

## EXTERNAL NOISE ASSESSMENT

### **CLIENT**

Highwood Group Ltd  
The Hay Barn  
Upper Ashfield  
Hoe Lane  
Romsey  
Hampshire  
SO51 9NJ

### **SITE**

Land at Dukes Meadow  
Waterlooville  
Hampshire

### **SURVEY DATE (S)**

11<sup>th</sup> – 14<sup>th</sup> October 2014

Report By



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## Introduction:

Sound Advice Acoustics Ltd has been instructed by Highwood Group Ltd, to carry out the relevant noise assessments and calculations at the land at Dukes Meadow, Waterlooville, Hampshire. It is proposed that the existing land is to be developed to include a new care home.

Ambient noise levels were measured 11<sup>th</sup> October – 14<sup>th</sup> October 2014. 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.

The Environmental Health Team Leader had the following comments with regards to noise. *“I have no objection to the application in principle but would ask that the following condition be applied to any consent granted”:-*

*The development hereby permitted shall not commence until a scheme for protecting the proposed habitable rooms on the north and western elevations from traffic noise from the Hambledon Road has been submitted to and approved in writing by the Local Planning Authority. The dwellings shall not be brought into use until the implementation of all works forming part of such approved noise protection scheme has been completed in full accordance with all detailed components of such scheme.*

*N.B The configuration of double glazed window units shall not contain panes of equal thickness and the maximum noise level (predicted 15 years from completion of dwellings) in habitable rooms, with windows closed and other means of ventilation provided should not exceed the following:*

*Daytime 35dB LAeq, 16h Night time 30dB LAeq, 8h*

The assessment for 15 year prediction of traffic movements is to be submitted as a separate report once the relevant data has been received.

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

**Table 2** 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 | Restaurant                | 40 – 55                        |
|                                                            | Open plan office          | 45 – 50                        |
|                                                            | Night club, public house  | 40 – 45                        |
|                                                            | Ballroom, banqueting hall | 35 – 40                        |
|                                                            | Living room               | 35 – 40                        |

NOTE See Noise control in building services [28] and BS EN ISO 3382.

**Table 4** Indoor ambient noise levels for dwellings

| Activity                   | Location           | 07:00 – 23:00           | 23:00 – 07:00          |
|----------------------------|--------------------|-------------------------|------------------------|
| Resting                    | Living Room        | 35 dB $L_{Aeq}$ 16 HOUR | --                     |
| Dining                     | Dining Room / Area | 40 dB $L_{Aeq}$ 16 HOUR | --                     |
| Sleeping (daytime resting) | Bedroom            | 35 dB $L_{Aeq}$ 16 HOUR | 30 dB $L_{Aeq}$ 8 HOUR |

Calculations and assessments are therefore to be carried out in order to satisfy the above requirements of BS 8233: 2014.

References and evaluations are to be made to the National Planning Policy Framework 2012 (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.*

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. The proposed layout is to be superimposed onto the CADNA A model in order to accurately calculate resultant façade levels to be used within the BS 8233: 2014 calculations.

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

## Procedure:

External noise levels were recorded over a typical period and analysis date extrapolated between 07:00 hrs 11<sup>th</sup> October – 07:00 hrs 14<sup>th</sup> October 2014 at positions 1 as detailed on the attached plan sketch layout.

Position 1 was located at the front façade of the site in order to capture the noise levels associated with the nearby roads and the Hambledon Road. Sample measurements were recorded over continuous 5 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 (Slow Weighting)**

|                 |                |
|-----------------|----------------|
| LAeq 1 HOUR dB  | LA10 1 HOUR dB |
| LAMAX 1 HOUR dB | LA50 1 HOUR dB |
| LAMIN 1 HOUR dB | LA90 1 HOUR dB |

### **Night Time 23:00 – 07:00 (Slow Weighting)**

|                    |                   |
|--------------------|-------------------|
| LAeq 5 MINUTES dB  | LA10 5 MINUTES dB |
| LAMAX 5 MINUTES dB | LA50 5 MINUTES dB |
| LAMIN 5 MINUTES dB | LA90 5 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 on the attached figures 1 – 3 inclusive. 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.

## 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 0.2 dB.

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.

| Description                         | Make     | Type | Serial No.     | Calibration Intervals | Last Calibrated | Next Due Calibration |
|-------------------------------------|----------|------|----------------|-----------------------|-----------------|----------------------|
| Integrated Sound Level Meter        | Norsonic | 140  | <u>1403140</u> | 2 YEARS               | 27.05.2014      | 27.05.2016           |
| 12.5mm Microphone (with windshield) | Norsonic | 1220 | <u>52260</u>   | 2 YEARS               | 27.05.2014      | 27.05.2016           |
| Microphone Pre – Amplifier          | Norsonic | 1201 | <u>30233</u>   | 2 YEARS               | 27.05.2014      | 27.05.2016           |
| Calibrator                          | Norsonic | 1251 | 31963          | 1 YEAR                | 21.05.2014      | 21.05.2015           |

Full calibration certificates are available upon request.

## Environmental Conditions:

START OF TEST                      11<sup>th</sup> October 2014

Temperature:                      17.0<sup>0</sup>C  
Relative Humidity                      58%  
Average Wind Speed:                      <0.5 m/s  
Cloud Cover:                      None  
Road Surface                      Dry  
Atmospheric Pressure:                      996mb

END OF TEST                      -                      14<sup>th</sup> October 2014

Temperature:                      20.0<sup>0</sup>C  
Relative Humidity                      67%  
Average Wind Speed:                      <0.5 m/s  
Cloud Cover:                      Moderate  
Road Surface                      Dry  
Atmospheric Pressure:                      1023mb

\* Wind speed, temperature and relative humidity were all recorded using standard equipment supplied by RS Components, Hedge End, Southampton and are taken as an average over the designated time period.

## 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.

See attached figures 1 - 3 for full downloaded results, and averages.

| 11 <sup>th</sup> – 12 <sup>th</sup> October 2014 – POSITION 1 |           |           |           |           |           |           |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                                   | $L_{Aeq}$ | $L_{max}$ | $L_{min}$ | $L_{A10}$ | $L_{A50}$ | $L_{A90}$ | 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 - 23:00<br>DAYTIME<br>AVERAGE<br>$L_{Aeq}$ 16 HOUR      | 59.0      | 71.1      | 44.3      | 62.7      | 56.6      | 49.4      | 62.2                              | 60.8 | 56.2 | 52.1 | 51.1 | 55.8  | 52.7  | 46.5  | 39.9  | 30.7   |
| 23:00 - 07:00<br>NIGHT<br>TIME<br>AVERAGE<br>$L_{Aeq}$ 8 HOUR | 50.8      | 68.9      | 29.7      | 53.6      | 40.5      | 33.2      | 58.3                              | 53.4 | 47.5 | 42.4 | 42.9 | 48.3  | 44.0  | 33.8  | 28.2  | 15.2   |

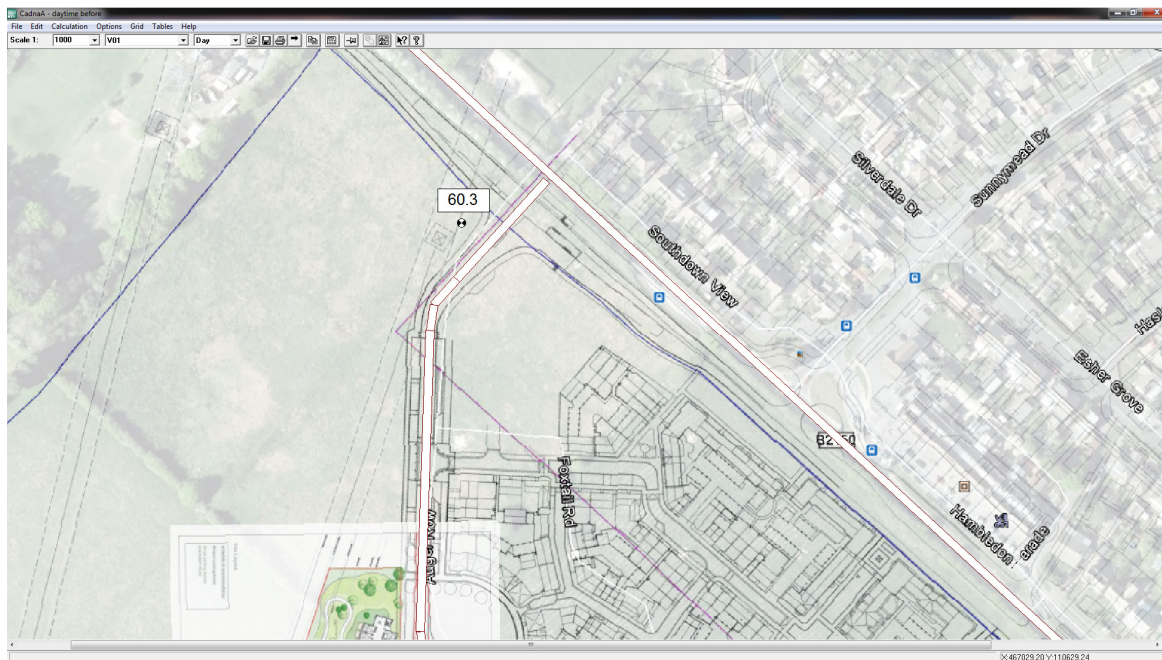
| 12 <sup>th</sup> – 13 <sup>th</sup> October 2014 – POSITION 1        |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|----------------------------------------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                                                          | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                                                      |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 07:00 - 23:00<br>DAYTIME<br>AVERAGE<br>L <sub>Aeq</sub> 16 HOUR      | 59.7 | 71.2 | 45.6 | 63.5 | 57.1 | 50.6 | 59.9                              | 61.6 | 57.9 | 53.8 | 52.2 | 56.4  | 53.2  | 47.6  | 34.6   |
| 23:00 - 07:00<br>NIGHT<br>TIME<br>AVERAGE<br>L <sub>Aeq</sub> 8 HOUR | 52.2 | 68.4 | 37.7 | 56.0 | 46.5 | 40.7 | 65.9                              | 58.3 | 51.6 | 47.0 | 45.2 | 48.6  | 45.9  | 40.3  | 24.2   |

| 13 <sup>th</sup> – 14 <sup>th</sup> October 2014 – POSITION 1        |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|----------------------------------------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                                                          | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                                                      |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 07:00 - 23:00<br>DAYTIME<br>AVERAGE<br>L <sub>Aeq</sub> 16 HOUR      | 60.3 | 72.9 | 46.9 | 63.7 | 58.5 | 51.7 | 60.4                              | 61.9 | 56.3 | 52.7 | 52.0 | 56.6  | 54.4  | 49.5  | 35.3   |
| 23:00 - 07:00<br>NIGHT<br>TIME<br>AVERAGE<br>L <sub>Aeq</sub> 8 HOUR | 51.0 | 66.0 | 40.8 | 54.0 | 46.4 | 42.9 | 64.8                              | 58.3 | 51.6 | 46.8 | 44.6 | 47.3  | 44.5  | 37.6  | 22.2   |

