     | V     | Resultant Vector               |
| 21 <sup>st</sup> February 2020 – 12 Hr                   | 0.031                                       | 0.04  | 0.234 | 6.33mm/s                       |
| 22 <sup>nd</sup> February 2020 – 16 Hr                   | 0.03                                        | 0.039 | 0.232 | 5.80mm/s                       |
| 23 <sup>rd</sup> February 2020 – 16 Hr                   | 0.028                                       | 0.036 | 0.175 | 3.35mm/s                       |
| 24 <sup>th</sup> February 2020 – 16 Hr                   | 0.031                                       | 0.038 | 0.234 | 6.73mm/s                       |
| 21 <sup>st</sup> – 22 <sup>nd</sup> February 2020 – 8 Hr | 0.026                                       | 0.032 | 0.162 | 4.40mm/s                       |
| 22 <sup>nd</sup> – 23 <sup>rd</sup> February 2020 – 8 Hr | 0.025                                       | 0.031 | 0.097 | 2.50mm/s                       |
| 23 <sup>rd</sup> – 24 <sup>th</sup> February 2020 – 8 Hr | 0.025                                       | 0.031 | 0.121 | 3.65mm/s                       |
| 24 <sup>th</sup> – 25 <sup>th</sup> February 2020 – 8 Hr | 0.026                                       | 0.033 | 0.158 | 4.88mm/s                       |

Table 3 Summary of daily VDV and PPV

The above table demonstrates that no detrimental or structural vibration levels have been measured and therefore the probability of neighbouring building damage is low.

#### **10.4 IMPLICATIONS**

The results indicate that vibration dose values (vdv) at the measurement location are below 0.2 and 0.4 for both daytime and night-time. These values are below the range associated with 'low probability of adverse comment'.

The maximum peak particle velocity recorded was found to be 6.73 mm/s at the measurement position, in accordance with the guidance in BS7385, this value is below the limit at which cosmetic damage to building is likely.

#### **10.5 RECOMMENDATIONS**

The results of this ambient vibration survey indicate that whilst some vibration events may be perceptible, in accordance with the advice given in the appropriate standards, there is likely to be no concern of adverse comments from future occupants of the proposed housing and no concern of cosmetic damage to new buildings arising from vibration at this measurement location.

## **11 ELEMENT 4 – ASSESSMENT OF OTHER RELEVANT ISSUES**

### **11.1 The National Planning Policy Framework 2019 (NPPF)**

The National Planning Policy Framework 2019 (NPPF) and assessments to the Noise Policy Statement for England 2010 (NPSE) should be made in conjunction with each other. Paragraphs 180 - 183 of the National Planning Policy Framework 2019 (NPPF) states the following:

**Paragraph 180** Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

**Paragraph 181** Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications.

**Paragraph 182** Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

**Paragraph 183** The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities

**The Noise Policy Statement for England** gives various levels of effect as detailed within this report.

With the glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a conclusion of **NOEL – No Observed Effect Level**. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

## 12 CONCLUSION

### 12.1.1 Background Noise Levels

A 96 hour background noise survey was undertaken from 21<sup>st</sup> – 25<sup>th</sup> February 2020 at two positions at the front of the site and the rear of the site in order to establish the underlying background noise levels. The maximum day time levels were found to be  $L_{Aeq, 16 \text{ hour}}$  65.4 dB and the maximum night time levels were found to be  $L_{Aeq, 8 \text{ hours}}$  56.8 dB at position 1. The maximum day time levels were found to be  $L_{Aeq, 16 \text{ hour}}$  65.9 dB and the maximum night time levels were found to be  $L_{Aeq, 8 \text{ hours}}$  63.0 dB at position 2.

| Assessment Position | Date Start | Date Finish | Daytime LAeq | Night Time LAeq |
|---------------------|------------|-------------|--------------|-----------------|
| Position 1 Front    | 21/02/2020 | 25/02/2020  | 65.4         | 56.8            |
| Position 2 Rear     | 21/02/2020 | 25/02/2020  | 65.9         | 63.0            |

## 12.2 Potential Façade Noise Levels

### 12.2.1 Daytime (07:00-23:00)

| Time Period                   | Highest Potential Façade Noise Level | Noise Risk Category<br>2 - Medium |
|-------------------------------|--------------------------------------|-----------------------------------|
| Average Daytime (07:00-23:00) | $L_{Aeq, 16 \text{ HOUR}}$ 67.0 dB   | 63 – 70 dB                        |

### 12.2.2 Night Time (23:00-07:00)

| Time Period                      | Highest Potential Façade Noise Level    | Noise Risk Category<br>3 - High |
|----------------------------------|-----------------------------------------|---------------------------------|
| Average Night Time (23:00-07:00) | $L_{Aeq, 16 \text{ HOUR}}$ 62.0 dB      | > 60 dB                         |
|                                  | Maximum (10 Times) – $L_{Amax}$ 84.8 dB | >80 dB (10 Times in 8 Hours)    |

## 12.3 Risk Assessment

### 12.3.1 Daytime (07:00-23:00) – Position 1

| Risk Assessment Category | Risk Assessment                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 - Medium               | As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. |

### 12.3.2 Night Time (23:00-07:00) – Position 1

| Risk Assessment Category | Risk Assessment                                                                                                                                                                                                                                                                  |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 - High                 | High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. |

The above table demonstrates this site is located within Noise Risk Category 2 which suggests a Medium level of risk for daytime levels and Noise Risk Category 3 which suggests a high of risk for night time levels. Therefore, further mitigation levels will be required at Stage 2.

#### **12.4 Glazing & Ventilation Specification**

The development should be designed with a 6mm glass / 6 - 16mm air gap / 4mm glass double glazed windows and a Titon V75 / C75 as shown above in blue in section 9.20 and a 10mm glass / 16mm air gap / 8.8mm glass & Greenwood MA-3051 wall vent as shown in red in section 9.20 in order to comply with the LAmax criteria in section 9.22 or similarly approved to all rooms to ensure the internal noise levels are acceptable in terms of the assessment to British Standard 8233: 2014.

#### **12.5 WHO Guidelines for Community Noise**

The development does not propose external living areas and therefore an assessment to the World Health Organisation's 'Guidelines for Community Noise' has not been carried out.

#### **12.6 Conclusion**

Levels have been recorded and assessments made in accordance with the relevant standards. Internal criteria's have been set and calculations made in order to determine the minimum construction details required in order to meet the desired level within the proposed residential dwellings and satisfy the local council's requirements.

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that the proposed development can demonstrate compliance with the National Planning Policy Framework 2019, NPPF & NPSE

## 12.7 Summary of Vibration

The following vibration levels have been assessed over a typical period between the 21<sup>st</sup> – 25<sup>th</sup> February 2020. The following table summarises these results:-

| Time Period                                              | Vibration Dose Value<br>m/s <sup>1.75</sup> |       |       | Peak Particle Velocity<br>mm/s |
|----------------------------------------------------------|---------------------------------------------|-------|-------|--------------------------------|
|                                                          | L                                           | T     | V     | Resultant Vector               |
| 21 <sup>st</sup> February 2020 – 12 Hr                   | 0.031                                       | 0.04  | 0.234 | 6.33mm/s                       |
| 22 <sup>nd</sup> February 2020 – 16 Hr                   | 0.03                                        | 0.039 | 0.232 | 5.80mm/s                       |
| 23 <sup>rd</sup> February 2020 – 16 Hr                   | 0.028                                       | 0.036 | 0.175 | 3.35mm/s                       |
| 24 <sup>th</sup> February 2020 – 16 Hr                   | 0.031                                       | 0.038 | 0.234 | 6.73mm/s                       |
| 21 <sup>st</sup> – 22 <sup>nd</sup> February 2020 – 8 Hr | 0.026                                       | 0.032 | 0.162 | 4.40mm/s                       |
| 22 <sup>nd</sup> – 23 <sup>rd</sup> February 2020 – 8 Hr | 0.025                                       | 0.031 | 0.097 | 2.50mm/s                       |
| 23 <sup>rd</sup> – 24 <sup>th</sup> February 2020 – 8 Hr | 0.025                                       | 0.031 | 0.121 | 3.65mm/s                       |
| 24 <sup>th</sup> – 25 <sup>th</sup> February 2020 – 8 Hr | 0.026                                       | 0.033 | 0.158 | 4.88mm/s                       |
| Table 3 Summary of daily VDV and PPV                     |                                             |       |       |                                |

The vibration results indicate that vibration dose values (vdv) at the measurement locations are between 0.2 – 0.4 for daytime and night time periods. These values are below the range associated with 'low probability of adverse comment'.

The maximum peak particle velocity recorded was found to be 6.73 mm/s at Location 1. In accordance with the guidance in BS7385, this value is below the limit at which cosmetic damage to building is likely.

The results of this vibration survey indicate that in accordance with the advice given in the appropriate standards, there is likely to be no concern of adverse comments from existing occupants of their properties and no concern of cosmetic damage to buildings arising from vibration at this measurement location.