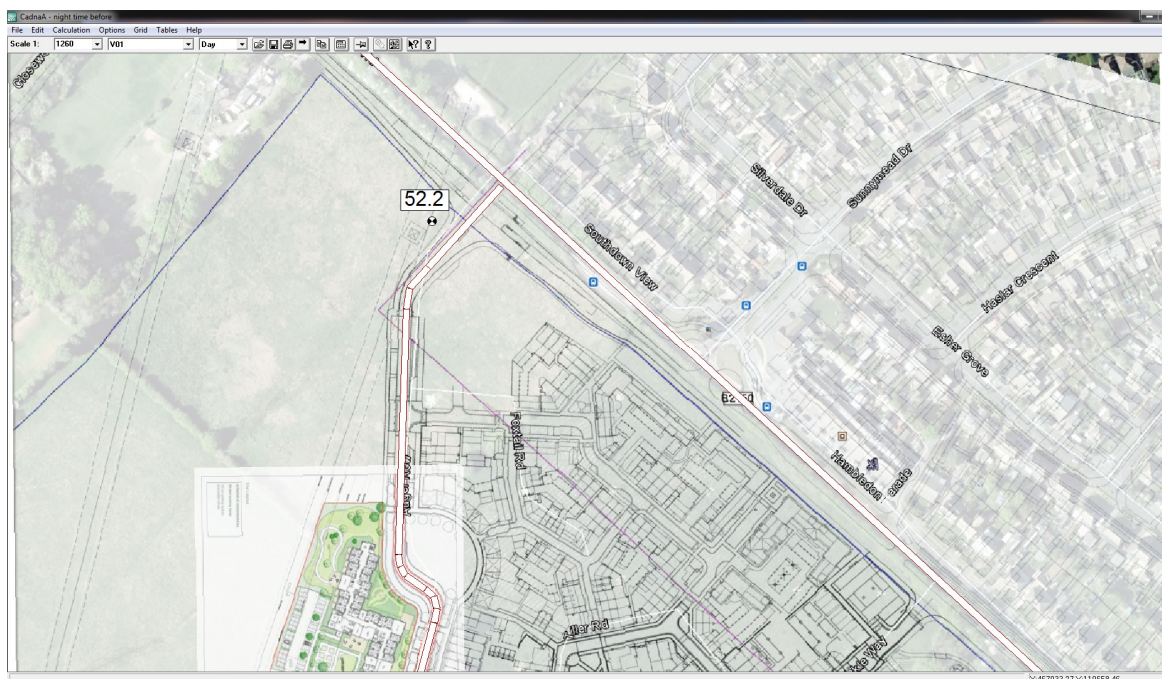
## Discussion of Results:

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.

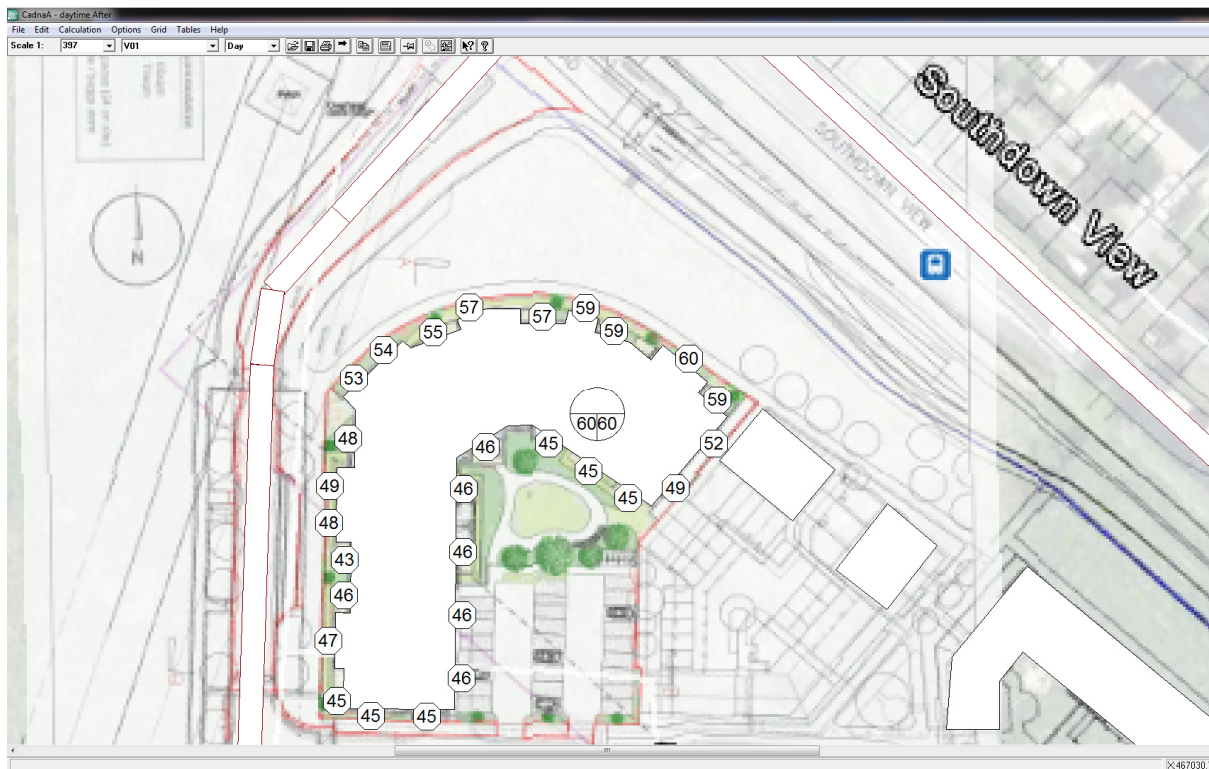
## DAYTIME BEFORE



## NIGHT TIME BEFORE



## DAYTIME AFTER



## NIGHT TIME AFTER



## 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 room's daytime and  $L_{Aeq\ 8\ HOUR}$  30 dB for Bedroom at night within the proposed residential properties, the following additional acoustic measures have been calculated. (Details on calculation sheets figure's 4 - 7 inclusive).

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.

### **MINIMUM CONSTRUCTION DETAILS**

#### STANDARD WALL CONSTRUCTION – MINIMUM VALUE

| <b>125</b> | <b>250</b> | <b>500</b> | <b>1.0k</b> | <b>2.0k</b> | <b>4.0k</b> | <b>Frequency (Hz)</b> |
|------------|------------|------------|-------------|-------------|-------------|-----------------------|
| 40.0       | 44.0       | 45.0       | 51.0        | 56.0        | 61.0        | dB reduction          |

#### WINDOW CONSTRUCTION 4mm glass / 14mm air gap / 6mm glass

| <b>125</b> | <b>250</b> | <b>500</b> | <b>1.0k</b> | <b>2.0k</b> | <b>4.0k</b> | <b>Frequency (Hz)</b> |
|------------|------------|------------|-------------|-------------|-------------|-----------------------|
| 24.4       | 26.5       | 36.2       | 41.7        | 40.3        | 42.6        | dB reduction          |

#### ROOF CONSTRUCTION – MINIMUM VALUE

| <b>125</b> | <b>250</b> | <b>500</b> | <b>1.0k</b> | <b>2.0k</b> | <b>4.0k</b> | <b>Frequency (Hz)</b> |
|------------|------------|------------|-------------|-------------|-------------|-----------------------|
| 28.0       | 34.0       | 40.0       | 45.0        | 49.0        | 53.0        | dB reduction          |

#### TRICKLE VENT – MINIMUM VALUE

| <b>125</b> | <b>250</b> | <b>500</b> | <b>1.0k</b> | <b>2.0k</b> | <b>4.0k</b> | <b>Frequency (Hz)</b> |
|------------|------------|------------|-------------|-------------|-------------|-----------------------|
| 33.0       | 32.0       | 29.0       | 29.0        | 31.0        | 33.0        | dB reduction          |

## Night Noise Guidelines for 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.

It should be noted that BS 8233: 2014 makes no reference to a criteria under this British Standard to  $L_{Amax}$  dB limits within bedrooms at night. The aforementioned documents are Guidelines and therefore should be used for reference purposes only.

Figure 5 calculates and internal bedroom level at night of  $L_{Aeq}$  8 HOUR 25.3 dB. The corresponding night time external level of  $L_{Aeq}$  8 HOUR 52.2 dB was recorded as detailed of figure 2, thus giving a calculated façade attenuation of 26.9 dB. Applying this to the  $L_{Amax}$  45 dB level above results in an  $L_{Amax}$  target level of  $L_{Amax}$  71.9 dB.