## 13 RESULTS

### 13.1 21<sup>st</sup> – 22<sup>nd</sup> February 2020 Position 1

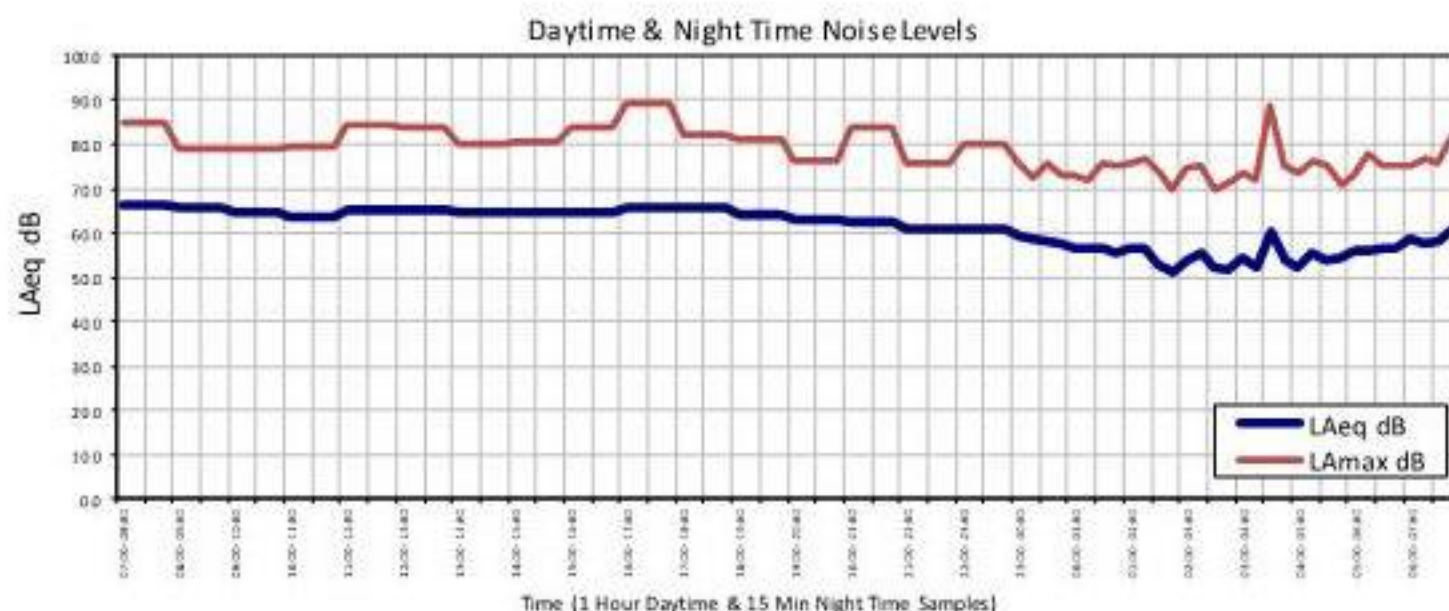
| NOISE LEVEL SUMMARY ASSESSMENT                                                    |      |      | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|-----------------------------------------------------------------------------------|------|------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                       | LAeq | LAmx | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR SCorresponding LAmx 16 HOUR</small>  | 64.4 | 89.3 | 72.8                              | 70.1 | 65.0 | 62.6 | 60.0 | 60.3 | 57.9 | 47.4 | 38.7 | 29.7  |
| NIGHT TIME 23:00 - 07:00<br><small>LAeq 8 HOUR SCorresponding LAmx 8 HOUR</small> | 56.7 | 88.5 | 76.4                              | 70.2 | 62.1 | 55.9 | 52.5 | 51.6 | 48.8 | 40.5 | 33.9 | 29.5  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |      |      | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | LAeq | LAmx | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 66.2 | 84.6 | 67.7                              | 69.9 | 66.1 | 63.6 | 61.9 | 62.0  | 59.8  | 49.2  | 40.1  | 30.0   |
| 08:00 - 09:00                                     | 65.6 | 79.2 | 69.5                              | 70.6 | 64.5 | 62.4 | 60.8 | 61.7  | 59.4  | 48.5  | 41.0  | 32.3   |
| 09:00 - 10:00                                     | 64.4 | 78.9 | 70.0                              | 70.0 | 64.0 | 62.3 | 59.7 | 60.4  | 58.0  | 47.5  | 38.5  | 28.8   |
| 10:00 - 11:00                                     | 63.6 | 79.6 | 68.7                              | 68.1 | 62.5 | 60.8 | 58.7 | 59.7  | 57.3  | 46.8  | 37.4  | 27.7   |
| 11:00 - 12:00                                     | 65.1 | 84.1 | 72.0                              | 70.1 | 63.5 | 61.8 | 59.7 | 60.8  | 58.4  | 48.7  | 38.9  | 30.9   |
| 12:00 - 13:00                                     | 65.1 | 84.0 | 74.3                              | 71.0 | 64.9 | 64.2 | 60.8 | 60.6  | 58.8  | 48.9  | 40.1  | 29.5   |
| 13:00 - 14:00                                     | 64.8 | 80.2 | 75.3                              | 71.8 | 66.3 | 63.4 | 60.9 | 60.5  | 57.8  | 47.8  | 40.6  | 31.7   |
| 14:00 - 15:00                                     | 64.4 | 80.4 | 74.2                              | 71.2 | 65.0 | 62.9 | 60.4 | 60.3  | 57.2  | 46.9  | 38.2  | 31.3   |
| 15:00 - 16:00                                     | 64.5 | 83.9 | 72.5                              | 70.2 | 64.2 | 64.0 | 60.6 | 60.5  | 57.4  | 46.9  | 37.4  | 28.0   |
| 16:00 - 17:00                                     | 65.8 | 89.3 | 73.3                              | 71.4 | 67.4 | 64.1 | 61.2 | 61.7  | 59.3  | 49.1  | 40.8  | 32.4   |
| 17:00 - 18:00                                     | 65.7 | 82.4 | 74.1                              | 71.0 | 66.1 | 63.6 | 61.4 | 61.4  | 59.2  | 49.2  | 40.3  | 31.4   |
| 18:00 - 19:00                                     | 64.2 | 81.3 | 72.9                              | 69.6 | 65.3 | 62.9 | 59.8 | 60.1  | 57.4  | 46.0  | 36.7  | 28.7   |
| 19:00 - 20:00                                     | 63.0 | 76.2 | 70.4                              | 67.6 | 63.1 | 60.8 | 58.5 | 58.2  | 56.3  | 45.0  | 35.2  | 25.6   |
| 20:00 - 21:00                                     | 62.2 | 83.7 | 74.0                              | 68.7 | 64.4 | 60.8 | 57.9 | 58.1  | 55.3  | 44.5  | 37.7  | 25.8   |
| 21:00 - 22:00                                     | 61.0 | 75.7 | 74.2                              | 69.4 | 64.9 | 59.9 | 56.4 | 56.7  | 54.1  | 43.6  | 35.6  | 25.2   |
| 22:00 - 23:00                                     | 60.6 | 79.8 | 73.7                              | 68.1 | 64.2 | 60.5 | 57.1 | 56.0  | 53.2  | 42.7  | 33.8  | 25.5   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |      |      | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | LAeq | LAmx | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 59.4 | 75.6 | 73.1                              | 67.7 | 62.8 | 59.4 | 56.0 | 54.7  | 51.7  | 42.2  | 33.1  | 23.5   |
| 23:15 - 23:30                                           | 58.8 | 72.5 | 71.9                              | 66.0 | 59.5 | 56.8 | 54.5 | 54.9  | 52.0  | 41.0  | 32.3  | 22.3   |
| 23:30 - 23:45                                           | 58.0 | 75.8 | 72.9                              | 67.0 | 59.1 | 55.5 | 53.4 | 54.1  | 51.4  | 40.8  | 30.8  | 20.8   |
| 23:45 - 00:00                                           | 57.6 | 72.9 | 76.2                              | 69.3 | 60.2 | 55.8 | 53.4 | 53.5  | 50.5  | 40.4  | 32.1  | 23.7   |
| 00:00 - 00:15                                           | 56.8 | 73.1 | 75.2                              | 69.0 | 60.3 | 54.7 | 52.3 | 52.6  | 49.9  | 39.6  | 33.2  | 26.6   |
| 00:15 - 00:30                                           | 56.8 | 72.0 | 72.6                              | 65.9 | 62.8 | 56.2 | 52.6 | 52.1  | 49.3  | 41.3  | 33.6  | 24.0   |
| 00:30 - 00:45                                           | 56.5 | 75.5 | 75.0                              | 68.8 | 60.2 | 54.0 | 51.8 | 52.4  | 49.4  | 39.3  | 31.2  | 22.6   |
| 00:45 - 01:00                                           | 55.4 | 75.0 | 77.0                              | 70.4 | 61.7 | 54.1 | 51.3 | 50.5  | 47.5  | 39.1  | 32.4  | 24.8   |
| 01:00 - 01:15                                           | 58.5 | 75.6 | 77.2                              | 70.7 | 61.0 | 54.3 | 51.5 | 52.1  | 49.6  | 39.5  | 31.3  | 22.9   |
| 01:15 - 01:30                                           | 56.5 | 76.9 | 76.7                              | 70.4 | 61.6 | 55.2 | 51.8 | 51.5  | 49.4  | 41.2  | 34.6  | 25.7   |
| 01:30 - 01:45                                           | 52.5 | 73.5 | 76.0                              | 69.4 | 60.1 | 51.3 | 48.1 | 47.4  | 43.7  | 35.2  | 29.5  | 21.5   |
| 01:45 - 02:00                                           | 50.9 | 70.0 | 72.3                              | 65.0 | 55.4 | 49.2 | 46.7 | 46.4  | 43.4  | 34.9  | 28.3  | 19.5   |
| 02:00 - 02:15                                           | 53.9 | 74.4 | 76.4                              | 70.1 | 60.6 | 53.1 | 49.6 | 49.0  | 45.7  | 36.9  | 30.7  | 22.8   |
| 02:15 - 02:30                                           | 55.3 | 75.3 | 78.9                              | 73.2 | 66.5 | 56.5 | 50.5 | 48.0  | 44.3  | 37.7  | 32.5  | 24.9   |
| 02:30 - 02:45                                           | 52.2 | 70.0 | 74.6                              | 68.1 | 58.9 | 50.8 | 48.0 | 47.2  | 44.3  | 35.6  | 28.9  | 24.7   |
| 02:45 - 03:00                                           | 51.7 | 71.4 | 74.0                              | 67.5 | 58.9 | 50.4 | 47.2 | 46.5  | 43.7  | 35.1  | 29.0  | 20.8   |
| 03:00 - 03:15                                           | 54.5 | 73.7 | 77.9                              | 71.6 | 62.3 | 53.3 | 49.7 | 49.1  | 46.2  | 37.6  | 31.7  | 23.9   |
| 03:15 - 03:30                                           | 52.4 | 71.7 | 75.8                              | 69.0 | 59.7 | 51.2 | 48.4 | 47.2  | 43.6  | 36.8  | 31.2  | 22.8   |
| 03:30 - 03:45                                           | 60.1 | 88.5 | 78.4                              | 71.9 | 65.6 | 62.6 | 58.8 | 51.8  | 48.9  | 43.1  | 34.8  | 25.4   |
| 03:45 - 04:00                                           | 54.0 | 74.9 | 78.1                              | 71.3 | 61.9 | 52.6 | 49.4 | 48.2  | 45.8  | 38.2  | 33.1  | 25.6   |
| 04:00 - 04:15                                           | 52.4 | 73.3 | 77.8                              | 71.6 | 62.5 | 51.8 | 47.0 | 45.6  | 42.5  | 36.2  | 31.1  | 23.3   |
| 04:15 - 04:30                                           | 55.3 | 76.4 | 80.5                              | 74.7 | 65.8 | 55.4 | 50.8 | 47.5  | 44.7  | 40.1  | 35.1  | 27.0   |
| 04:30 - 04:45                                           | 54.0 | 75.0 | 78.1                              | 71.7 | 62.6 | 52.9 | 49.2 | 48.1  | 45.5  | 38.7  | 31.9  | 23.7   |
| 04:45 - 05:00                                           | 54.3 | 70.7 | 77.4                              | 70.8 | 62.1 | 53.9 | 49.9 | 48.6  | 45.6  | 39.0  | 36.1  | 42.0   |
| 05:00 - 05:15                                           | 55.9 | 73.2 | 73.2                              | 66.9 | 60.1 | 56.9 | 51.9 | 50.5  | 48.1  | 42.4  | 36.0  | 27.5   |
| 05:15 - 05:30                                           | 55.8 | 78.1 | 78.3                              | 72.2 | 63.3 | 54.9 | 51.1 | 50.6  | 47.7  | 39.6  | 32.7  | 24.4   |
| 05:30 - 05:45                                           | 56.5 | 75.1 | 77.0                              | 71.3 | 63.0 | 55.5 | 52.2 | 51.4  | 48.5  | 40.8  | 39.4  | 36.0   |
| 05:45 - 06:00                                           | 56.7 | 75.4 | 75.5                              | 69.1 | 60.7 | 54.4 | 52.1 | 52.1  | 49.6  | 43.4  | 36.2  | 25.7   |
| 06:00 - 06:15                                           | 58.8 | 75.4 | 73.9                              | 68.7 | 62.7 | 60.7 | 55.4 | 53.4  | 50.7  | 43.1  | 34.4  | 23.5   |
| 06:15 - 06:30                                           | 57.5 | 77.0 | 76.7                              | 70.8 | 63.7 | 54.9 | 52.6 | 52.8  | 50.4  | 41.2  | 34.3  | 25.7   |
| 06:30 - 06:45                                           | 58.2 | 75.9 | 74.2                              | 68.6 | 60.5 | 55.9 | 54.1 | 54.1  | 50.9  | 41.4  | 33.8  | 24.8   |
| 06:45 - 07:00                                           | 61.1 | 81.8 | 76.7                              | 71.0 | 63.6 | 59.3 | 56.6 | 56.5  | 54.4  | 46.4  | 39.7  | 30.3   |

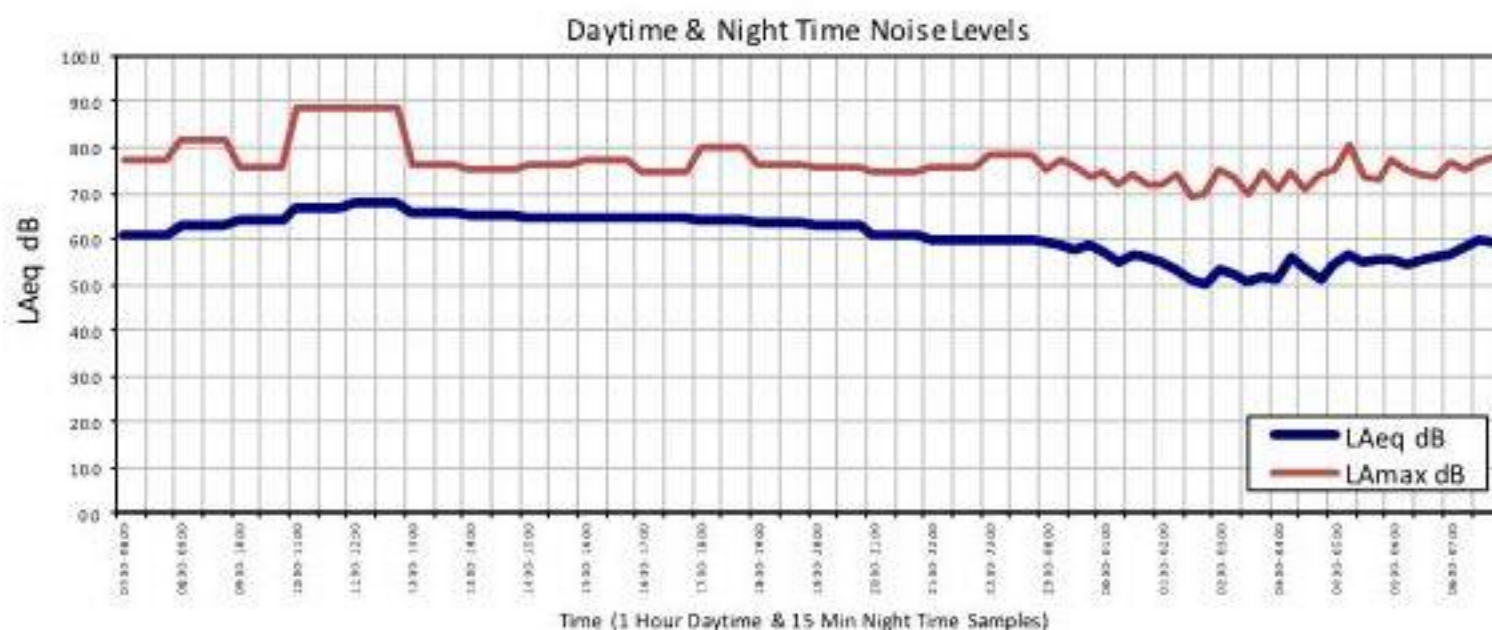


### 13.2 22<sup>nd</sup> – 23<sup>rd</sup> February 2020 Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                                               |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|--------------------------------------------------------------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                                                  | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>L<sub>Aeq</sub> 16 HOUR &amp; Corresponding L<sub>Amax</sub> 16 HOUR</small> | 64.1             | 88.7              | 71.9                              | 68.8 | 63.4 | 60.8 | 58.9 | 60.3 | 58.2 | 48.4 | 41.5 | 32.9  |
| NIGHTTIME 23:00 - 07:00<br><small>L<sub>Aeq</sub> 8 HOUR &amp; Corresponding L<sub>Amax</sub> 8 HOUR</small> | 56.0             | 80.7              | 75.1                              | 69.1 | 60.8 | 53.9 | 50.8 | 51.1 | 49.0 | 41.7 | 35.5 | 25.8  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |                  |                   |      |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------------------|-------------------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5 | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 60.6             | 77.4              | 76.3 | 70.6 | 62.8 | 57.9 | 56.1 | 56.6  | 53.8  | 43.6  | 35.4  | 26.4   |
| 08:00 - 09:00                                     | 63.1             | 81.8              | 77.6 | 72.5 | 65.4 | 60.5 | 58.5 | 59.0  | 56.6  | 46.3  | 37.5  | 31.4   |
| 09:00 - 10:00                                     | 64.2             | 75.7              | 75.7 | 71.0 | 65.0 | 61.5 | 58.3 | 60.3  | 57.8  | 47.2  | 37.9  | 28.1   |
| 10:00 - 11:00                                     | 66.9             | 88.7              | 75.2 | 70.7 | 64.6 | 62.6 | 60.8 | 63.1  | 61.1  | 50.8  | 42.9  | 34.6   |
| 11:00 - 12:00                                     | 68.0             | 88.6              | 71.2 | 69.7 | 63.8 | 62.0 | 60.7 | 63.7  | 62.9  | 55.1  | 49.3  | 42.3   |
| 12:00 - 13:00                                     | 65.7             | 76.2              | 66.7 | 68.3 | 63.0 | 61.8 | 60.0 | 61.7  | 60.0  | 50.5  | 42.1  | 31.5   |
| 13:00 - 14:00                                     | 64.9             | 75.2              | 69.5 | 68.6 | 63.5 | 61.3 | 59.7 | 61.1  | 58.8  | 48.3  | 38.9  | 27.6   |
| 14:00 - 15:00                                     | 64.7             | 76.3              | 70.1 | 69.0 | 64.5 | 62.0 | 60.1 | 60.9  | 58.2  | 47.2  | 37.4  | 27.5   |
| 15:00 - 16:00                                     | 64.4             | 77.5              | 69.3 | 68.2 | 63.7 | 61.6 | 59.8 | 60.7  | 57.8  | 46.8  | 36.9  | 26.1   |
| 16:00 - 17:00                                     | 64.4             | 74.4              | 69.5 | 68.9 | 64.1 | 61.7 | 59.7 | 60.6  | 57.9  | 47.0  | 37.6  | 28.1   |
| 17:00 - 18:00                                     | 64.2             | 79.7              | 67.2 | 68.7 | 64.2 | 61.3 | 59.5 | 60.3  | 57.9  | 47.1  | 38.0  | 28.0   |
| 18:00 - 19:00                                     | 63.6             | 76.4              | 64.5 | 66.1 | 61.9 | 60.1 | 58.1 | 59.7  | 57.6  | 47.3  | 42.6  | 32.7   |
| 19:00 - 20:00                                     | 62.8             | 75.8              | 65.2 | 65.7 | 61.2 | 59.5 | 57.7 | 59.0  | 56.7  | 46.1  | 35.8  | 25.9   |
| 20:00 - 21:00                                     | 60.9             | 74.9              | 66.3 | 64.7 | 59.7 | 57.7 | 56.0 | 57.0  | 54.6  | 44.1  | 37.2  | 29.4   |
| 21:00 - 22:00                                     | 59.8             | 75.5              | 66.1 | 63.8 | 60.8 | 57.8 | 56.0 | 56.7  | 53.4  | 43.1  | 44.7  | 31.6   |
| 22:00 - 23:00                                     | 59.6             | 78.6              | 61.8 | 61.1 | 61.8 | 59.9 | 55.3 | 55.2  | 52.5  | 41.7  | 32.4  | 21.0   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |                  |                   |      |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------------------|-------------------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5 | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 59.3             | 75.0              | 62.6 | 60.9 | 59.0 | 57.7 | 54.3 | 55.5  | 52.8  | 42.3  | 36.0  | 24.5   |
| 23:15 - 23:30                                           | 58.5             | 77.2              | 61.1 | 61.3 | 62.1 | 57.1 | 53.4 | 54.5  | 51.6  | 40.0  | 28.9  | 17.7   |
| 23:30 - 23:45                                           | 57.6             | 75.5              | 62.2 | 62.4 | 58.7 | 56.3 | 52.6 | 53.5  | 51.1  | 42.4  | 32.1  | 21.7   |
| 23:45 - 00:00                                           | 58.6             | 73.5              | 63.7 | 61.5 | 58.8 | 57.6 | 53.9 | 54.3  | 51.9  | 44.1  | 41.9  | 30.8   |
| 00:00 - 00:15                                           | 57.0             | 74.5              | 62.6 | 59.7 | 54.8 | 54.0 | 52.3 | 53.2  | 50.6  | 39.6  | 29.3  | 18.3   |
| 00:15 - 00:30                                           | 54.9             | 71.9              | 59.1 | 59.2 | 52.7 | 51.8 | 50.5 | 51.4  | 48.1  | 36.0  | 25.9  | 14.3   |
| 00:30 - 00:45                                           | 58.4             | 73.9              | 60.8 | 58.4 | 54.5 | 53.6 | 51.8 | 52.6  | 49.8  | 39.4  | 29.1  | 21.0   |
| 00:45 - 01:00                                           | 56.1             | 71.7              | 60.1 | 59.2 | 57.0 | 56.2 | 51.5 | 51.8  | 49.2  | 40.3  | 30.2  | 19.2   |
| 01:00 - 01:15                                           | 54.9             | 72.1              | 63.6 | 59.1 | 53.3 | 52.1 | 50.6 | 51.3  | 48.0  | 37.3  | 26.2  | 14.9   |
| 01:15 - 01:30                                           | 53.1             | 73.9              | 64.7 | 57.9 | 51.9 | 50.4 | 48.0 | 49.4  | 46.5  | 36.3  | 25.3  | 14.0   |
| 01:30 - 01:45                                           | 51.2             | 69.2              | 66.7 | 59.5 | 51.8 | 49.0 | 47.3 | 47.5  | 43.8  | 33.9  | 25.2  | 16.5   |
| 01:45 - 02:00                                           | 49.9             | 70.0              | 68.1 | 60.2 | 50.3 | 46.7 | 44.4 | 46.1  | 43.5  | 32.8  | 24.6  | 16.8   |
| 02:00 - 02:15                                           | 53.1             | 75.0              | 70.1 | 62.6 | 53.0 | 48.1 | 47.2 | 49.1  | 47.3  | 38.8  | 31.5  | 23.0   |
| 02:15 - 02:30                                           | 52.0             | 73.4              | 73.3 | 66.7 | 55.4 | 48.4 | 46.6 | 47.2  | 45.5  | 39.4  | 32.7  | 24.6   |
| 02:30 - 02:45                                           | 50.4             | 69.8              | 74.3 | 66.8 | 56.1 | 48.4 | 45.4 | 45.2  | 42.9  | 36.3  | 29.2  | 21.2   |
| 02:45 - 03:00                                           | 51.8             | 74.5              | 75.6 | 68.4 | 58.0 | 49.5 | 46.3 | 46.2  | 44.6  | 38.9  | 32.9  | 24.7   |
| 03:00 - 03:15                                           | 51.3             | 70.9              | 75.1 | 68.1 | 58.3 | 49.7 | 46.7 | 45.9  | 43.3  | 36.5  | 29.8  | 21.8   |
| 03:15 - 03:30                                           | 56.1             | 74.5              | 75.5 | 69.0 | 60.0 | 52.5 | 50.7 | 51.3  | 50.0  | 42.9  | 36.2  | 27.1   |
| 03:30 - 03:45                                           | 53.2             | 70.8              | 76.3 | 69.6 | 60.2 | 51.5 | 48.7 | 47.7  | 45.4  | 39.0  | 32.8  | 24.0   |
| 03:45 - 04:00                                           | 51.2             | 74.0              | 74.5 | 67.5 | 58.0 | 49.1 | 45.9 | 46.3  | 43.5  | 35.9  | 29.2  | 21.8   |
| 04:00 - 04:15                                           | 54.5             | 75.4              | 77.7 | 72.0 | 63.3 | 52.9 | 48.7 | 48.1  | 47.1  | 40.7  | 35.3  | 27.3   |
| 04:15 - 04:30                                           | 56.7             | 80.7              | 78.9 | 72.6 | 64.4 | 57.4 | 51.9 | 49.8  | 48.8  | 42.5  | 36.5  | 28.4   |
| 04:30 - 04:45                                           | 54.8             | 73.7              | 76.6 | 70.2 | 60.9 | 52.3 | 49.7 | 49.5  | 48.2  | 41.4  | 34.9  | 26.4   |
| 04:45 - 05:00                                           | 55.4             | 73.2              | 79.1 | 73.2 | 64.4 | 54.1 | 50.2 | 48.7  | 47.2  | 42.3  | 36.4  | 27.6   |
| 05:00 - 05:15                                           | 55.5             | 77.4              | 77.2 | 70.8 | 62.2 | 52.9 | 49.8 | 49.9  | 48.8  | 43.3  | 37.6  | 28.0   |
| 05:15 - 05:30                                           | 54.3             | 75.2              | 77.7 | 71.5 | 62.4 | 53.2 | 49.2 | 48.0  | 46.3  | 41.4  | 35.4  | 26.2   |
| 05:30 - 05:45                                           | 55.5             | 74.3              | 75.7 | 69.6 | 60.0 | 52.4 | 50.5 | 50.1  | 49.0  | 44.1  | 37.8  | 27.8   |
| 05:45 - 06:00                                           | 55.9             | 73.4              | 78.3 | 72.2 | 63.3 | 53.6 | 50.6 | 50.1  | 48.7  | 43.4  | 37.2  | 27.3   |
| 06:00 - 06:15                                           | 58.6             | 76.5              | 77.7 | 71.4 | 62.1 | 53.9 | 51.1 | 51.5  | 49.6  | 44.2  | 37.5  | 27.3   |
| 06:15 - 06:30                                           | 58.2             | 75.0              | 76.1 | 70.5 | 62.4 | 54.8 | 52.6 | 53.2  | 52.0  | 46.2  | 39.8  | 29.4   |
| 06:30 - 06:45                                           | 59.6             | 76.7              | 80.6 | 75.3 | 67.0 | 57.5 | 54.3 | 53.9  | 52.3  | 46.5  | 40.5  | 30.6   |
| 06:45 - 07:00                                           | 59.3             | 77.7              | 79.4 | 74.2 | 65.6 | 56.8 | 53.8 | 53.9  | 52.5  | 46.3  | 40.1  | 30.3   |