There have only been a total of 12 exceeded 5 minute levels over a total evaluated period of 24 night time hours. This equates to an  $L_{Amax}$  dB level exceedance of just 4.16 % over the two nights.

Therefore, in our professional opinion we would consider this to be an acceptable level increase and no further remedial works need be introduced over and above those already contained within this report.

## Outdoor Living Areas:

The World Health Organisation 'Guidelines for Community Noise' gives guidance as to desirable noise levels that should be achieved within outdoor living areas such as gardens, patios and verandas etc.

Table 1: Guideline values for community noise in specific environments, details the desirable target noise levels within various areas.

### Outdoor Living Area

|                                         |                           |
|-----------------------------------------|---------------------------|
| Serious Annoyance, daytime and evening  | $L_{Aeq\ 16\ HOUR}$ 55 dB |
| Moderate Annoyance, daytime and evening | $L_{Aeq\ 16\ HOUR}$ 50 dB |

In order to evaluate the external noise levels within the proposed development, and to correctly and accurately select the precise required minimum screen heights, the 3D modelling software CADNA A is to be used. Initially, the site plan is to be overlaid onto Google Earth and then imported directly into CADNA A using the geometric co-ordinates.

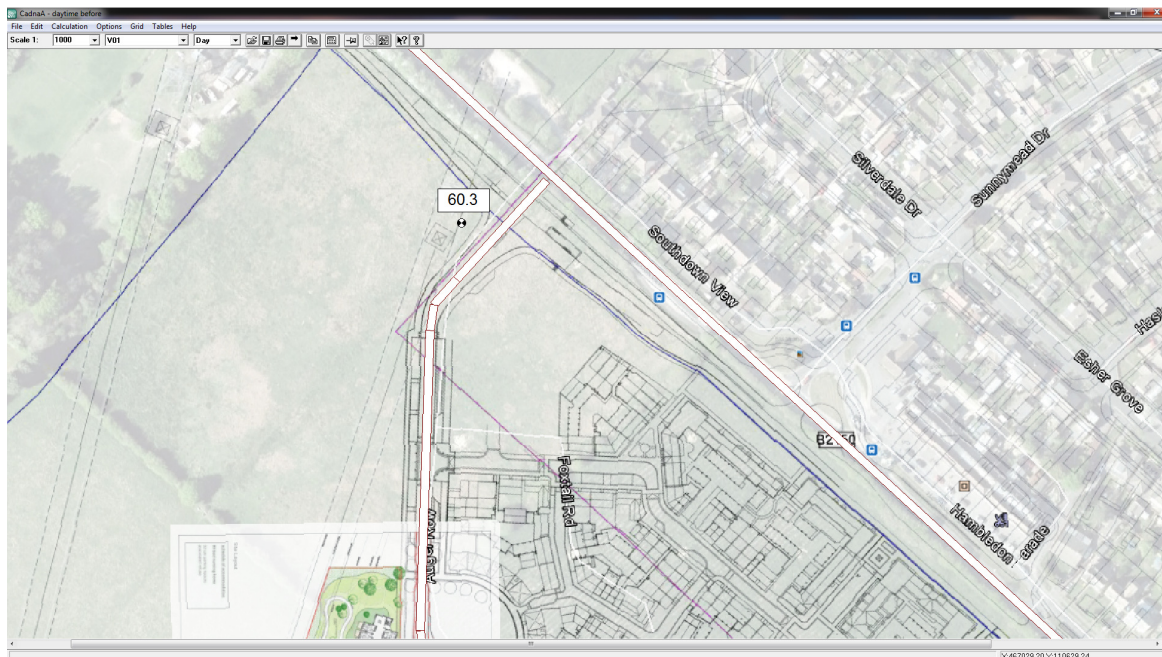
From this, the existing buildings, monitoring positions and noise sources such as railways and road are added. The output noise levels from the roads and railway are then increased until the monitored noise levels are achieved at the monitoring position. This model is then saved and used as a working 3D acoustic model of the site.

The proposed site plan is then overlaid and the existing buildings deleted accordingly from the program. The proposed buildings are then constructed on a 3D bases and receptors placed within the garden areas.

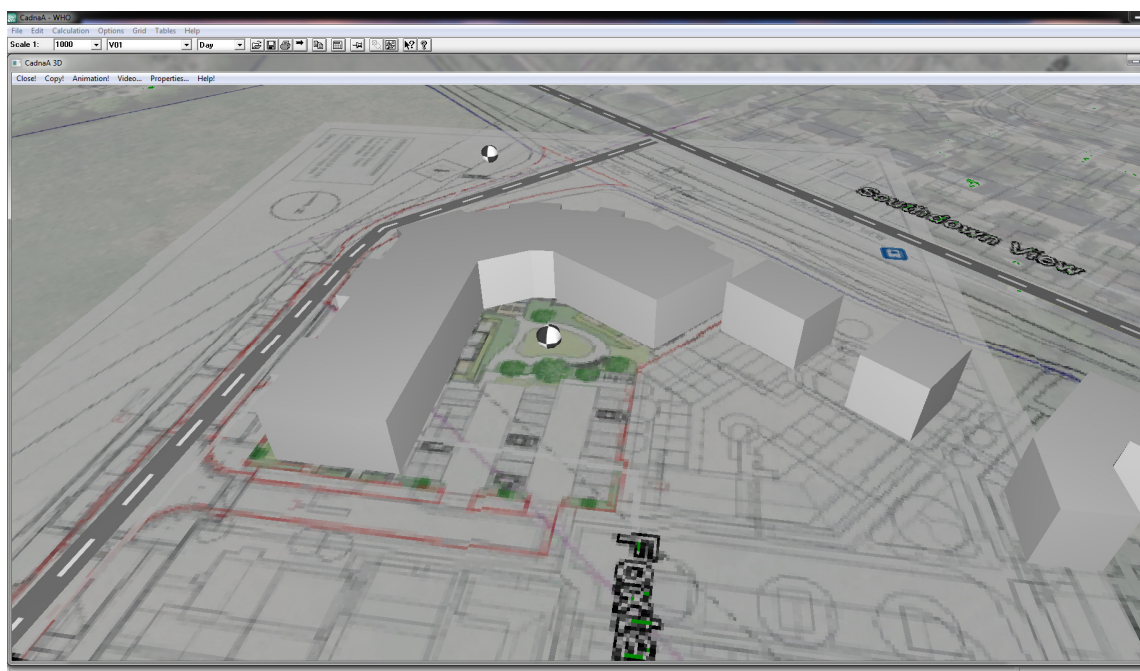
The calculation software is then re-run several time with various screen heights drawn on until the required WHO criteria is achieved at the receptor points.

The following CADNA A screen shots demonstrate the existing sites working 3D model. The levels at the measurement position correlate with the measured daytime average levels detailed on page 11 of this report.

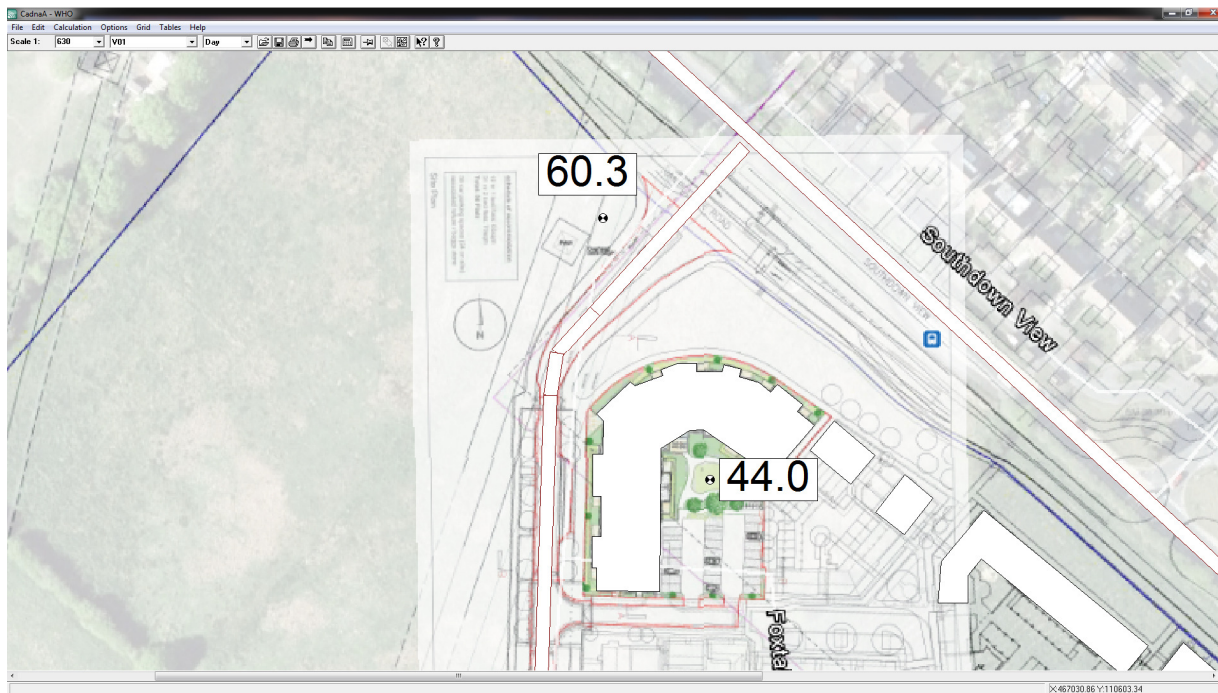
### Plan View



### 3D View



The development has external living areas on the development and therefore this criteria / guideline would be appropriately considered within the proposed rear residential garden areas. The highest daytime calculated level of  $L_{Aeq\ 16\ \text{HOUR}}$  44.0 dB would be below that of the  $L_{Aeq\ 16\ \text{HOUR}}$  50 dB lower guideline.



## **M & E Background Noise Level Criteria:**

During our initial background noise level assessment, the following lowest recorded background noise levels have been recorded for the site where the nearest existing residential dwellings have the potential to be affected by associated noise from the proposed plant noise levels.