### 13.3 23<sup>rd</sup> – 24<sup>th</sup> February 2020 Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                                               |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|--------------------------------------------------------------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                                                  | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>L<sub>Aeq</sub> 16 HOUR &amp; Corresponding L<sub>Amax</sub> 16 HOUR</small> | 63.1             | 87.5              | 74.5                              | 69.8 | 63.4 | 59.7 | 57.9 | 59.1 | 56.9 | 47.2 | 39.1 | 28.8  |
| NIGHTTIME 23:00 - 07:00<br><small>L<sub>Aeq</sub> 8 HOUR &amp; Corresponding L<sub>Amax</sub> 8 HOUR</small> | 56.8             | 85.5              | 66.8                              | 61.9 | 56.5 | 54.7 | 51.7 | 52.6 | 50.7 | 42.7 | 35.5 | 25.7  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 60.1             | 79.5              | 60.2                              | 74.5 | 65.8 | 57.5 | 54.6 | 54.8  | 53.4  | 47.7  | 43.4  | 33.3   |
| 08:00 - 09:00                                     | 60.9             | 76.7              | 78.5                              | 73.1 | 65.0 | 57.6 | 55.3 | 56.4  | 54.5  | 46.9  | 40.3  | 29.5   |
| 09:00 - 10:00                                     | 63.1             | 76.5              | 78.4                              | 72.8 | 64.8 | 58.2 | 57.6 | 59.1  | 57.1  | 47.8  | 40.4  | 29.2   |
| 10:00 - 11:00                                     | 64.7             | 77.9              | 78.2                              | 73.0 | 65.5 | 60.9 | 58.2 | 60.7  | 58.7  | 48.7  | 40.4  | 29.7   |
| 11:00 - 12:00                                     | 65.0             | 74.5              | 75.6                              | 71.2 | 64.2 | 60.9 | 58.6 | 61.1  | 59.1  | 48.7  | 39.3  | 29.4   |
| 12:00 - 13:00                                     | 65.6             | 76.6              | 71.4                              | 69.0 | 62.9 | 61.5 | 60.2 | 61.5  | 59.7  | 51.4  | 44.0  | 34.0   |
| 13:00 - 14:00                                     | 65.0             | 79.0              | 72.8                              | 68.9 | 64.3 | 60.8 | 59.6 | 61.2  | 59.0  | 49.0  | 40.1  | 30.7   |
| 14:00 - 15:00                                     | 64.4             | 76.1              | 75.3                              | 70.4 | 63.4 | 60.7 | 59.4 | 60.8  | 58.0  | 47.2  | 37.4  | 27.0   |
| 15:00 - 16:00                                     | 65.2             | 87.5              | 74.0                              | 69.1 | 63.5 | 61.1 | 59.0 | 61.3  | 59.8  | 48.0  | 35.7  | 25.0   |
| 16:00 - 17:00                                     | 63.3             | 81.0              | 68.2                              | 67.1 | 64.5 | 61.3 | 59.1 | 59.4  | 56.5  | 45.8  | 37.4  | 25.6   |
| 17:00 - 18:00                                     | 62.6             | 74.4              | 63.9                              | 65.8 | 62.6 | 59.9 | 57.8 | 58.9  | 55.9  | 44.6  | 34.1  | 23.4   |
| 18:00 - 19:00                                     | 61.8             | 75.5              | 62.3                              | 64.9 | 60.0 | 59.3 | 57.1 | 58.1  | 55.2  | 43.8  | 33.4  | 23.3   |
| 19:00 - 20:00                                     | 61.1             | 77.8              | 61.3                              | 64.0 | 60.5 | 58.2 | 56.7 | 57.4  | 54.3  | 43.3  | 32.6  | 21.5   |
| 20:00 - 21:00                                     | 60.8             | 82.1              | 61.6                              | 63.5 | 61.7 | 59.0 | 56.9 | 56.7  | 53.8  | 44.1  | 34.3  | 22.8   |
| 21:00 - 22:00                                     | 58.9             | 75.8              | 58.9                              | 60.1 | 58.8 | 56.4 | 53.8 | 55.0  | 52.8  | 43.8  | 35.0  | 25.0   |
| 22:00 - 23:00                                     | 57.8             | 75.7              | 57.5                              | 59.4 | 58.4 | 54.7 | 52.6 | 53.6  | 51.7  | 44.1  | 36.6  | 26.9   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 56.9             | 74.7              | 56.6                              | 58.9 | 58.1 | 54.0 | 51.4 | 52.7  | 50.7  | 41.8  | 33.4  | 23.2   |
| 23:15 - 23:30                                           | 57.0             | 75.9              | 56.3                              | 57.2 | 53.3 | 52.7 | 51.2 | 53.1  | 51.2  | 42.3  | 33.9  | 24.8   |
| 23:30 - 23:45                                           | 54.5             | 72.0              | 53.2                              | 58.8 | 55.8 | 52.1 | 48.2 | 50.3  | 48.7  | 39.5  | 30.5  | 20.4   |
| 23:45 - 00:00                                           | 55.6             | 73.5              | 56.8                              | 59.4 | 59.5 | 58.3 | 51.2 | 50.0  | 47.9  | 41.6  | 39.1  | 25.6   |
| 00:00 - 00:15                                           | 52.5             | 74.9              | 51.3                              | 54.4 | 50.0 | 48.1 | 47.1 | 48.6  | 46.6  | 37.1  | 28.9  | 18.7   |
| 00:15 - 00:30                                           | 51.8             | 71.6              | 51.8                              | 54.7 | 53.5 | 52.9 | 46.8 | 47.1  | 44.9  | 37.1  | 34.4  | 20.5   |
| 00:30 - 00:45                                           | 49.0             | 69.9              | 51.8                              | 51.0 | 46.2 | 45.0 | 43.7 | 45.1  | 42.6  | 36.7  | 28.8  | 17.0   |
| 00:45 - 01:00                                           | 52.9             | 71.8              | 52.8                              | 53.1 | 52.9 | 50.9 | 47.8 | 48.7  | 46.5  | 39.5  | 30.7  | 20.1   |
| 01:00 - 01:15                                           | 52.0             | 73.3              | 52.3                              | 54.3 | 48.1 | 46.7 | 46.0 | 47.8  | 46.4  | 38.9  | 32.0  | 21.9   |
| 01:15 - 01:30                                           | 47.7             | 73.8              | 55.0                              | 51.3 | 46.5 | 43.5 | 41.6 | 44.0  | 41.6  | 32.7  | 25.3  | 16.1   |
| 01:30 - 01:45                                           | 45.5             | 71.3              | 55.6                              | 50.0 | 45.9 | 41.7 | 40.1 | 40.9  | 39.8  | 31.2  | 24.3  | 13.7   |
| 01:45 - 02:00                                           | 42.7             | 64.8              | 55.3                              | 48.6 | 45.8 | 41.7 | 39.5 | 38.0  | 35.2  | 27.6  | 20.4  | 9.7    |
| 02:00 - 02:15                                           | 46.4             | 66.2              | 55.8                              | 52.0 | 50.6 | 47.5 | 43.4 | 40.9  | 38.1  | 33.1  | 22.8  | 12.1   |
| 02:15 - 02:30                                           | 49.3             | 73.5              | 54.9                              | 52.0 | 45.5 | 43.5 | 42.7 | 45.2  | 43.7  | 36.8  | 30.0  | 20.9   |
| 02:30 - 02:45                                           | 48.7             | 73.6              | 52.1                              | 48.3 | 44.1 | 42.6 | 42.3 | 44.9  | 43.2  | 34.9  | 28.0  | 19.4   |
| 02:45 - 03:00                                           | 48.8             | 75.2              | 51.6                              | 50.4 | 44.5 | 43.3 | 43.0 | 45.0  | 43.0  | 34.7  | 28.1  | 20.3   |
| 03:00 - 03:15                                           | 39.5             | 64.0              | 51.1                              | 46.7 | 42.9 | 38.8 | 35.2 | 35.7  | 31.5  | 26.0  | 20.1  | 15.0   |
| 03:15 - 03:30                                           | 51.3             | 77.2              | 55.1                              | 54.0 | 55.3 | 50.5 | 48.2 | 46.0  | 45.0  | 39.1  | 32.0  | 23.1   |
| 03:30 - 03:45                                           | 47.5             | 70.0              | 53.8                              | 51.2 | 44.5 | 42.5 | 41.9 | 43.0  | 41.6  | 36.4  | 29.5  | 20.8   |
| 03:45 - 04:00                                           | 50.0             | 71.9              | 52.6                              | 53.3 | 47.2 | 45.6 | 44.5 | 45.6  | 43.8  | 38.9  | 32.2  | 22.2   |
| 04:00 - 04:15                                           | 50.2             | 74.4              | 51.4                              | 50.7 | 47.3 | 44.9 | 44.1 | 45.5  | 44.5  | 39.5  | 33.8  | 25.6   |
| 04:15 - 04:30                                           | 51.7             | 74.3              | 59.4                              | 55.4 | 52.3 | 48.0 | 46.9 | 46.4  | 45.4  | 41.6  | 34.6  | 25.0   |
| 04:30 - 04:45                                           | 52.7             | 72.3              | 54.1                              | 56.9 | 54.3 | 50.1 | 47.6 | 47.9  | 46.6  | 41.0  | 33.7  | 25.1   |
| 04:45 - 05:00                                           | 53.7             | 74.5              | 64.7                              | 58.0 | 50.9 | 48.4 | 48.0 | 49.8  | 47.8  | 41.1  | 34.8  | 26.1   |
| 05:00 - 05:15                                           | 57.5             | 74.2              | 70.6                              | 64.4 | 58.3 | 52.8 | 51.7 | 53.1  | 51.6  | 44.8  | 37.6  | 28.1   |
| 05:15 - 05:30                                           | 58.6             | 74.8              | 70.7                              | 64.3 | 56.5 | 54.2 | 53.2 | 54.3  | 52.7  | 45.3  | 38.7  | 29.0   |
| 05:30 - 05:45                                           | 60.8             | 76.8              | 72.2                              | 67.0 | 60.2 | 56.9 | 55.5 | 56.5  | 54.9  | 47.6  | 40.2  | 30.7   |
| 05:45 - 06:00                                           | 61.2             | 76.0              | 73.7                              | 68.1 | 60.5 | 57.0 | 55.7 | 57.2  | 55.2  | 47.4  | 40.4  | 30.6   |
| 06:00 - 06:15                                           | 62.7             | 85.5              | 71.0                              | 66.3 | 63.7 | 65.2 | 58.8 | 57.0  | 55.2  | 47.7  | 40.7  | 31.0   |
| 06:15 - 06:30                                           | 62.8             | 74.8              | 72.8                              | 67.3 | 60.4 | 58.3 | 57.1 | 58.6  | 56.7  | 48.1  | 40.3  | 30.4   |
| 06:30 - 06:45                                           | 63.1             | 75.8              | 74.9                              | 69.4 | 61.5 | 59.1 | 57.9 | 59.1  | 57.1  | 47.2  | 38.7  | 28.4   |
| 06:45 - 07:00                                           | 63.7             | 80.3              | 72.1                              | 68.3 | 63.0 | 58.7 | 58.5 | 58.6  | 57.8  | 48.6  | 40.5  | 30.8   |

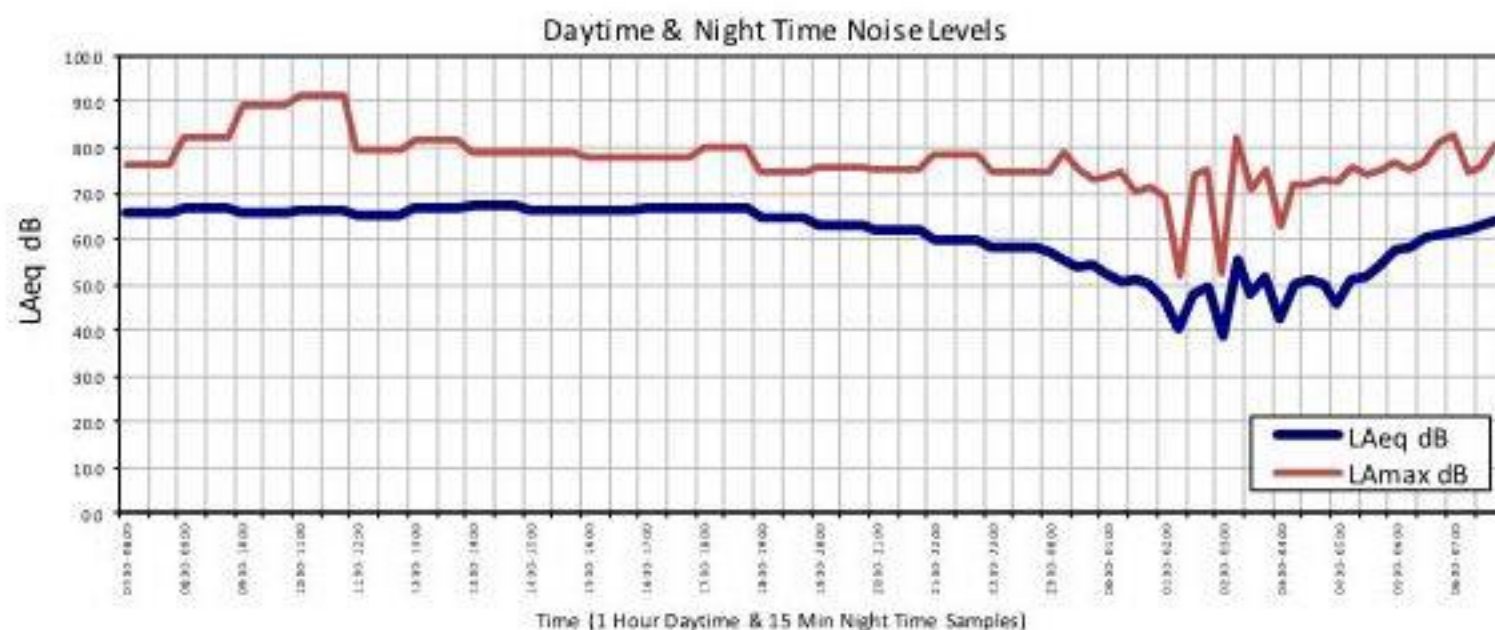


24<sup>th</sup> – 25<sup>th</sup> February 2020 Position 1

| NOISE LEVEL SUMMARY ASSESSMENT                                                         |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|----------------------------------------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                            | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>LAeq 16 HOUR &amp; Corresponding LAmaz 16 HOUR</small> | 65.4 | 91.4  | 74.4                              | 70.5 | 64.0 | 61.7 | 59.6 | 60.9 | 59.8 | 52.6 | 45.4 | 36.4  |
| NIGHTTIME 23:00 - 07:00<br><small>LAeq 8 HOUR &amp; Corresponding LAmaz 8 HOUR</small> | 56.6 | 82.5  | 62.8                              | 61.7 | 56.3 | 54.4 | 52.1 | 52.6 | 50.1 | 40.1 | 31.7 | 22.5  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 66.0 | 76.1  | 77.6                              | 73.2 | 67.4 | 62.6 | 60.7 | 61.6  | 60.1  | 50.9  | 43.0  | 34.0   |
| 08:00 - 09:00                                     | 66.8 | 82.3  | 78.0                              | 73.7 | 67.1 | 63.6 | 61.5 | 62.4  | 61.1  | 52.0  | 44.2  | 35.3   |
| 09:00 - 10:00                                     | 65.8 | 89.1  | 77.5                              | 72.7 | 64.7 | 62.3 | 60.1 | 61.2  | 60.3  | 52.8  | 45.5  | 35.4   |
| 10:00 - 11:00                                     | 66.5 | 91.4  | 76.6                              | 72.0 | 64.7 | 61.8 | 59.8 | 62.1  | 61.1  | 52.6  | 45.4  | 37.8   |
| 11:00 - 12:00                                     | 65.1 | 79.6  | 76.3                              | 71.5 | 63.9 | 61.5 | 59.4 | 60.7  | 59.5  | 51.6  | 44.2  | 34.5   |
| 12:00 - 13:00                                     | 66.7 | 81.5  | 74.7                              | 70.8 | 63.9 | 62.4 | 60.4 | 61.4  | 61.4  | 56.5  | 49.9  | 41.0   |
| 13:00 - 14:00                                     | 67.3 | 78.8  | 73.6                              | 69.7 | 62.7 | 61.4 | 58.9 | 61.2  | 62.3  | 58.8  | 52.2  | 43.4   |
| 14:00 - 15:00                                     | 66.2 | 78.9  | 73.7                              | 71.2 | 63.7 | 62.3 | 60.0 | 61.1  | 60.9  | 55.5  | 48.5  | 39.4   |
| 15:00 - 16:00                                     | 66.1 | 77.6  | 74.3                              | 70.7 | 63.9 | 62.3 | 60.3 | 61.8  | 60.5  | 51.4  | 43.4  | 33.6   |
| 16:00 - 17:00                                     | 66.6 | 78.0  | 73.3                              | 71.1 | 65.7 | 63.6 | 61.1 | 62.4  | 60.9  | 51.2  | 43.7  | 34.5   |
| 17:00 - 18:00                                     | 66.7 | 80.2  | 72.2                              | 70.1 | 64.9 | 64.3 | 61.6 | 62.5  | 60.7  | 50.8  | 41.9  | 34.0   |
| 18:00 - 19:00                                     | 64.6 | 74.8  | 70.8                              | 68.5 | 62.5 | 60.6 | 59.1 | 60.7  | 58.8  | 48.3  | 38.6  | 28.4   |
| 19:00 - 20:00                                     | 63.2 | 75.7  | 68.2                              | 66.2 | 60.9 | 59.3 | 57.9 | 59.4  | 57.3  | 46.6  | 36.3  | 26.5   |
| 20:00 - 21:00                                     | 61.7 | 75.4  | 67.9                              | 64.9 | 59.9 | 58.6 | 58.5 | 57.8  | 55.6  | 45.1  | 34.6  | 23.6   |
| 21:00 - 22:00                                     | 59.5 | 78.3  | 66.8                              | 63.1 | 60.2 | 57.1 | 54.9 | 55.7  | 53.0  | 42.2  | 31.6  | 20.6   |
| 22:00 - 23:00                                     | 58.4 | 74.6  | 61.4                              | 60.3 | 57.5 | 55.5 | 53.6 | 54.6  | 52.0  | 41.3  | 31.0  | 19.8   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |      |       | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------|-------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | LAeq | LAmaz | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 57.3 | 74.5  | 60.9                              | 58.6 | 59.4 | 54.4 | 52.3 | 53.3  | 50.7  | 40.6  | 30.5  | 19.4   |
| 23:15 - 23:30                                           | 55.6 | 78.7  | 62.7                              | 59.0 | 55.3 | 53.5 | 50.6 | 51.7  | 49.1  | 38.9  | 28.1  | 15.3   |
| 23:30 - 23:45                                           | 53.7 | 74.9  | 61.7                              | 57.2 | 54.3 | 52.1 | 49.3 | 49.3  | 47.3  | 39.3  | 31.7  | 21.2   |
| 23:45 - 00:00                                           | 54.5 | 72.9  | 58.4                              | 58.2 | 54.5 | 52.6 | 50.3 | 50.6  | 47.8  | 38.3  | 27.8  | 16.2   |
| 00:00 - 00:15                                           | 52.0 | 73.7  | 56.6                              | 53.0 | 51.3 | 49.8 | 48.0 | 48.2  | 45.0  | 34.2  | 25.4  | 14.4   |
| 00:15 - 00:30                                           | 50.8 | 74.5  | 53.2                              | 53.2 | 51.4 | 49.0 | 47.1 | 46.9  | 43.6  | 35.0  | 23.5  | 11.6   |
| 00:30 - 00:45                                           | 51.2 | 70.3  | 59.3                              | 56.6 | 53.5 | 49.6 | 48.4 | 47.1  | 44.2  | 35.9  | 25.5  | 14.9   |
| 00:45 - 01:00                                           | 50.0 | 71.5  | 59.9                              | 54.3 | 48.8 | 46.0 | 45.1 | 46.6  | 43.7  | 31.4  | 20.1  | 10.1   |
| 01:00 - 01:15                                           | 47.0 | 69.0  | 58.9                              | 52.7 | 46.7 | 45.2 | 44.1 | 42.9  | 39.4  | 29.4  | 20.3  | 11.6   |
| 01:15 - 01:30                                           | 40.5 | 51.9  | 58.4                              | 50.8 | 43.7 | 37.1 | 37.6 | 37.9  | 28.7  | 14.6  | 10.3  | 7.0    |
| 01:30 - 01:45                                           | 47.7 | 74.1  | 63.7                              | 55.6 | 46.1 | 42.4 | 42.5 | 43.9  | 41.8  | 30.8  | 20.7  | 10.9   |
| 01:45 - 02:00                                           | 49.3 | 75.1  | 62.9                              | 55.5 | 50.3 | 47.1 | 45.5 | 45.3  | 42.4  | 32.0  | 21.6  | 12.0   |
| 02:00 - 02:15                                           | 38.6 | 52.6  | 63.7                              | 54.1 | 43.9 | 35.4 | 35.4 | 35.4  | 26.1  | 16.2  | 12.4  | 9.5    |
| 02:15 - 02:30                                           | 55.7 | 82.2  | 56.6                              | 57.0 | 62.3 | 59.8 | 55.4 | 46.2  | 44.1  | 35.4  | 29.2  | 21.6   |
| 02:30 - 02:45                                           | 48.1 | 70.6  | 63.8                              | 54.9 | 46.4 | 44.6 | 44.0 | 44.4  | 41.1  | 30.4  | 20.6  | 12.7   |
| 02:45 - 03:00                                           | 51.5 | 75.2  | 62.1                              | 55.8 | 52.1 | 49.8 | 49.5 | 46.6  | 43.8  | 35.4  | 27.3  | 17.4   |
| 03:00 - 03:15                                           | 42.4 | 62.9  | 62.8                              | 53.8 | 44.3 | 40.1 | 38.9 | 38.7  | 34.1  | 24.5  | 15.9  | 9.2    |
| 03:15 - 03:30                                           | 49.8 | 72.0  | 63.9                              | 57.3 | 47.8 | 45.5 | 45.7 | 48.2  | 42.9  | 32.7  | 23.0  | 12.9   |
| 03:30 - 03:45                                           | 51.2 | 71.9  | 63.0                              | 56.6 | 54.3 | 50.4 | 46.9 | 46.1  | 44.3  | 40.0  | 28.8  | 19.1   |
| 03:45 - 04:00                                           | 49.9 | 73.2  | 59.9                              | 61.8 | 51.8 | 47.2 | 45.6 | 46.1  | 42.9  | 32.6  | 23.8  | 12.8   |
| 04:00 - 04:15                                           | 45.7 | 72.6  | 60.7                              | 51.8 | 43.9 | 40.2 | 41.4 | 42.7  | 38.3  | 25.6  | 15.2  | 8.6    |
| 04:15 - 04:30                                           | 51.0 | 75.6  | 58.6                              | 56.2 | 50.9 | 47.5 | 46.5 | 47.4  | 44.2  | 34.7  | 29.7  | 24.7   |
| 04:30 - 04:45                                           | 51.5 | 74.3  | 58.7                              | 53.4 | 50.2 | 48.1 | 46.8 | 47.8  | 45.0  | 35.9  | 25.7  | 15.7   |
| 04:45 - 05:00                                           | 54.4 | 75.0  | 62.0                              | 58.2 | 54.1 | 51.1 | 50.6 | 50.3  | 47.7  | 37.6  | 28.7  | 22.1   |
| 05:00 - 05:15                                           | 57.4 | 76.7  | 62.1                              | 60.3 | 58.9 | 54.7 | 53.8 | 53.4  | 50.5  | 40.3  | 29.5  | 17.4   |
| 05:15 - 05:30                                           | 58.1 | 75.3  | 63.1                              | 61.7 | 57.2 | 54.9 | 53.6 | 54.2  | 51.7  | 42.5  | 35.4  | 30.1   |
| 05:30 - 05:45                                           | 60.1 | 76.6  | 62.9                              | 64.9 | 59.0 | 56.4 | 55.2 | 56.4  | 53.7  | 43.6  | 35.0  | 29.9   |
| 05:45 - 06:00                                           | 61.0 | 81.2  | 68.8                              | 64.0 | 58.1 | 57.1 | 56.1 | 57.3  | 54.5  | 44.7  | 39.0  | 30.6   |
| 06:00 - 06:15                                           | 61.3 | 82.5  | 62.9                              | 63.3 | 61.4 | 62.9 | 57.1 | 58.7  | 54.0  | 44.8  | 34.3  | 21.8   |
| 06:15 - 06:30                                           | 61.9 | 74.4  | 65.5                              | 64.8 | 59.1 | 58.0 | 57.0 | 58.4  | 55.6  | 44.7  | 35.4  | 24.3   |
| 06:30 - 06:45                                           | 62.9 | 75.9  | 67.5                              | 72.1 | 61.8 | 59.4 | 57.8 | 59.0  | 56.7  | 46.3  | 36.7  | 26.8   |
| 06:45 - 07:00                                           | 64.2 | 80.5  | 67.2                              | 68.5 | 62.0 | 60.3 | 58.9 | 60.3  | 58.4  | 47.6  | 36.8  | 24.7   |



13.4 21<sup>st</sup> – 22<sup>nd</sup> February 2020 Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                                               |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|--------------------------------------------------------------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                                                  | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>L<sub>Aeq</sub> 16 HOUR &amp; Corresponding L<sub>Amax</sub> 16 HOUR</small> | 65.9             | 88.4              | 75.6                              | 69.1 | 62.6 | 61.0 | 60.1 | 62.3 | 59.9 | 51.8 | 46.9 | 37.8  |
| NIGHTTIME 23:00 - 07:00<br><small>L<sub>Aeq</sub> 8 HOUR &amp; Corresponding L<sub>Amax</sub> 8 HOUR</small> | 63.0             | 94.3              | 80.8                              | 74.2 | 66.1 | 60.2 | 57.2 | 58.2 | 56.5 | 49.6 | 50.3 | 45.8  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 65.4             | 86.3              | 60.8                              | 62.3 | 60.1 | 59.9 | 60.3 | 62.0  | 59.0  | 51.2  | 44.0  | 35.7   |
| 08:00 - 09:00                                     | 66.2             | 86.3              | 61.6                              | 61.6 | 60.5 | 61.2 | 60.8 | 62.1  | 60.2  | 52.4  | 54.5  | 44.7   |
| 09:00 - 10:00                                     | 64.7             | 85.4              | 62.9                              | 61.0 | 59.4 | 60.0 | 59.3 | 61.0  | 58.7  | 51.0  | 43.0  | 31.8   |
| 10:00 - 11:00                                     | 66.0             | 86.3              | 61.9                              | 61.7 | 60.4 | 60.9 | 59.9 | 62.3  | 60.2  | 51.0  | 44.1  | 34.0   |
| 11:00 - 12:00                                     | 65.8             | 87.0              | 70.9                              | 65.5 | 60.9 | 60.3 | 59.9 | 62.2  | 59.9  | 51.5  | 44.4  | 34.4   |
| 12:00 - 13:00                                     | 65.7             | 84.8              | 76.3                              | 69.6 | 62.7 | 61.0 | 60.0 | 62.2  | 59.5  | 51.4  | 43.0  | 30.4   |
| 13:00 - 14:00                                     | 66.2             | 87.2              | 76.5                              | 70.0 | 63.3 | 61.4 | 60.3 | 62.4  | 60.4  | 51.8  | 44.7  | 41.6   |
| 14:00 - 15:00                                     | 65.9             | 85.0              | 76.9                              | 70.4 | 63.2 | 60.9 | 60.4 | 62.2  | 59.7  | 51.8  | 46.1  | 37.7   |
| 15:00 - 16:00                                     | 66.3             | 88.4              | 74.5                              | 67.8 | 62.3 | 61.4 | 60.5 | 63.2  | 59.9  | 52.1  | 44.5  | 35.6   |
| 16:00 - 17:00                                     | 66.5             | 87.0              | 75.5                              | 69.0 | 62.3 | 60.9 | 60.3 | 62.9  | 60.8  | 51.8  | 43.8  | 32.9   |
| 17:00 - 18:00                                     | 67.2             | 85.6              | 78.2                              | 71.6 | 64.4 | 62.0 | 61.2 | 63.5  | 61.3  | 53.0  | 45.5  | 34.3   |
| 18:00 - 19:00                                     | 65.6             | 86.4              | 76.9                              | 70.2 | 62.8 | 60.5 | 59.5 | 62.2  | 59.3  | 51.3  | 48.5  | 40.8   |
| 19:00 - 20:00                                     | 65.6             | 88.3              | 74.0                              | 67.3 | 61.3 | 60.5 | 59.6 | 62.1  | 59.6  | 51.8  | 43.7  | 35.8   |
| 20:00 - 21:00                                     | 66.8             | 86.6              | 78.1                              | 71.4 | 64.4 | 62.4 | 61.0 | 63.0  | 60.9  | 52.8  | 49.0  | 37.3   |
| 21:00 - 22:00                                     | 65.5             | 86.7              | 79.4                              | 72.7 | 64.9 | 61.1 | 59.7 | 61.4  | 59.5  | 52.0  | 45.1  | 36.0   |
| 22:00 - 23:00                                     | 64.5             | 86.6              | 78.4                              | 71.6 | 63.9 | 60.4 | 58.4 | 60.7  | 58.4  | 50.5  | 43.5  | 34.7   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 61.1             | 84.5              | 78.3                              | 71.7 | 64.7 | 59.0 | 55.3 | 57.1  | 54.4  | 46.5  | 39.5  | 29.1   |
| 23:15 - 23:30                                           | 67.2             | 87.8              | 75.6                              | 69.4 | 63.4 | 62.5 | 61.3 | 62.5  | 62.0  | 54.5  | 45.9  | 36.0   |
| 23:30 - 23:45                                           | 62.1             | 82.8              | 77.6                              | 70.9 | 63.0 | 58.4 | 56.8 | 58.0  | 55.7  | 49.3  | 40.6  | 28.5   |
| 23:45 - 00:00                                           | 64.7             | 85.1              | 80.7                              | 73.9 | 66.0 | 61.5 | 59.3 | 60.5  | 58.6  | 50.7  | 45.9  | 38.0   |
| 00:00 - 00:15                                           | 62.6             | 85.4              | 81.0                              | 74.4 | 65.9 | 61.1 | 55.7 | 58.6  | 56.4  | 47.6  | 41.2  | 30.7   |
| 00:15 - 00:30                                           | 64.4             | 84.6              | 77.8                              | 71.1 | 63.4 | 60.3 | 58.7 | 60.4  | 58.4  | 50.7  | 44.2  | 34.5   |
| 00:30 - 00:45                                           | 58.1             | 76.5              | 80.0                              | 73.1 | 64.7 | 58.3 | 52.8 | 51.8  | 50.9  | 46.1  | 39.0  | 29.2   |
| 00:45 - 01:00                                           | 63.9             | 84.8              | 82.4                              | 75.4 | 67.6 | 61.4 | 59.1 | 59.5  | 57.7  | 50.0  | 44.1  | 38.9   |
| 01:00 - 01:15                                           | 62.6             | 81.4              | 82.0                              | 75.5 | 66.4 | 59.4 | 56.9 | 59.0  | 55.1  | 47.9  | 41.1  | 32.0   |
| 01:15 - 01:30                                           | 62.1             | 81.8              | 81.7                              | 74.7 | 66.4 | 59.4 | 55.5 | 56.6  | 56.1  | 51.0  | 42.2  | 31.7   |
| 01:30 - 01:45                                           | 53.6             | 73.3              | 80.0                              | 73.2 | 63.8 | 54.6 | 47.5 | 46.0  | 42.4  | 39.8  | 36.1  | 27.8   |
| 01:45 - 02:00                                           | 51.6             | 70.2              | 77.8                              | 70.3 | 60.7 | 52.6 | 45.9 | 45.0  | 40.9  | 37.4  | 33.7  | 25.3   |
| 02:00 - 02:15                                           | 55.9             | 76.3              | 82.3                              | 75.6 | 66.5 | 57.5 | 50.2 | 46.8  | 44.1  | 42.1  | 38.5  | 30.2   |
| 02:15 - 02:30                                           | 56.3             | 79.0              | 82.4                              | 75.6 | 67.4 | 57.8 | 50.5 | 47.1  | 44.4  | 42.2  | 38.9  | 30.9   |
| 02:30 - 02:45                                           | 53.4             | 70.8              | 79.6                              | 72.8 | 63.3 | 54.5 | 47.8 | 45.7  | 42.3  | 39.6  | 35.8  | 27.5   |
| 02:45 - 03:00                                           | 50.7             | 72.6              | 75.9                              | 68.8 | 59.8 | 51.4 | 45.2 | 44.5  | 40.2  | 36.1  | 32.1  | 23.9   |
| 03:00 - 03:15                                           | 54.8             | 74.3              | 81.0                              | 74.5 | 65.1 | 56.1 | 49.1 | 46.3  | 43.3  | 41.0  | 37.3  | 29.1   |
| 03:15 - 03:30                                           | 55.1             | 75.1              | 81.3                              | 74.3 | 65.6 | 56.5 | 49.6 | 46.8  | 43.6  | 41.2  | 37.5  | 29.2   |
| 03:30 - 03:45                                           | 56.2             | 77.7              | 82.4                              | 75.8 | 66.7 | 57.6 | 50.9 | 47.3  | 44.5  | 42.1  | 38.5  | 30.5   |
| 03:45 - 04:00                                           | 57.3             | 79.0              | 83.2                              | 76.9 | 68.2 | 58.8 | 51.8 | 47.8  | 45.3  | 43.4  | 40.2  | 32.6   |
| 04:00 - 04:15                                           | 54.2             | 75.6              | 80.6                              | 73.4 | 64.6 | 55.8 | 48.4 | 45.6  | 42.9  | 40.6  | 36.7  | 28.4   |
| 04:15 - 04:30                                           | 62.4             | 84.5              | 85.1                              | 78.2 | 69.5 | 60.9 | 57.3 | 57.3  | 54.4  | 48.6  | 43.0  | 33.9   |
| 04:30 - 04:45                                           | 63.2             | 85.0              | 83.4                              | 77.2 | 69.4 | 61.7 | 57.0 | 58.7  | 56.1  | 49.8  | 42.2  | 32.6   |
| 04:45 - 05:00                                           | 64.6             | 85.2              | 82.3                              | 76.2 | 68.5 | 61.2 | 58.2 | 59.7  | 58.0  | 51.1  | 51.8  | 58.7   |
| 05:00 - 05:15                                           | 68.8             | 94.3              | 80.2                              | 74.1 | 67.4 | 64.9 | 62.3 | 62.0  | 62.2  | 57.3  | 63.4  | 54.0   |
| 05:15 - 05:30                                           | 65.0             | 85.5              | 82.9                              | 76.6 | 68.7 | 62.9 | 58.6 | 60.9  | 58.8  | 50.2  | 43.7  | 33.1   |
| 05:30 - 05:45                                           | 66.8             | 86.1              | 74.6                              | 68.7 | 64.1 | 61.6 | 60.9 | 62.2  | 60.6  | 52.9  | 58.2  | 52.2   |
| 05:45 - 06:00                                           | 61.7             | 83.9              | 80.0                              | 73.5 | 66.2 | 58.0 | 55.4 | 58.0  | 55.1  | 46.6  | 41.3  | 37.0   |
| 06:00 - 06:15                                           | 69.3             | 87.2              | 78.2                              | 72.3 | 67.1 | 66.9 | 64.3 | 64.7  | 63.3  | 55.9  | 48.3  | 35.5   |
| 06:15 - 06:30                                           | 53.4             | 71.0              | 77.0                              | 70.1 | 60.9 | 51.8 | 47.4 | 49.2  | 44.3  | 38.4  | 34.2  | 26.0   |
| 06:30 - 06:45                                           | 64.6             | 85.9              | 75.6                              | 68.7 | 61.6 | 58.3 | 60.1 | 60.8  | 58.5  | 50.7  | 43.7  | 33.4   |
| 06:45 - 07:00                                           | 62.9             | 84.2              | 81.3                              | 75.0 | 66.7 | 60.8 | 57.4 | 58.9  | 55.9  | 47.7  | 42.4  | 32.2   |