Therefore in order to eliminate the possible of such an occurrence, the following design specification has been calculated to which all plant, plant rooms, louvres and flues should adhere to when combined noise levels are calculated at the boundary of the proposed development.

At this stage of the development the precise details of all the proposed external plant is yet to be determined and therefore for the purpose of this assessment a design criteria noise level is to be set to which any and all external noise generating plant must adhere to in order to suitably protect the local residents from unwanted noise.

Therefore, the following design criteria has been derived from the lowest recorded background noise levels for both daytime and night time periods and for the various time intervals.

| POSITION 2                                    |                  |                  |                                   |       |       |       |       |       |       |       |       |        |
|-----------------------------------------------|------------------|------------------|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| MAXIMUM NOISE LEVEL CRITERIA                  |                  |                  |                                   |       |       |       |       |       |       |       |       |        |
| L <sub>Aeq</sub> 1 HOUR dB<br>Daytime         | L <sub>Aeq</sub> | L <sub>A90</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 |
| Lowest Recorded Level                         | 53.7             | 36.9             | 51.2                              | 52.7  | 48.2  | 44.6  | 45.7  | 51.3  | 46.9  | 36.2  | 25.2  | 13.4   |
| L <sub>Aeq</sub> 53.7 – L <sub>A90</sub> 36.9 |                  |                  | -16.8                             | -16.8 | -16.8 | -16.8 | -16.8 | -16.8 | -16.8 | -16.8 | -16.8 | -16.8  |
| -10 dB Below Background Noise Criteria        |                  |                  | -10                               | -10   | -10   | -10   | -10   | -10   | -10   | -10   | -10   | -10    |
| CALCULATED CRITERIA LEVEL                     | 26.9             |                  | 24.4                              | 25.9  | 21.4  | 17.8  | 18.9  | 24.5  | 20.1  | 9.4   | -1.6  | -13.4  |
| L <sub>Aeq</sub> 5 MIN dB<br>Night Time       | L <sub>Aeq</sub> | L <sub>A90</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 |
| Lowest Recorded Level                         | 25.2             | 23.5             | 46.2                              | 40.0  | 33.5  | 27.1  | 22.0  | 17.9  | 15.2  | 11.7  | 8.8   | 5.9    |
| L <sub>Aeq</sub> 25.2 – L <sub>A90</sub> 23.5 |                  |                  | -1.7                              | -1.7  | -1.7  | -1.7  | -1.7  | -1.7  | -1.7  | -1.7  | -1.7  | -1.7   |
| -10 dB Below Background Noise Criteria        |                  |                  | -10                               | -10   | -10   | -10   | -10   | -10   | -10   | -10   | -10   | -10    |
| CALCULATED CRITERIA LEVEL                     | 13.5             |                  | 34.5                              | 28.3  | 21.8  | 15.4  | 10.3  | 6.2   | 3.5   | 0     | -2.9  | -5.8   |

With all external plant achieving the above design criteria's when calculated at the site boundary from the nearest affected existing residential dwelling, the requirements for both BS 4142: 1997 and the local council will be met. It is recommended that the lower of both daytime and night time criteria's be adopted for this site in order to suitably protect local residents from any background noise level increase as a direct result of the proposed sites associated plant. The lowest background noise levels for daytime and night time periods have been evaluated from the attached figure 1 – 3 for the site.

Based on all plant meeting the criteria, the following BS 4142: 1997 noise assessment would be expected.

## **BS 4142: 1997 Noise Assessment:**

This standard provides a method for measurement and rating of industrial and background noise levels outside dwellings in mixed residential and industrial areas. The rating level (defined in BS 4142:1997) is used to rate the industrial noise source outside residential dwellings (this is defined as the “specific noise source”. This level is obtained by adding a 5dB correction for tonal or impulsive characteristics to the equivalent continuous A-weighted sound pressure level of the specific noise source.

The procedure defined in BS 4142: 1997 for predicting the likelihood of complaints is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The greater the difference the greater the likelihood of complaints and more specifically:-

### **Assessment Indicator**

1. A difference of +10dB or more indicates that complaints are likely.
2. A difference of +5dB is of marginal significance.
3. If the rating is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

The assessment of noise nuisance explicitly falls outside the scope of BS 4142: 1997. A statutory noise nuisance requires the consideration of both relative and absolute noise levels, material loss of amenity, mitigation options and other non-acoustic factors. Section 80, part III of the Environmental Protection Act 1990 provides a defence of “best practicable means” against any nuisance proceedings.

However, it must also be recognised that the simple use of an overall A-weighted noise level can underestimate the degree of disturbance caused by relatively low levels of environmental noise with low frequency components or other discrete characteristics such as tonal, impulsive and / or irregular temporal features. Therefore the overall approach suggested in BS 4142: 1997 is an important indicator of the acceptability of noise from industrial or commercial premises.

The lowest background noise level recorded has been considered to be representative of the lowest recorded background noise level associated with this site and therefore with the proposed design criteria achieved, the following BS 4142 assessment could be expected.

| Residential Nearest to Position 2               | Assessment Periods            |                                |
|-------------------------------------------------|-------------------------------|--------------------------------|
|                                                 | 07:00 – 23:00<br>LAeq 1 Hr dB | 23:00 – 07:00<br>LAeq 5 Min dB |
| Calculated Level at Residential $L_{Aeq\ t}$ dB | 26.9                          | 13.5                           |
| Residual Noise Level $L_{Aeq\ t}$ dB            | 53.7                          | 25.2                           |
| Specific Noise Level                            | 26.9                          | 13.5                           |
| Character Correction                            | 0.0                           | 0.0                            |
| Rating Level                                    | 26.9                          | 13.5                           |
| Background Noise Level $L_{A90\ t}$ dB          | 36.9                          | 23.5                           |
| Excess Over Background                          | <b>-10 dB</b>                 | <b>-10 dB</b>                  |
| <b>Assessments Indicates</b>                    | <b>*3</b>                     | <b>*3</b>                      |

\*Refer to assessment indicator above

**Plan Sketch Layout:**

## Proposed Site



## Measurement Position No.1

## NPPF & NPSE:

The National Planning Policy Framework 2012 (NPPF) and assessments to the Noise Policy Statement for England 2010 (NPSE) should be made in conjunction with each other. Paragraph 123 of the National Planning Policy Framework (NPPF) states the following:

Planning policies and decisions should aim to:

- ✓ avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- ✓ mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- ✓ recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- ✓ identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

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

With the external noise level M & E criteria and glazing / ventilation specifications achieved within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a development 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.

## 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.

The development should be designed with a 4 / 14 / 6 standard double glazed window and standard trickle vents. This is in order that the panes of glass are not of equal thickness as detailed in page 3 of this report

An assessment in accordance with the World Health Organisation's 'Guidelines for Community Noise' has also been carried out in order to calculate and demonstrate the predicted noise levels within outdoor living areas. Compliance is likely to be achieved to these guidelines.

This report and subsequent calculations and assessments have demonstrated that mitigation measures can be introduced to the site in order to ensure compliance with BS 8233: 2014 for predicted internal noise levels within dwellings and the WHO guidelines for community noise for external living areas.

| NOISE LEVEL SUMMARY ASSESSMENT                                               |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|------------------------------------------------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                                                  | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 - 23:00<br>DAYTIME AVERAGE<br><small>L<sub>Aeq</sub> 16 HOUR</small>   | 59.0 | 71.1 | 44.3 | 62.7 | 56.6 | 49.4 | 62.2                              | 60.8 | 56.2 | 52.1 | 51.1 | 55.8  | 52.7  | 46.5  | 39.9  | 30.7   |
| 23:00 - 07:00<br>NIGHT TIME AVERAGE<br><small>L<sub>Aeq</sub> 8 HOUR</small> | 50.8 | 68.9 | 29.7 | 53.6 | 40.5 | 33.2 | 58.3                              | 53.4 | 47.5 | 42.4 | 42.9 | 48.3  | 44.0  | 33.8  | 28.2  | 15.2   |

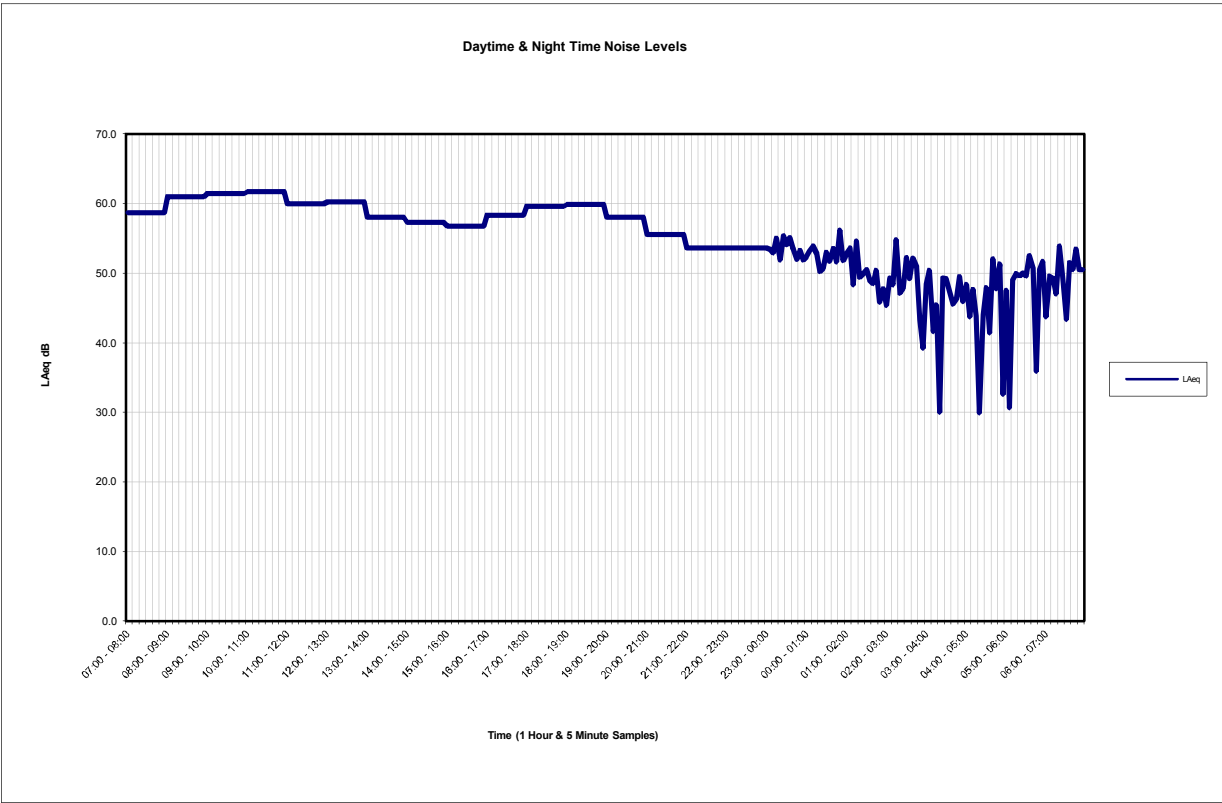


FIGURE 1  
PAGE 1

| DAYTIME NOISE LEVELS 07:00 - 23:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                        | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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                      | 58.7 | 71.4 | 40.9 | 63.2 | 53.4 | 45.6 | 64.5                              | 61.5 | 59.8 | 53.4 | 50.5 | 55.0  | 52.7  | 47.1  | 39.3  | 28.2   |
| 08:00 - 09:00                      | 61.0 | 74.5 | 46.8 | 64.7 | 58.0 | 51.6 | 70.0                              | 64.8 | 58.5 | 53.9 | 53.0 | 57.5  | 55.1  | 49.1  | 42.0  | 31.8   |
| 09:00 - 10:00                      | 61.5 | 72.2 | 48.1 | 65.2 | 59.3 | 52.7 | 65.6                              | 63.4 | 56.8 | 53.4 | 53.5 | 58.4  | 55.4  | 48.3  | 42.5  | 32.3   |
| 10:00 - 11:00                      | 61.8 | 70.7 | 47.5 | 65.3 | 60.5 | 53.0 | 62.8                              | 62.7 | 57.3 | 54.1 | 53.1 | 57.4  | 56.0  | 52.6  | 46.9  | 37.9   |
| 11:00 - 12:00                      | 60.0 | 68.4 | 47.0 | 63.4 | 58.7 | 52.0 | 59.4                              | 61.7 | 56.1 | 52.8 | 51.9 | 56.4  | 54.0  | 48.8  | 42.2  | 34.2   |
| 12:00 - 13:00                      | 60.3 | 75.1 | 45.1 | 63.1 | 58.0 | 50.8 | 60.1                              | 61.9 | 57.9 | 54.1 | 51.3 | 56.5  | 54.4  | 49.4  | 43.4  | 33.3   |
| 13:00 - 14:00                      | 58.1 | 66.9 | 43.7 | 61.8 | 56.4 | 49.3 | 60.8                              | 59.6 | 54.7 | 50.8 | 50.2 | 54.8  | 51.9  | 46.1  | 40.1  | 29.0   |
| 14:00 - 15:00                      | 57.4 | 68.4 | 43.7 | 61.0 | 55.0 | 48.6 | 60.8                              | 60.0 | 54.3 | 51.0 | 50.1 | 54.4  | 50.8  | 43.9  | 37.5  | 27.3   |
| 15:00 - 16:00                      | 56.7 | 68.8 | 42.9 | 60.5 | 54.5 | 48.0 | 60.8                              | 60.3 | 55.6 | 51.9 | 49.7 | 53.8  | 50.1  | 42.1  | 34.4  | 27.6   |
| 16:00 - 17:00                      | 58.3 | 75.6 | 42.9 | 61.6 | 55.4 | 48.0 | 57.9                              | 59.7 | 56.1 | 53.2 | 51.7 | 55.5  | 51.6  | 43.0  | 33.9  | 25.7   |
| 17:00 - 18:00                      | 59.7 | 69.1 | 44.0 | 63.5 | 57.6 | 49.9 | 56.9                              | 60.8 | 56.4 | 53.0 | 52.4 | 57.1  | 52.8  | 43.5  | 34.0  | 23.6   |
| 18:00 - 19:00                      | 59.9 | 69.5 | 44.8 | 63.6 | 57.9 | 50.2 | 57.5                              | 60.9 | 58.6 | 53.3 | 52.5 | 57.4  | 52.9  | 43.0  | 33.9  | 28.5   |
| 19:00 - 20:00                      | 58.0 | 68.6 | 41.6 | 62.2 | 54.9 | 46.8 | 55.7                              | 57.5 | 52.9 | 49.8 | 50.3 | 55.7  | 51.3  | 40.6  | 30.2  | 19.7   |
| 20:00 - 21:00                      | 55.6 | 68.0 | 36.3 | 60.4 | 49.8 | 41.0 | 54.0                              | 54.2 | 48.8 | 46.6 | 47.7 | 53.2  | 48.9  | 38.4  | 28.3  | 21.1   |
| 21:00 - 22:00                      | 53.6 | 66.4 | 33.9 | 58.4 | 47.2 | 37.4 | 52.3                              | 52.7 | 49.4 | 44.9 | 45.9 | 51.4  | 46.7  | 36.3  | 25.5  | 25.7   |
| 22:00 - 23:00                      | 53.7 | 66.3 | 32.6 | 58.4 | 47.4 | 36.9 | 51.2                              | 52.7 | 48.2 | 44.6 | 45.7 | 51.3  | 46.9  | 36.2  | 25.2  | 13.4   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 - 00:00                         | 53.7 | 72.0 | 34.1 | 57.3 | 44.3 | 37.0 | 52.8                              | 54.4 | 46.8 | 44.9 | 45.7 | 51.5  | 46.6  | 36.7  | 26.3  | 14.3   |
|                                       | 53.5 | 65.8 | 33.6 | 57.9 | 47.4 | 37.9 | 52.6                              | 55.7 | 56.4 | 49.9 | 45.7 | 51.0  | 46.2  | 35.8  | 25.2  | 15.3   |
|                                       | 52.9 | 64.0 | 33.7 | 58.3 | 45.6 | 36.6 | 50.2                              | 49.3 | 44.6 | 43.8 | 45.2 | 50.5  | 46.2  | 35.4  | 23.4  | 11.5   |
|                                       | 55.0 | 71.7 | 36.6 | 59.4 | 50.1 | 41.2 | 60.9                              | 56.7 | 49.2 | 47.1 | 47.2 | 52.5  | 48.4  | 37.6  | 25.8  | 13.8   |
|                                       | 51.9 | 64.6 | 32.1 | 57.0 | 44.9 | 34.2 | 51.9                              | 49.3 | 45.0 | 42.7 | 44.0 | 49.5  | 45.4  | 33.7  | 22.1  | 10.4   |
|                                       | 55.4 | 66.2 | 34.0 | 61.1 | 47.9 | 38.2 | 50.1                              | 51.7 | 44.6 | 44.8 | 46.9 | 53.1  | 48.9  | 38.0  | 25.5  | 13.4   |
|                                       | 54.1 | 68.5 | 33.9 | 58.8 | 45.2 | 37.7 | 52.8                              | 55.7 | 51.4 | 45.9 | 46.1 | 51.5  | 47.6  | 37.6  | 27.1  | 15.0   |
|                                       | 55.1 | 73.5 | 33.0 | 58.4 | 44.4 | 36.8 | 51.7                              | 56.5 | 48.2 | 44.1 | 46.3 | 52.7  | 48.7  | 37.8  | 25.4  | 14.0   |
|                                       | 53.6 | 67.4 | 34.6 | 58.0 | 45.3 | 38.2 | 54.6                              | 53.6 | 45.0 | 44.3 | 46.5 | 51.3  | 46.5  | 35.7  | 26.2  | 14.6   |
|                                       | 52.0 | 65.8 | 33.4 | 56.3 | 43.7 | 38.2 | 61.7                              | 55.0 | 47.1 | 43.4 | 44.5 | 49.6  | 45.1  | 34.8  | 24.8  | 15.8   |
|                                       | 53.3 | 67.0 | 34.7 | 58.0 | 46.3 | 38.4 | 62.5                              | 56.1 | 48.2 | 45.5 | 45.9 | 51.0  | 46.2  | 36.3  | 25.9  | 17.0   |
|                                       | 51.9 | 66.6 | 36.3 | 55.8 | 43.7 | 39.3 | 64.3                              | 56.8 | 49.4 | 44.6 | 44.6 | 49.3  | 45.1  | 34.4  | 24.1  | 15.1   |
|                                       | 52.4 | 66.8 | 35.4 | 56.6 | 45.7 | 38.8 | 58.7                              | 53.1 | 45.5 | 43.5 | 44.9 | 50.3  | 45.1  | 34.5  | 22.8  | 11.9   |
|                                       | 53.2 | 82.1 | 30.6 | 56.0 | 41.2 | 32.9 | 73.5                              | 68.4 | 61.9 | 52.4 | 46.0 | 49.1  | 44.6  | 33.2  | 24.5  | 15.6   |
| 00:00 - 01:00                         | 53.9 | 69.9 | 34.7 | 55.7 | 43.3 | 38.3 | 70.2                              | 62.8 | 54.0 | 47.4 | 46.0 | 51.5  | 46.7  | 36.3  | 25.4  | 19.9   |
|                                       | 52.8 | 67.1 | 34.0 | 56.7 | 47.2 | 39.1 | 71.0                              | 63.0 | 55.3 | 47.6 | 44.8 | 49.7  | 46.3  | 35.1  | 25.9  | 21.1   |
|                                       | 50.3 | 63.5 | 30.3 | 53.1 | 40.0 | 33.7 | 62.2                              | 54.5 | 47.5 | 42.8 | 42.8 | 47.7  | 43.8  | 33.9  | 22.7  | 14.4   |
|                                       | 50.7 | 67.8 | 29.0 | 51.9 | 38.7 | 32.0 | 55.6                              | 52.6 | 43.2 | 41.1 | 42.7 | 48.6  | 43.5  | 32.0  | 18.8  | 9.2    |
|                                       | 53.0 | 69.5 | 27.1 | 52.9 | 36.7 | 30.5 | 58.5                              | 52.4 | 45.6 | 43.0 | 45.2 | 50.9  | 45.9  | 34.9  | 22.3  | 12.5   |
|                                       | 51.7 | 66.4 | 33.5 | 54.3 | 45.0 | 36.6 | 54.2                              | 57.3 | 52.0 | 44.6 | 43.9 | 49.1  | 44.9  | 35.4  | 24.0  | 17.2   |
|                                       | 53.6 | 71.5 | 32.4 | 55.2 | 44.9 | 35.3 | 62.5                              | 54.0 | 48.1 | 43.8 | 45.0 | 51.5  | 46.7  | 36.2  | 25.1  | 14.9   |
|                                       | 51.6 | 65.4 | 30.0 | 56.0 | 42.7 | 34.3 | 49.5                              | 57.1 | 47.7 | 44.5 | 44.0 | 49.1  | 44.9  | 34.7  | 23.7  | 12.2   |
|                                       | 56.2 | 71.2 | 31.7 | 60.6 | 44.1 | 36.1 | 47.1                              | 52.8 | 47.1 | 46.3 | 48.7 | 54.1  | 48.9  | 38.9  | 27.1  | 14.1   |
|                                       | 51.8 | 69.0 | 30.5 | 55.7 | 39.7 | 34.1 | 44.2                              | 45.7 | 40.0 | 40.5 | 44.1 | 49.7  | 44.8  | 32.1  | 19.2  | 8.3    |
| 01:00 - 02:00                         | 52.7 | 69.4 | 30.3 | 55.0 | 38.0 | 33.0 | 48.2                              | 50.9 | 45.0 | 43.9 | 45.9 | 50.4  | 45.6  | 36.2  | 27.2  | 17.0   |
|                                       | 53.7 | 68.8 | 31.6 | 58.2 | 41.7 | 34.4 | 48.1                              | 51.6 | 44.7 | 43.4 | 45.9 | 51.6  | 46.6  | 36.5  | 24.5  | 12.2   |
|                                       | 48.3 | 67.7 | 24.6 | 45.1 | 34.1 | 26.1 | 46.2                              | 41.6 | 38.8 | 36.1 | 38.8 | 45.5  | 42.8  | 30.4  | 17.5  | 8.2    |
|                                       | 54.7 | 69.0 | 26.9 | 60.0 | 41.4 | 33.7 | 47.6                              | 50.1 | 44.6 | 45.4 | 47.0 | 52.4  | 48.0  | 37.1  | 23.8  | 11.5   |