13.5 22<sup>nd</sup> – 23<sup>rd</sup> February 2020 Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                                               |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|--------------------------------------------------------------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                                                  | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>L<sub>Aeq</sub> 16 HOUR &amp; Corresponding L<sub>Amax</sub> 16 HOUR</small> | 65.5             | 92.2              | 73.0                              | 67.0 | 61.7 | 60.7 | 59.5 | 61.4 | 59.6 | 51.5 | 52.7 | 46.3  |
| NIGHTTIME 23:00 - 07:00<br><small>L<sub>Aeq</sub> 8 HOUR &amp; Corresponding L<sub>Amax</sub> 8 HOUR</small> | 60.5             | 89.9              | 78.3                              | 71.5 | 63.5 | 57.8 | 54.4 | 55.7 | 54.3 | 46.9 | 45.1 | 34.3  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |                  |                   |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | L <sub>Aeq</sub> | L <sub>Amax</sub> | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|                                                   |                  |                   | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 63.2             | 84.6              | 77.8                              | 71.3 | 63.2 | 58.7 | 57.5 | 59.5  | 56.9  | 49.4  | 41.8  | 31.8   |
| 08:00 - 09:00                                     | 64.9             | 84.5              | 79.6                              | 73.0 | 65.1 | 60.7 | 59.3 | 60.9  | 59.0  | 51.3  | 43.4  | 35.7   |
| 09:00 - 10:00                                     | 65.7             | 85.4              | 78.2                              | 71.9 | 64.7 | 61.2 | 58.9 | 61.9  | 59.7  | 51.7  | 44.8  | 35.9   |
| 10:00 - 11:00                                     | 67.1             | 86.1              | 77.3                              | 70.2 | 64.2 | 62.7 | 61.5 | 63.4  | 61.0  | 52.8  | 45.2  | 33.7   |
| 11:00 - 12:00                                     | 67.6             | 80.6              | 68.5                              | 64.7 | 61.0 | 60.9 | 60.2 | 62.7  | 60.9  | 53.0  | 42.6  | 37.6   |
| 12:00 - 13:00                                     | 65.4             | 87.9              | 61.4                              | 61.0 | 59.5 | 61.0 | 59.8 | 61.1  | 60.1  | 51.5  | 42.7  | 29.4   |
| 13:00 - 14:00                                     | 65.0             | 84.6              | 70.6                              | 65.2 | 60.8 | 60.2 | 59.1 | 61.4  | 59.2  | 50.8  | 42.7  | 29.5   |
| 14:00 - 15:00                                     | 66.0             | 84.8              | 69.3                              | 64.3 | 61.7 | 60.9 | 59.9 | 62.3  | 60.1  | 52.0  | 44.0  | 34.8   |
| 15:00 - 16:00                                     | 64.7             | 83.9              | 66.0                              | 61.8 | 59.6 | 60.0 | 59.1 | 60.8  | 58.8  | 51.2  | 43.9  | 34.3   |
| 16:00 - 17:00                                     | 66.1             | 86.7              | 63.8                              | 62.1 | 60.5 | 61.2 | 59.9 | 62.2  | 60.4  | 51.7  | 48.9  | 41.6   |
| 17:00 - 18:00                                     | 64.8             | 86.2              | 60.5                              | 60.2 | 59.0 | 60.0 | 59.0 | 60.7  | 59.0  | 51.6  | 48.5  | 41.3   |
| 18:00 - 19:00                                     | 64.6             | 86.2              | 64.7                              | 62.0 | 60.6 | 60.9 | 58.9 | 60.7  | 58.7  | 50.8  | 43.2  | 31.1   |
| 19:00 - 20:00                                     | 66.1             | 86.5              | 64.7                              | 63.9 | 61.7 | 61.3 | 60.2 | 62.3  | 60.2  | 52.0  | 44.5  | 45.4   |
| 20:00 - 21:00                                     | 65.3             | 86.7              | 62.6                              | 60.2 | 59.7 | 60.4 | 59.4 | 61.3  | 59.4  | 51.9  | 52.6  | 42.0   |
| 21:00 - 22:00                                     | 65.9             | 92.2              | 63.4                              | 60.4 | 59.7 | 61.0 | 59.0 | 60.1  | 60.9  | 51.9  | 57.7  | 42.4   |
| 22:00 - 23:00                                     | 62.4             | 84.2              | 63.6                              | 58.7 | 57.6 | 58.1 | 56.6 | 58.7  | 56.5  | 48.5  | 39.9  | 25.8   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |                  |                   |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | L <sub>Aeq</sub> | L <sub>Amax</sub> | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |       |        |
|                                                         |                  |                   | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 63.9             | 85.8              | 63.7                              | 59.5 | 60.2 | 60.9 | 58.7 | 59.1  | 58.6  | 50.9  | 51.0  | 38.7   |
| 23:15 - 23:30                                           | 59.2             | 84.9              | 58.1                              | 54.5 | 54.6 | 58.1 | 52.5 | 56.1  | 52.7  | 43.4  | 36.7  | 22.3   |
| 23:30 - 23:45                                           | 65.5             | 83.1              | 59.9                              | 59.9 | 60.1 | 60.6 | 59.9 | 61.2  | 60.0  | 53.3  | 44.2  | 30.1   |
| 23:45 - 00:00                                           | 64.7             | 85.8              | 66.3                              | 60.5 | 59.0 | 60.2 | 59.0 | 60.6  | 59.1  | 50.2  | 42.1  | 28.0   |
| 00:00 - 00:15                                           | 68.4             | 89.9              | 66.8                              | 61.9 | 62.5 | 63.3 | 61.2 | 63.6  | 63.1  | 55.7  | 58.4  | 46.6   |
| 00:15 - 00:30                                           | 48.5             | 56.4              | 60.1                              | 53.2 | 45.2 | 40.5 | 42.0 | 46.6  | 40.3  | 25.0  | 15.6  | 9.0    |
| 00:30 - 00:45                                           | 63.8             | 84.4              | 61.6                              | 57.8 | 58.4 | 59.1 | 57.6 | 59.9  | 58.4  | 49.9  | 43.6  | 40.8   |
| 00:45 - 01:00                                           | 66.9             | 86.9              | 63.0                              | 60.9 | 61.3 | 61.9 | 60.3 | 62.9  | 61.7  | 52.7  | 44.1  | 30.7   |
| 01:00 - 01:15                                           | 62.0             | 84.0              | 64.9                              | 58.4 | 55.1 | 54.4 | 56.9 | 58.3  | 56.0  | 48.8  | 39.3  | 26.8   |
| 01:15 - 01:30                                           | 48.1             | 61.0              | 69.0                              | 60.9 | 51.4 | 45.0 | 41.7 | 45.4  | 39.6  | 29.9  | 25.3  | 16.7   |
| 01:30 - 01:45                                           | 58.5             | 80.0              | 73.7                              | 65.9 | 58.3 | 58.1 | 51.9 | 53.2  | 53.1  | 47.4  | 38.1  | 24.9   |
| 01:45 - 02:00                                           | 48.4             | 63.4              | 73.8                              | 66.2 | 56.1 | 48.2 | 42.0 | 43.6  | 38.8  | 33.4  | 29.8  | 22.2   |
| 02:00 - 02:15                                           | 50.0             | 71.2              | 73.8                              | 66.6 | 57.0 | 49.2 | 44.7 | 45.3  | 40.8  | 34.5  | 31.8  | 25.8   |
| 02:15 - 02:30                                           | 51.9             | 68.6              | 76.2                              | 69.0 | 58.8 | 51.4 | 47.4 | 47.0  | 42.4  | 36.2  | 31.8  | 23.9   |
| 02:30 - 02:45                                           | 54.4             | 73.7              | 79.5                              | 72.1 | 62.6 | 55.0 | 50.2 | 48.0  | 44.1  | 40.2  | 36.2  | 27.6   |
| 02:45 - 03:00                                           | 55.0             | 76.1              | 80.4                              | 73.3 | 64.5 | 56.5 | 50.6 | 47.5  | 44.1  | 40.8  | 36.6  | 27.5   |
| 03:00 - 03:15                                           | 55.3             | 80.2              | 80.8                              | 73.8 | 65.4 | 56.7 | 50.6 | 47.4  | 44.0  | 40.8  | 36.6  | 27.7   |
| 03:15 - 03:30                                           | 54.9             | 74.9              | 80.0                              | 73.0 | 64.3 | 55.9 | 50.4 | 47.7  | 44.3  | 40.6  | 36.2  | 27.4   |
| 03:30 - 03:45                                           | 56.3             | 74.2              | 81.9                              | 75.2 | 66.2 | 57.7 | 51.9 | 48.2  | 45.0  | 42.3  | 38.2  | 29.4   |
| 03:45 - 04:00                                           | 54.3             | 75.0              | 79.8                              | 72.6 | 63.9 | 56.7 | 50.1 | 46.7  | 43.2  | 40.1  | 36.1  | 27.8   |
| 04:00 - 04:15                                           | 55.8             | 76.9              | 81.3                              | 74.0 | 65.3 | 57.5 | 51.8 | 47.7  | 44.6  | 41.9  | 37.8  | 29.3   |
| 04:15 - 04:30                                           | 56.8             | 79.4              | 81.6                              | 75.0 | 66.5 | 58.5 | 52.5 | 48.9  | 45.7  | 42.6  | 38.7  | 30.7   |
| 04:30 - 04:45                                           | 55.8             | 78.5              | 80.6                              | 74.1 | 65.7 | 57.0 | 51.3 | 48.0  | 44.8  | 41.7  | 38.0  | 29.9   |
| 04:45 - 05:00                                           | 56.4             | 79.3              | 81.0                              | 74.7 | 66.7 | 57.7 | 52.2 | 48.1  | 45.1  | 42.2  | 38.7  | 30.8   |
| 05:00 - 05:15                                           | 54.8             | 80.2              | 78.9                              | 73.0 | 64.2 | 56.4 | 50.1 | 47.6  | 44.6  | 40.9  | 37.1  | 29.2   |
| 05:15 - 05:30                                           | 56.3             | 79.5              | 81.3                              | 74.4 | 66.0 | 57.4 | 51.9 | 48.5  | 45.5  | 42.2  | 38.5  | 30.5   |
| 05:30 - 05:45                                           | 54.9             | 77.5              | 79.2                              | 72.3 | 63.9 | 55.6 | 50.6 | 48.1  | 44.8  | 40.6  | 36.2  | 28.2   |
| 05:45 - 06:00                                           | 55.4             | 74.9              | 80.2                              | 73.2 | 64.4 | 56.1 | 51.0 | 48.5  | 45.4  | 42.0  | 37.3  | 28.8   |
| 06:00 - 06:15                                           | 55.3             | 77.9              | 80.0                              | 72.9 | 64.3 | 56.1 | 50.8 | 48.6  | 45.2  | 41.5  | 37.2  | 28.8   |
| 06:15 - 06:30                                           | 59.3             | 83.7              | 77.6                              | 70.6 | 62.2 | 57.8 | 53.2 | 55.7  | 52.2  | 44.9  | 38.9  | 29.0   |
| 06:30 - 06:45                                           | 53.6             | 74.4              | 76.1                              | 68.9 | 60.0 | 52.5 | 48.7 | 49.0  | 45.3  | 38.8  | 33.1  | 24.4   |
| 06:45 - 07:00                                           | 62.5             | 84.2              | 83.5                              | 77.0 | 70.1 | 62.8 | 56.6 | 57.6  | 54.7  | 47.6  | 43.0  | 35.4   |



13.6 23<sup>rd</sup> – 24<sup>th</sup> February 2020 Position 2

| NOISE LEVEL SUMMARY ASSESSMENT                                                                               |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|--------------------------------------------------------------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                                                  | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>L<sub>Aeq</sub> 16 HOUR &amp; Corresponding L<sub>Amax</sub> 16 HOUR</small> | 63.5             | 89.4              | 73.3                              | 67.2 | 61.3 | 59.0 | 57.9 | 59.9 | 57.5 | 49.5 | 41.6 | 33.2  |
| NIGHTTIME 23:00 - 07:00<br><small>L<sub>Aeq</sub> 8 HOUR &amp; Corresponding L<sub>Amax</sub> 8 HOUR</small> | 60.0             | 88.2              | 70.7                              | 64.2 | 58.4 | 56.4 | 54.0 | 55.6 | 54.3 | 46.9 | 46.1 | 35.2  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |                  |                   |      |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------------------|-------------------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5 | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 63.8             | 85.0              | 80.9 | 74.5 | 67.0 | 60.9 | 58.6 | 59.6  | 57.2  | 49.7  | 43.2  | 33.8   |
| 08:00 - 09:00                                     | 63.3             | 83.5              | 77.5 | 71.0 | 63.5 | 59.7 | 57.8 | 59.4  | 56.9  | 49.6  | 41.7  | 31.3   |
| 09:00 - 10:00                                     | 64.0             | 85.7              | 79.7 | 73.3 | 66.0 | 60.6 | 58.5 | 60.0  | 57.5  | 50.0  | 43.1  | 36.8   |
| 10:00 - 11:00                                     | 63.6             | 84.4              | 73.9 | 67.6 | 60.7 | 58.7 | 57.7 | 60.2  | 57.2  | 49.6  | 40.4  | 29.3   |
| 11:00 - 12:00                                     | 65.6             | 86.4              | 74.6 | 68.3 | 62.5 | 60.7 | 59.7 | 62.2  | 59.4  | 51.2  | 42.4  | 31.8   |
| 12:00 - 13:00                                     | 64.4             | 84.7              | 68.1 | 63.3 | 59.8 | 59.2 | 58.3 | 61.1  | 58.3  | 49.7  | 41.7  | 30.4   |
| 13:00 - 14:00                                     | 64.0             | 89.4              | 61.8 | 60.1 | 58.1 | 58.5 | 58.2 | 60.4  | 58.2  | 50.1  | 41.7  | 30.7   |
| 14:00 - 15:00                                     | 63.3             | 84.9              | 59.8 | 59.4 | 57.7 | 58.5 | 57.8 | 60.0  | 57.2  | 48.6  | 39.8  | 27.9   |
| 15:00 - 16:00                                     | 63.5             | 83.9              | 58.8 | 59.2 | 58.0 | 58.4 | 57.6 | 60.0  | 57.5  | 49.0  | 40.0  | 28.7   |
| 16:00 - 17:00                                     | 63.1             | 84.3              | 56.2 | 58.4 | 57.9 | 58.0 | 57.4 | 59.6  | 57.0  | 48.9  | 39.7  | 28.4   |
| 17:00 - 18:00                                     | 61.1             | 82.1              | 55.4 | 57.1 | 56.6 | 57.1 | 55.7 | 57.4  | 55.1  | 46.9  | 38.9  | 29.8   |
| 18:00 - 19:00                                     | 63.6             | 84.8              | 55.4 | 58.5 | 58.6 | 59.4 | 58.4 | 59.6  | 57.7  | 49.4  | 44.7  | 39.8   |
| 19:00 - 20:00                                     | 62.4             | 85.0              | 54.2 | 57.0 | 56.7 | 57.3 | 56.9 | 58.7  | 56.6  | 48.4  | 41.4  | 37.2   |
| 20:00 - 21:00                                     | 63.4             | 84.4              | 58.1 | 58.9 | 58.6 | 59.0 | 57.8 | 59.3  | 57.7  | 50.6  | 41.4  | 30.3   |
| 21:00 - 22:00                                     | 63.6             | 84.1              | 63.4 | 59.5 | 58.7 | 58.9 | 57.8 | 59.7  | 57.8  | 50.7  | 41.7  | 31.6   |
| 22:00 - 23:00                                     | 62.6             | 84.4              | 60.7 | 58.7 | 58.1 | 57.6 | 57.6 | 58.8  | 56.8  | 48.0  | 40.4  | 28.2   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |                  |                   |      |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------------------|-------------------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5 | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 60.5             | 81.3              | 65.2 | 60.5 | 57.1 | 56.8 | 55.2 | 56.5  | 54.6  | 48.3  | 37.2  | 24.4   |
| 23:15 - 23:30                                           | 58.0             | 83.3              | 66.4 | 60.8 | 55.4 | 52.0 | 51.9 | 54.5  | 52.2  | 41.9  | 35.1  | 24.4   |
| 23:30 - 23:45                                           | 59.1             | 82.0              | 67.3 | 61.5 | 57.5 | 56.8 | 54.2 | 55.4  | 52.1  | 44.1  | 37.6  | 26.4   |
| 23:45 - 00:00                                           | 69.9             | 88.2              | 65.9 | 63.7 | 65.4 | 66.0 | 62.7 | 65.3  | 64.5  | 66.5  | 58.4  | 45.3   |
| 00:00 - 00:15                                           | 54.6             | 80.1              | 63.2 | 57.5 | 52.4 | 49.7 | 49.2 | 51.2  | 48.1  | 40.1  | 33.6  | 23.2   |
| 00:15 - 00:30                                           | 62.6             | 88.1              | 62.0 | 59.3 | 59.1 | 58.5 | 56.0 | 56.8  | 57.6  | 48.5  | 54.1  | 39.7   |
| 00:30 - 00:45                                           | 43.1             | 57.6              | 62.1 | 56.0 | 49.6 | 43.5 | 38.7 | 39.1  | 33.2  | 24.9  | 19.4  | 14.0   |
| 00:45 - 01:00                                           | 63.5             | 86.8              | 62.8 | 59.4 | 59.6 | 60.3 | 57.3 | 58.4  | 57.7  | 52.1  | 52.6  | 46.7   |
| 01:00 - 01:15                                           | 43.5             | 57.7              | 63.4 | 56.6 | 49.6 | 43.3 | 39.2 | 39.6  | 34.1  | 24.4  | 20.2  | 14.2   |
| 01:15 - 01:30                                           | 43.3             | 56.5              | 65.0 | 58.3 | 51.4 | 44.9 | 39.5 | 38.0  | 32.6  | 22.4  | 17.0  | 11.5   |
| 01:30 - 01:45                                           | 42.5             | 71.9              | 65.7 | 58.8 | 52.4 | 45.5 | 38.1 | 35.6  | 30.5  | 20.3  | 16.9  | 13.2   |
| 01:45 - 02:00                                           | 41.9             | 56.7              | 61.4 | 54.0 | 46.3 | 40.6 | 37.9 | 38.5  | 32.9  | 21.9  | 17.2  | 11.5   |
| 02:00 - 02:15                                           | 60.7             | 83.1              | 64.0 | 58.6 | 57.5 | 58.2 | 55.4 | 56.5  | 54.7  | 47.5  | 38.5  | 26.6   |
| 02:15 - 02:30                                           | 60.2             | 68.1              | 71.6 | 64.8 | 58.5 | 63.0 | 47.8 | 43.4  | 37.6  | 30.2  | 25.2  | 20.5   |
| 02:30 - 02:45                                           | 43.3             | 56.2              | 64.9 | 58.1 | 51.3 | 44.9 | 39.7 | 38.0  | 33.1  | 24.4  | 20.7  | 15.3   |
| 02:45 - 03:00                                           | 43.6             | 63.1              | 63.6 | 56.3 | 49.1 | 43.2 | 39.2 | 39.5  | 34.9  | 27.9  | 25.1  | 16.3   |
| 03:00 - 03:15                                           | 43.9             | 57.0              | 66.0 | 59.1 | 52.2 | 45.8 | 40.1 | 38.1  | 33.5  | 26.4  | 24.4  | 19.3   |
| 03:15 - 03:30                                           | 60.5             | 82.7              | 67.8 | 61.7 | 58.2 | 55.5 | 54.0 | 55.0  | 55.7  | 48.8  | 46.0  | 32.4   |
| 03:30 - 03:45                                           | 45.9             | 61.0              | 67.0 | 60.0 | 53.0 | 47.0 | 42.0 | 40.9  | 36.3  | 28.8  | 27.5  | 23.6   |
| 03:45 - 04:00                                           | 43.1             | 55.7              | 58.0 | 50.3 | 41.8 | 38.6 | 38.5 | 40.3  | 35.3  | 25.0  | 21.4  | 17.5   |
| 04:00 - 04:15                                           | 43.8             | 56.5              | 53.9 | 48.7 | 42.2 | 39.2 | 39.4 | 40.8  | 36.0  | 27.1  | 24.6  | 19.9   |
| 04:15 - 04:30                                           | 44.6             | 58.8              | 55.5 | 50.7 | 44.1 | 39.0 | 39.5 | 41.7  | 36.8  | 29.0  | 27.3  | 22.7   |
| 04:30 - 04:45                                           | 57.3             | 74.4              | 56.0 | 55.4 | 54.9 | 53.7 | 51.5 | 51.6  | 52.7  | 45.2  | 36.4  | 25.0   |
| 04:45 - 05:00                                           | 57.8             | 79.0              | 68.1 | 61.9 | 55.4 | 52.1 | 52.2 | 52.5  | 52.5  | 47.5  | 37.4  | 26.0   |
| 05:00 - 05:15                                           | 51.6             | 70.8              | 74.3 | 67.2 | 58.6 | 50.8 | 45.5 | 47.4  | 43.1  | 35.4  | 30.0  | 21.8   |
| 05:15 - 05:30                                           | 61.6             | 80.9              | 74.1 | 67.5 | 61.7 | 55.6 | 54.8 | 58.1  | 55.9  | 46.8  | 40.5  | 30.4   |
| 05:30 - 05:45                                           | 64.3             | 86.0              | 75.8 | 69.2 | 62.0 | 59.0 | 58.9 | 59.6  | 58.8  | 52.3  | 43.2  | 32.9   |
| 05:45 - 06:00                                           | 61.0             | 82.0              | 76.6 | 69.4 | 62.4 | 60.2 | 55.3 | 57.9  | 53.6  | 45.4  | 39.5  | 29.2   |
| 06:00 - 06:15                                           | 62.0             | 81.8              | 74.8 | 68.2 | 60.9 | 57.6 | 57.2 | 57.8  | 55.7  | 49.2  | 39.4  | 28.8   |
| 06:15 - 06:30                                           | 58.4             | 80.7              | 75.5 | 68.7 | 60.7 | 56.9 | 52.2 | 55.2  | 50.9  | 42.1  | 35.4  | 25.4   |
| 06:30 - 06:45                                           | 64.3             | 83.2              | 78.4 | 72.1 | 64.5 | 60.1 | 58.1 | 60.2  | 58.0  | 51.0  | 44.6  | 36.9   |
| 06:45 - 07:00                                           | 61.1             | 80.4              | 74.0 | 67.2 | 60.0 | 56.1 | 56.1 | 57.2  | 54.8  | 47.9  | 39.2  | 28.4   |