FIGURE 1  
PAGE 2

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                       |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 01:00 - 02:00 <i>Continued</i>        | 49.4 | 64.1 | 28.0 | 52.5 | 40.1 | 30.9 | 45.6                              | 47.0 | 41.4 | 40.3 | 42.1 | 47.1  | 42.5  | 31.6  | 19.7   |
|                                       | 49.9 | 65.9 | 25.3 | 48.7 | 34.7 | 27.0 | 44.3                              | 44.0 | 39.7 | 40.0 | 42.0 | 47.6  | 43.2  | 31.6  | 20.3   |
|                                       | 50.5 | 70.0 | 26.1 | 52.1 | 35.4 | 29.4 | 44.9                              | 46.9 | 40.7 | 39.8 | 42.8 | 48.1  | 44.0  | 32.0  | 19.6   |
|                                       | 49.0 | 70.2 | 27.1 | 47.1 | 32.6 | 28.7 | 43.8                              | 54.9 | 55.3 | 45.6 | 41.5 | 46.0  | 41.3  | 30.4  | 20.2   |
|                                       | 48.5 | 65.2 | 26.1 | 51.0 | 36.6 | 29.7 | 44.1                              | 45.6 | 40.5 | 39.3 | 41.4 | 45.6  | 42.4  | 32.3  | 20.5   |
|                                       | 50.4 | 68.4 | 26.8 | 49.1 | 34.6 | 30.3 | 43.7                              | 44.1 | 40.3 | 39.8 | 42.5 | 48.1  | 43.4  | 33.2  | 21.2   |
|                                       | 45.8 | 62.9 | 24.0 | 42.8 | 32.2 | 26.9 | 43.5                              | 41.3 | 35.5 | 33.5 | 38.2 | 43.6  | 39.0  | 25.9  | 14.6   |
| 02:00 - 03:00                         | 47.8 | 66.9 | 24.0 | 46.3 | 31.6 | 26.4 | 44.4                              | 47.3 | 44.4 | 39.1 | 40.9 | 45.5  | 40.5  | 32.0  | 22.8   |
|                                       | 45.4 | 63.2 | 22.7 | 43.5 | 29.3 | 24.6 | 43.3                              | 45.6 | 39.0 | 35.7 | 37.6 | 42.7  | 39.4  | 28.6  | 15.8   |
|                                       | 49.3 | 69.1 | 23.7 | 46.1 | 31.8 | 25.3 | 42.8                              | 41.7 | 38.9 | 36.8 | 40.4 | 46.2  | 44.0  | 33.0  | 19.3   |
|                                       | 48.3 | 66.8 | 25.2 | 44.9 | 32.5 | 28.1 | 43.1                              | 43.6 | 42.9 | 38.7 | 41.1 | 45.8  | 41.6  | 30.8  | 19.1   |
|                                       | 54.9 | 74.0 | 26.5 | 53.6 | 37.4 | 28.7 | 45.6                              | 45.7 | 47.6 | 43.7 | 46.6 | 53.0  | 47.7  | 37.7  | 27.9   |
|                                       | 47.1 | 63.5 | 24.7 | 46.6 | 33.6 | 27.3 | 45.3                              | 42.2 | 38.1 | 38.1 | 40.1 | 45.1  | 39.5  | 28.4  | 16.9   |
|                                       | 47.8 | 64.2 | 24.1 | 50.9 | 32.1 | 26.6 | 45.7                              | 43.3 | 39.6 | 39.3 | 39.4 | 45.4  | 41.4  | 30.2  | 19.4   |
|                                       | 52.3 | 69.4 | 27.3 | 55.0 | 36.5 | 30.4 | 47.4                              | 48.6 | 44.1 | 42.7 | 44.5 | 50.1  | 45.3  | 35.3  | 25.1   |
|                                       | 49.2 | 67.5 | 26.7 | 53.6 | 38.6 | 30.3 | 49.7                              | 52.6 | 47.2 | 43.5 | 41.9 | 45.5  | 42.0  | 35.8  | 40.3   |
|                                       | 52.2 | 68.1 | 29.1 | 53.1 | 38.0 | 31.5 | 43.8                              | 45.9 | 39.9 | 39.9 | 43.3 | 49.8  | 45.9  | 34.0  | 21.3   |
|                                       | 50.9 | 69.5 | 26.7 | 51.2 | 37.9 | 30.7 | 46.1                              | 45.9 | 41.6 | 41.0 | 43.0 | 48.6  | 44.1  | 33.3  | 21.6   |
|                                       | 43.3 | 62.2 | 23.6 | 38.4 | 29.3 | 25.3 | 43.2                              | 38.9 | 35.5 | 32.0 | 33.9 | 41.3  | 36.4  | 23.4  | 12.0   |
| 03:00 - 04:00                         | 39.2 | 58.3 | 23.8 | 32.5 | 26.0 | 24.7 | 43.8                              | 39.0 | 34.1 | 30.4 | 32.9 | 37.2  | 31.4  | 19.8  | 11.1   |
|                                       | 48.4 | 65.3 | 24.3 | 47.3 | 35.9 | 29.3 | 44.8                              | 44.2 | 40.4 | 38.0 | 40.5 | 46.6  | 40.9  | 30.6  | 18.4   |
|                                       | 50.4 | 70.4 | 23.2 | 42.3 | 30.1 | 25.8 | 46.1                              | 44.3 | 39.6 | 39.1 | 43.0 | 48.3  | 43.1  | 31.3  | 18.8   |
|                                       | 41.6 | 60.4 | 23.2 | 38.5 | 26.2 | 24.3 | 44.2                              | 39.5 | 35.2 | 31.2 | 35.5 | 39.3  | 34.1  | 22.2  | 11.6   |
|                                       | 45.5 | 66.7 | 22.3 | 37.1 | 26.8 | 24.1 | 44.2                              | 43.7 | 37.5 | 35.3 | 37.9 | 43.2  | 39.1  | 26.8  | 14.2   |
|                                       | 30.0 | 41.5 | 22.8 | 33.8 | 26.1 | 24.0 | 44.1                              | 39.1 | 34.8 | 26.2 | 25.2 | 27.2  | 21.5  | 8.8   | 7.9    |
|                                       | 49.3 | 68.4 | 25.3 | 49.9 | 36.3 | 28.1 | 45.6                              | 50.6 | 40.2 | 39.9 | 41.5 | 47.1  | 42.3  | 31.5  | 19.8   |
|                                       | 49.2 | 69.3 | 24.1 | 47.1 | 33.0 | 26.5 | 46.1                              | 44.9 | 39.7 | 38.8 | 41.7 | 47.4  | 41.4  | 31.7  | 19.4   |
|                                       | 47.2 | 67.1 | 23.5 | 38.6 | 28.3 | 25.6 | 45.5                              | 41.2 | 37.6 | 37.0 | 40.1 | 45.3  | 39.4  | 29.5  | 18.1   |
|                                       | 45.6 | 62.8 | 23.3 | 44.7 | 31.9 | 24.9 | 46.0                              | 42.8 | 36.2 | 34.6 | 37.9 | 43.9  | 37.8  | 26.4  | 14.2   |
|                                       | 46.2 | 63.7 | 23.5 | 44.8 | 30.9 | 25.4 | 47.4                              | 42.8 | 38.3 | 36.4 | 39.1 | 43.5  | 40.0  | 29.5  | 18.2   |
| 04:00 - 05:00                         | 45.9 | 65.4 | 22.9 | 45.7 | 30.3 | 25.3 | 45.9                              | 44.2 | 38.4 | 37.7 | 37.4 | 43.7  | 39.1  | 27.7  | 19.9   |
|                                       | 48.4 | 68.9 | 22.2 | 43.9 | 29.8 | 23.7 | 45.3                              | 47.5 | 39.5 | 38.3 | 40.7 | 46.0  | 41.9  | 30.5  | 18.5   |
|                                       | 43.7 | 64.8 | 23.2 | 37.2 | 27.2 | 24.8 | 44.3                              | 40.8 | 36.3 | 34.2 | 36.4 | 41.6  | 36.3  | 26.4  | 15.7   |
|                                       | 47.7 | 65.3 | 23.4 | 46.8 | 32.4 | 26.4 | 44.0                              | 42.6 | 37.2 | 36.3 | 39.4 | 45.5  | 40.8  | 29.1  | 16.5   |
|                                       | 43.8 | 64.3 | 24.0 | 41.0 | 30.3 | 25.6 | 43.4                              | 40.2 | 35.5 | 34.0 | 34.9 | 41.5  | 37.4  | 26.2  | 14.1   |
|                                       | 29.9 | 39.5 | 23.3 | 33.9 | 26.2 | 24.5 | 43.7                              | 40.1 | 33.5 | 26.6 | 25.5 | 27.2  | 20.2  | 10.8  | 8.3    |
|                                       | 44.1 | 62.3 | 23.4 | 47.7 | 31.3 | 25.5 | 52.0                              | 46.8 | 37.5 | 35.6 | 36.6 | 41.3  | 38.2  | 26.1  | 15.7   |
|                                       | 48.0 | 67.3 | 24.0 | 46.0 | 30.6 | 25.8 | 51.4                              | 48.0 | 39.1 | 36.5 | 39.0 | 45.9  | 41.1  | 29.5  | 16.3   |
|                                       | 41.4 | 56.1 | 25.9 | 45.0 | 30.6 | 27.0 | 48.2                              | 43.5 | 38.4 | 35.0 | 32.8 | 36.7  | 37.2  | 26.7  | 15.1   |
|                                       | 52.1 | 71.7 | 25.4 | 51.1 | 34.9 | 27.4 | 48.1                              | 48.5 | 43.6 | 40.7 | 44.2 | 49.7  | 45.9  | 33.6  | 20.6   |
|                                       | 47.8 | 68.7 | 26.7 | 48.9 | 33.2 | 28.9 | 48.5                              | 47.7 | 40.4 | 38.8 | 39.6 | 45.6  | 41.1  | 29.9  | 18.8   |
| 05:00 - 06:00                         | 51.4 | 73.2 | 26.7 | 49.6 | 33.8 | 28.9 | 48.7                              | 47.1 | 40.6 | 38.7 | 41.4 | 48.7  | 45.8  | 33.9  | 19.4   |
|                                       | 32.6 | 45.7 | 25.9 | 36.1 | 29.7 | 27.5 | 47.7                              | 42.0 | 35.8 | 29.9 | 26.9 | 29.9  | 24.3  | 13.2  | 9.0    |
|                                       | 47.6 | 66.8 | 26.7 | 45.0 | 30.7 | 28.2 | 48.5                              | 44.5 | 38.7 | 36.2 | 39.0 | 45.3  | 41.1  | 29.5  | 16.4   |
|                                       | 30.7 | 45.8 | 25.8 | 30.5 | 27.9 | 27.0 | 48.9                              | 43.2 | 37.0 | 30.6 | 27.0 | 27.2  | 18.8  | 9.8   | 8.5    |
|                                       | 49.0 | 68.4 | 26.7 | 47.2 | 34.9 | 29.1 | 52.8                              | 47.9 | 43.2 | 40.3 | 41.7 | 46.6  | 42.2  | 31.7  | 21.0   |
|                                       | 50.0 | 71.8 | 26.7 | 44.7 | 33.0 | 28.5 | 49.0                              | 45.0 | 42.5 | 40.1 | 42.8 | 47.8  | 42.7  | 34.0  | 27.3   |
|                                       | 49.6 | 67.5 | 26.6 | 50.6 | 35.1 | 29.1 | 48.2                              | 45.0 | 39.6 | 38.2 | 41.5 | 47.4  | 43.1  | 30.2  | 17.0   |
|                                       | 50.1 | 66.6 | 28.9 | 51.3 | 34.8 | 30.6 | 49.9                              | 50.1 | 45.0 | 41.0 | 41.8 | 48.1  | 42.8  | 29.9  | 18.0   |

FIGURE 1  
PAGE 3

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 |
| 05:00 - 06:00 <i>Continued</i>        | 49.6 | 65.8 | 28.5 | 50.1 | 36.2 | 31.6 | 48.6                              | 46.5 | 41.5 | 39.6 | 40.6 | 47.1  | 43.6  | 31.7  | 18.0  | 8.2    |
|                                       | 52.6 | 68.6 | 31.3 | 56.8 | 39.0 | 34.5 | 49.8                              | 49.6 | 44.1 | 40.8 | 43.5 | 49.4  | 47.4  | 37.3  | 29.5  | 18.5   |
|                                       | 50.7 | 67.6 | 28.0 | 49.4 | 34.6 | 30.1 | 48.5                              | 45.9 | 45.4 | 43.0 | 43.4 | 48.6  | 43.2  | 33.5  | 22.1  | 10.7   |
|                                       | 35.9 | 53.3 | 26.4 | 34.8 | 29.3 | 27.8 | 47.5                              | 42.2 | 39.3 | 32.1 | 30.4 | 33.3  | 27.5  | 17.8  | 9.9   | 6.3    |
|                                       | 50.5 | 70.3 | 26.6 | 52.3 | 30.9 | 28.1 | 47.8                              | 45.6 | 43.1 | 41.0 | 42.9 | 47.3  | 44.0  | 39.1  | 34.1  | 20.7   |
| 06:00 - 07:00                         | 51.7 | 68.1 | 30.3 | 53.6 | 40.3 | 32.4 | 48.9                              | 47.9 | 43.2 | 41.1 | 43.3 | 49.1  | 45.5  | 34.6  | 21.3  | 10.1   |
|                                       | 43.7 | 58.0 | 26.8 | 41.4 | 31.1 | 28.8 | 46.6                              | 44.3 | 41.1 | 36.9 | 37.1 | 39.9  | 38.3  | 29.9  | 16.7  | 7.8    |
|                                       | 49.6 | 67.2 | 28.8 | 48.4 | 35.7 | 30.8 | 47.9                              | 44.8 | 41.2 | 37.7 | 40.4 | 47.1  | 43.5  | 31.5  | 17.6  | 7.6    |
|                                       | 49.3 | 65.2 | 29.3 | 51.3 | 38.9 | 31.7 | 50.5                              | 52.0 | 45.6 | 44.9 | 45.6 | 45.8  | 41.8  | 31.9  | 21.0  | 11.1   |
|                                       | 47.0 | 64.6 | 27.8 | 50.5 | 36.1 | 30.9 | 50.7                              | 46.3 | 44.0 | 41.1 | 41.6 | 43.8  | 40.5  | 32.1  | 20.4  | 9.8    |
|                                       | 53.9 | 69.1 | 30.6 | 58.3 | 43.7 | 36.0 | 48.3                              | 50.2 | 46.3 | 44.5 | 46.7 | 51.7  | 47.1  | 35.4  | 23.6  | 13.3   |
|                                       | 49.6 | 67.1 | 29.0 | 49.5 | 33.4 | 31.0 | 47.8                              | 46.5 | 40.7 | 38.0 | 41.8 | 47.4  | 42.8  | 31.6  | 20.2  | 8.8    |
|                                       | 43.4 | 61.6 | 29.0 | 44.9 | 33.2 | 30.9 | 50.2                              | 45.8 | 40.6 | 34.5 | 35.1 | 40.6  | 36.3  | 26.9  | 32.3  | 14.0   |
|                                       | 51.5 | 68.7 | 29.1 | 52.1 | 35.5 | 32.1 | 52.5                              | 50.2 | 49.5 | 45.2 | 43.6 | 49.1  | 44.8  | 33.9  | 25.3  | 10.1   |
|                                       | 50.5 | 64.9 | 31.3 | 54.2 | 43.1 | 35.6 | 57.3                              | 55.1 | 52.8 | 44.7 | 42.4 | 46.7  | 44.4  | 37.9  | 37.6  | 21.0   |
|                                       | 53.5 | 67.7 | 33.2 | 58.0 | 46.9 | 38.4 | 52.1                              | 51.7 | 48.2 | 45.0 | 44.6 | 50.3  | 47.2  | 41.7  | 38.0  | 21.5   |
|                                       | 50.5 | 68.5 | 32.0 | 52.5 | 38.3 | 33.9 | 49.7                              | 47.6 | 41.4 | 40.0 | 41.3 | 46.8  | 43.8  | 36.3  | 43.1  | 25.9   |

| NOISE LEVEL SUMMARY ASSESSMENT                                               |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|------------------------------------------------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                                                  | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 - 23:00<br>DAYTIME AVERAGE<br><small>L<sub>Aeq</sub> 16 HOUR</small>   | 59.7 | 71.2 | 45.6 | 63.5 | 57.1 | 50.6 | 59.9                              | 61.6 | 57.9 | 53.8 | 52.2 | 56.4  | 53.2  | 47.6  | 41.5  | 34.6   |
| 23:00 - 07:00<br>NIGHT TIME AVERAGE<br><small>L<sub>Aeq</sub> 8 HOUR</small> | 52.2 | 68.4 | 37.7 | 56.0 | 46.5 | 40.7 | 65.9                              | 58.3 | 51.6 | 47.0 | 45.2 | 48.6  | 45.9  | 40.3  | 33.8  | 24.2   |