13.7 24<sup>th</sup> – 25<sup>th</sup> February 2020 Position 2

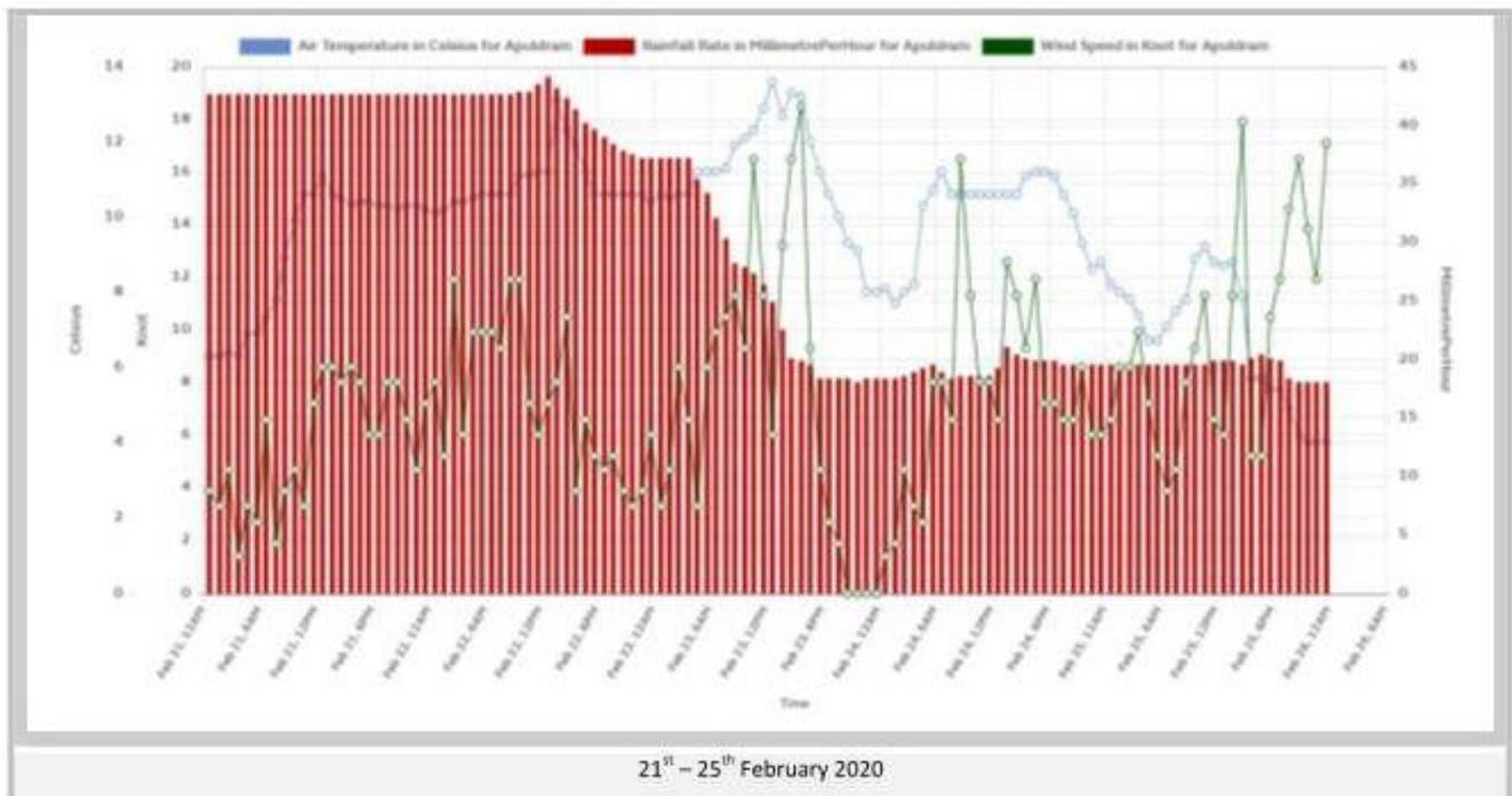
| NOISE LEVEL SUMMARY ASSESSMENT                                                                               |                  |                   | Octave Band Centre Frequency (Hz) |      |      |      |      |      |      |      |      |       |
|--------------------------------------------------------------------------------------------------------------|------------------|-------------------|-----------------------------------|------|------|------|------|------|------|------|------|-------|
| Date / Time                                                                                                  | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5                              | 63   | 125  | 250  | 500  | 1.0k | 2.0k | 4.0k | 8.0k | 16.0k |
| DAYTIME 07:00 - 23:00<br><small>L<sub>Aeq</sub> 16 HOUR &amp; Corresponding L<sub>Amax</sub> 16 HOUR</small> | 65.2             | 87.5              | 76.7                              | 70.4 | 63.5 | 60.8 | 59.6 | 61.4 | 59.0 | 51.1 | 44.0 | 35.2  |
| NIGHTTIME 23:00 - 07:00<br><small>L<sub>Aeq</sub> 8 HOUR &amp; Corresponding L<sub>Amax</sub> 8 HOUR</small> | 60.5             | 89.4              | 53.8                              | 55.5 | 55.5 | 55.9 | 55.0 | 56.7 | 54.5 | 46.7 | 39.2 | 32.5  |

| DAYTIME NOISE LEVELS 07:00 - 23:00 1 HOUR SAMPLES |                  |                   |      |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------|------------------|-------------------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                       | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5 | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 07:00 - 08:00                                     | 64.8             | 82.5              | 80.7 | 74.0 | 66.4 | 61.3 | 59.2 | 61.0  | 58.1  | 51.0  | 43.2  | 33.8   |
| 08:00 - 09:00                                     | 65.7             | 85.1              | 81.1 | 74.5 | 66.8 | 61.7 | 60.1 | 61.9  | 59.3  | 51.5  | 44.6  | 34.9   |
| 09:00 - 10:00                                     | 65.0             | 84.5              | 79.7 | 73.4 | 65.7 | 61.3 | 58.7 | 61.3  | 58.2  | 51.3  | 43.8  | 33.8   |
| 10:00 - 11:00                                     | 66.6             | 86.9              | 80.5 | 74.0 | 66.6 | 62.6 | 60.6 | 62.8  | 60.5  | 52.4  | 45.1  | 35.3   |
| 11:00 - 12:00                                     | 64.7             | 84.2              | 79.8 | 73.3 | 65.8 | 61.3 | 59.0 | 60.8  | 58.3  | 50.9  | 44.0  | 34.2   |
| 12:00 - 13:00                                     | 64.4             | 83.1              | 75.8 | 69.4 | 62.5 | 60.0 | 58.8 | 60.8  | 58.1  | 50.4  | 44.3  | 35.0   |
| 13:00 - 14:00                                     | 65.3             | 86.2              | 75.8 | 69.3 | 62.7 | 61.0 | 59.5 | 61.6  | 59.3  | 51.8  | 45.3  | 36.9   |
| 14:00 - 15:00                                     | 65.7             | 85.7              | 76.0 | 69.5 | 62.9 | 60.8 | 60.9 | 61.8  | 59.5  | 51.3  | 44.1  | 34.0   |
| 15:00 - 16:00                                     | 66.1             | 87.5              | 76.9 | 70.7 | 63.9 | 61.7 | 60.8 | 62.0  | 60.3  | 51.5  | 43.6  | 33.4   |
| 16:00 - 17:00                                     | 66.1             | 86.0              | 72.1 | 66.6 | 61.5 | 60.8 | 60.3 | 62.7  | 59.9  | 51.4  | 44.0  | 32.9   |
| 17:00 - 18:00                                     | 64.2             | 83.1              | 71.0 | 65.2 | 59.9 | 59.2 | 58.7 | 60.8  | 57.9  | 49.5  | 41.6  | 33.0   |
| 18:00 - 19:00                                     | 65.0             | 85.0              | 67.8 | 63.1 | 60.3 | 60.5 | 59.2 | 61.6  | 58.7  | 51.0  | 43.8  | 38.9   |
| 19:00 - 20:00                                     | 65.6             | 84.9              | 60.2 | 61.2 | 60.3 | 61.2 | 59.9 | 62.0  | 59.6  | 51.2  | 44.9  | 39.2   |
| 20:00 - 21:00                                     | 65.1             | 84.4              | 59.0 | 59.5 | 59.5 | 60.4 | 59.6 | 61.6  | 58.9  | 51.1  | 42.8  | 33.7   |
| 21:00 - 22:00                                     | 64.2             | 84.4              | 56.2 | 58.4 | 58.8 | 59.4 | 58.5 | 60.1  | 58.4  | 50.8  | 45.7  | 34.2   |
| 22:00 - 23:00                                     | 63.0             | 84.1              | 55.2 | 56.9 | 57.9 | 58.4 | 57.4 | 59.1  | 57.3  | 49.1  | 40.8  | 28.9   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 15 MINUTE SAMPLES |                  |                   |      |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------|------------------|-------------------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                             | L <sub>Aeq</sub> | L <sub>Amax</sub> | 31.5 | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 8.0 k | 16.0 k |
| 23:00 - 23:15                                           | 64.3             | 85.5              | 54.5 | 55.2 | 57.4 | 58.9 | 58.1 | 61.0  | 58.5  | 49.4  | 41.7  | 30.1   |
| 23:15 - 23:30                                           | 63.7             | 84.2              | 56.0 | 59.3 | 60.3 | 61.8 | 57.4 | 58.8  | 58.7  | 50.1  | 42.1  | 29.0   |
| 23:30 - 23:45                                           | 62.7             | 82.1              | 55.3 | 58.2 | 59.5 | 59.1 | 57.3 | 58.4  | 56.8  | 50.8  | 44.7  | 36.7   |
| 23:45 - 00:00                                           | 64.1             | 85.5              | 55.6 | 55.9 | 58.3 | 59.6 | 58.7 | 60.6  | 58.0  | 49.5  | 42.6  | 32.2   |
| 00:00 - 00:15                                           | 60.4             | 84.6              | 51.8 | 51.2 | 51.0 | 53.2 | 54.7 | 57.7  | 53.4  | 43.3  | 35.8  | 24.7   |
| 00:15 - 00:30                                           | 62.0             | 84.8              | 53.3 | 55.6 | 57.3 | 58.1 | 56.4 | 58.1  | 56.1  | 48.4  | 38.9  | 25.8   |
| 00:30 - 00:45                                           | 60.6             | 84.2              | 50.5 | 59.4 | 57.4 | 57.1 | 55.0 | 58.0  | 54.6  | 48.5  | 40.9  | 34.7   |
| 00:45 - 01:00                                           | 42.5             | 56.8              | 54.8 | 49.2 | 40.3 | 35.4 | 36.6 | 40.4  | 34.0  | 22.1  | 14.7  | 8.1    |
| 01:00 - 01:15                                           | 44.4             | 68.2              | 51.8 | 47.9 | 39.1 | 41.3 | 41.5 | 42.1  | 33.5  | 17.8  | 11.7  | 7.4    |
| 01:15 - 01:30                                           | 40.5             | 51.3              | 44.5 | 44.5 | 38.6 | 33.6 | 34.9 | 38.6  | 31.6  | 15.0  | 10.0  | 7.0    |
| 01:30 - 01:45                                           | 41.3             | 55.6              | 49.7 | 46.2 | 36.9 | 34.1 | 36.1 | 39.1  | 32.8  | 19.4  | 14.5  | 8.1    |
| 01:45 - 02:00                                           | 40.9             | 54.5              | 48.4 | 45.7 | 37.2 | 33.5 | 36.1 | 38.8  | 32.3  | 18.5  | 11.5  | 7.1    |
| 02:00 - 02:15                                           | 37.0             | 47.1              | 45.7 | 42.7 | 34.3 | 30.6 | 32.3 | 34.9  | 27.8  | 14.8  | 10.8  | 7.3    |
| 02:15 - 02:30                                           | 44.8             | 65.2              | 45.2 | 44.9 | 46.8 | 44.6 | 44.4 | 40.1  | 33.3  | 20.7  | 12.7  | 6.8    |
| 02:30 - 02:45                                           | 40.4             | 53.8              | 48.1 | 44.3 | 36.7 | 33.9 | 35.6 | 38.3  | 31.4  | 17.5  | 10.7  | 7.2    |
| 02:45 - 03:00                                           | 41.7             | 57.2              | 47.0 | 45.7 | 40.0 | 36.1 | 37.8 | 39.2  | 32.4  | 18.2  | 10.4  | 7.1    |
| 03:00 - 03:15                                           | 39.0             | 54.3              | 51.3 | 45.1 | 36.6 | 32.5 | 33.8 | 36.8  | 30.1  | 17.8  | 12.7  | 7.9    |
| 03:15 - 03:30                                           | 41.3             | 55.0              | 52.0 | 47.3 | 38.4 | 34.4 | 36.2 | 39.2  | 32.2  | 18.5  | 12.3  | 7.7    |
| 03:30 - 03:45                                           | 59.1             | 84.5              | 53.1 | 54.6 | 56.9 | 54.9 | 54.7 | 63.9  | 62.9  | 49.4  | 42.3  | 43.9   |
| 03:45 - 04:00                                           | 42.4             | 55.3              | 45.3 | 48.7 | 37.7 | 34.9 | 37.5 | 40.5  | 33.0  | 16.6  | 9.4   | 6.7    |
| 04:00 - 04:15                                           | 41.3             | 58.3              | 43.8 | 44.7 | 36.9 | 34.1 | 36.4 | 39.2  | 32.1  | 19.9  | 15.1  | 11.2   |
| 04:15 - 04:30                                           | 43.6             | 55.4              | 46.0 | 46.9 | 38.9 | 36.5 | 38.6 | 41.8  | 34.3  | 18.0  | 10.6  | 6.7    |
| 04:30 - 04:45                                           | 44.2             | 56.2              | 47.8 | 47.3 | 39.6 | 36.5 | 38.7 | 42.3  | 35.0  | 19.0  | 9.8   | 6.7    |
| 04:45 - 05:00                                           | 57.3             | 76.1              | 53.3 | 52.8 | 52.4 | 50.9 | 52.5 | 52.4  | 51.4  | 47.3  | 35.4  | 23.2   |
| 05:00 - 05:15                                           | 63.8             | 83.8              | 56.3 | 57.4 | 60.2 | 61.4 | 57.7 | 60.0  | 57.9  | 50.1  | 42.6  | 30.5   |
| 05:15 - 05:30                                           | 65.4             | 85.4              | 57.6 | 62.0 | 61.7 | 60.2 | 59.0 | 61.7  | 59.9  | 50.3  | 43.7  | 34.7   |
| 05:30 - 05:45                                           | 64.2             | 86.8              | 55.2 | 58.2 | 58.6 | 59.7 | 59.2 | 60.0  | 58.2  | 52.0  | 42.3  | 30.3   |
| 05:45 - 06:00                                           | 60.5             | 80.9              | 54.5 | 57.1 | 56.0 | 54.6 | 56.3 | 56.9  | 54.3  | 44.9  | 42.1  | 40.3   |
| 06:00 - 06:15                                           | 64.5             | 83.9              | 57.0 | 58.4 | 58.9 | 59.9 | 59.3 | 60.7  | 58.3  | 51.8  | 42.2  | 30.8   |
| 06:15 - 06:30                                           | 61.4             | 83.5              | 56.1 | 57.0 | 54.9 | 56.7 | 55.2 | 58.9  | 54.4  | 44.8  | 37.8  | 25.4   |
| 06:30 - 06:45                                           | 67.1             | 85.9              | 58.8 | 60.5 | 60.0 | 60.8 | 61.7 | 63.6  | 61.3  | 51.6  | 45.4  | 34.4   |
| 06:45 - 07:00                                           | 63.1             | 89.4              | 57.4 | 59.6 | 56.9 | 55.2 | 59.0 | 59.4  | 56.1  | 49.1  | 39.4  | 27.1   |



## 14 ENVIRONMENTAL CONDITIONS



#END OF REPORT#