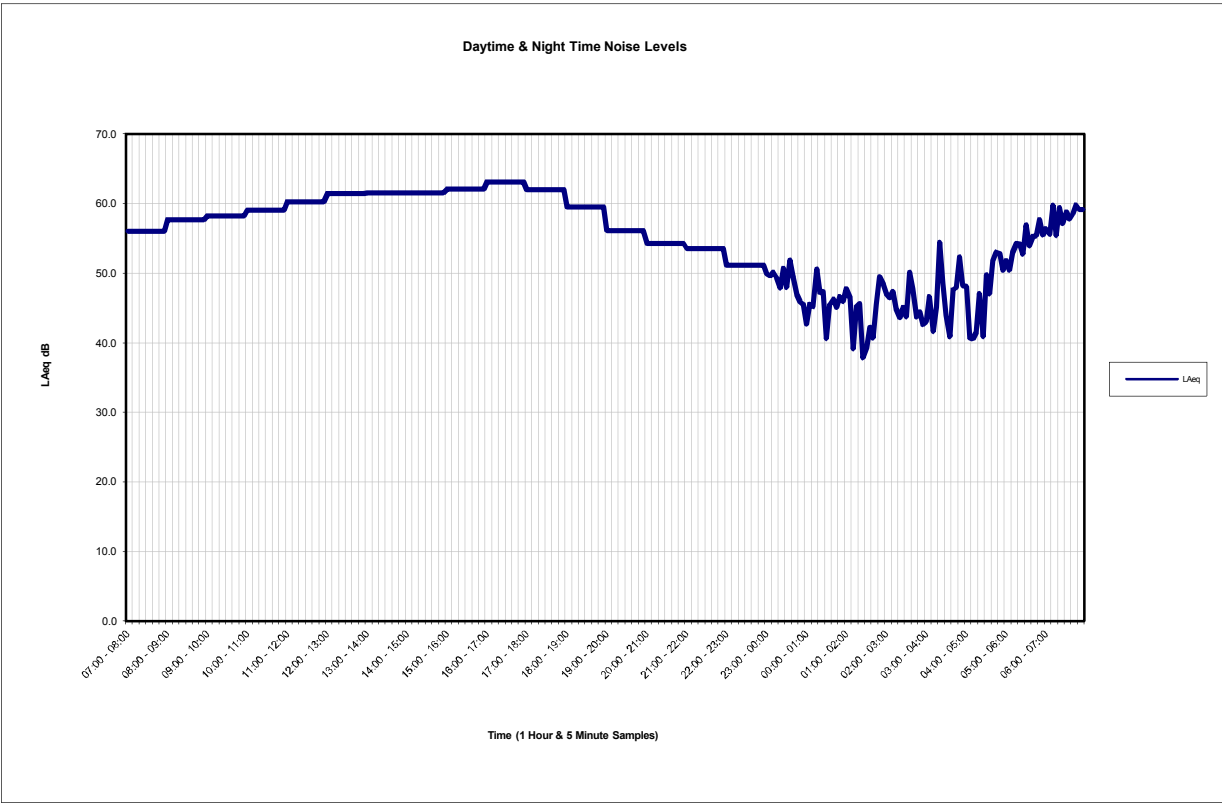


FIGURE 2  
PAGE 1

| DAYTIME NOISE LEVELS 07:00 - 23:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                        | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                    |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 07:00 - 08:00                      | 56.1 | 70.4 | 36.5 | 60.4 | 49.1 | 41.7 | 52.7                              | 55.1 | 50.6 | 48.7 | 48.4 | 53.5  | 49.6  | 39.7  | 17.7   |
| 08:00 - 09:00                      | 57.7 | 69.7 | 38.7 | 62.1 | 53.3 | 45.0 | 59.0                              | 59.5 | 54.7 | 50.7 | 50.1 | 55.1  | 51.2  | 41.7  | 22.2   |
| 09:00 - 10:00                      | 58.3 | 70.3 | 42.0 | 62.1 | 54.9 | 47.6 | 58.8                              | 62.4 | 61.3 | 55.2 | 51.2 | 55.3  | 51.1  | 42.8  | 32.2   |
| 10:00 - 11:00                      | 59.0 | 69.6 | 46.4 | 62.7 | 56.9 | 51.2 | 58.6                              | 61.3 | 57.1 | 52.5 | 51.8 | 56.4  | 52.2  | 43.1  | 32.9   |
| 11:00 - 12:00                      | 60.3 | 70.2 | 48.4 | 63.8 | 58.5 | 53.1 | 59.3                              | 63.4 | 58.7 | 55.2 | 53.8 | 57.5  | 53.3  | 44.4  | 38.3   |
| 12:00 - 13:00                      | 61.4 | 72.8 | 49.3 | 64.8 | 59.7 | 54.0 | 61.6                              | 65.4 | 62.6 | 57.0 | 54.9 | 58.6  | 54.3  | 45.6  | 38.2   |
| 13:00 - 14:00                      | 61.6 | 74.1 | 48.8 | 65.1 | 59.3 | 53.5 | 60.9                              | 64.4 | 61.3 | 57.8 | 55.0 | 58.7  | 54.4  | 46.6  | 39.3   |
| 14:00 - 15:00                      | 61.5 | 74.3 | 48.6 | 64.9 | 59.4 | 53.8 | 61.0                              | 64.8 | 58.9 | 57.0 | 54.8 | 58.9  | 54.3  | 45.3  | 30.1   |
| 15:00 - 16:00                      | 62.1 | 73.3 | 49.5 | 65.5 | 60.1 | 54.3 | 60.9                              | 64.5 | 61.0 | 56.6 | 55.0 | 59.4  | 55.1  | 46.7  | 34.9   |
| 16:00 - 17:00                      | 63.1 | 73.3 | 47.1 | 66.9 | 61.0 | 52.8 | 57.3                              | 61.9 | 58.8 | 55.3 | 54.5 | 59.0  | 57.3  | 53.4  | 38.0   |
| 17:00 - 18:00                      | 62.1 | 71.3 | 44.7 | 66.4 | 59.1 | 50.4 | 54.9                              | 59.6 | 55.2 | 52.4 | 52.8 | 57.1  | 56.6  | 53.9  | 37.6   |
| 18:00 - 19:00                      | 59.5 | 69.9 | 43.2 | 63.9 | 56.0 | 48.1 | 57.7                              | 57.4 | 51.8 | 49.6 | 50.4 | 54.8  | 54.0  | 51.2  | 35.1   |
| 19:00 - 20:00                      | 56.1 | 66.9 | 39.4 | 60.8 | 51.5 | 43.7 | 61.8                              | 57.6 | 51.9 | 47.7 | 47.5 | 52.7  | 50.1  | 45.0  | 28.9   |
| 20:00 - 21:00                      | 54.3 | 67.3 | 39.0 | 58.9 | 48.8 | 42.3 | 65.7                              | 59.5 | 52.2 | 46.9 | 46.2 | 51.5  | 47.9  | 39.8  | 22.7   |
| 21:00 - 22:00                      | 53.6 | 67.2 | 34.5 | 58.2 | 46.7 | 37.5 | 51.3                              | 52.4 | 50.2 | 45.2 | 44.8 | 49.9  | 47.7  | 43.2  | 26.1   |
| 22:00 - 23:00                      | 51.2 | 66.6 | 34.4 | 54.9 | 43.0 | 37.3 | 55.2                              | 52.1 | 46.9 | 46.2 | 43.3 | 48.1  | 44.9  | 38.2  | 20.1   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                       |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 23:00 - 00:00                         | 49.9 | 64.1 | 37.2 | 53.4 | 42.8 | 39.4 | 58.1                              | 54.6 | 55.9 | 49.0 | 42.6 | 46.0  | 42.7  | 36.2  | 18.7   |
|                                       | 49.6 | 65.1 | 36.3 | 53.0 | 42.8 | 40.2 | 59.0                              | 52.6 | 47.2 | 43.6 | 42.8 | 46.7  | 42.8  | 35.0  | 17.6   |
|                                       | 50.2 | 68.0 | 37.1 | 52.5 | 42.5 | 40.5 | 59.8                              | 52.8 | 47.9 | 44.2 | 42.9 | 47.1  | 43.8  | 36.0  | 21.8   |
|                                       | 49.4 | 66.2 | 38.7 | 51.2 | 43.4 | 40.9 | 60.9                              | 53.6 | 48.4 | 44.4 | 43.1 | 46.6  | 42.3  | 34.8  | 17.6   |
|                                       | 47.9 | 67.1 | 39.0 | 46.0 | 42.3 | 41.0 | 60.4                              | 53.4 | 48.4 | 43.9 | 41.0 | 44.6  | 41.2  | 33.8  | 15.2   |
|                                       | 50.7 | 65.6 | 39.8 | 53.4 | 44.9 | 41.9 | 59.4                              | 52.8 | 49.1 | 45.2 | 44.2 | 47.5  | 44.1  | 36.4  | 18.6   |
|                                       | 48.0 | 63.0 | 38.9 | 50.5 | 44.5 | 41.1 | 58.9                              | 52.9 | 49.1 | 45.6 | 43.3 | 44.1  | 40.9  | 34.2  | 18.6   |
|                                       | 51.9 | 71.1 | 39.1 | 53.0 | 43.0 | 41.1 | 57.8                              | 53.4 | 48.0 | 44.7 | 44.1 | 49.3  | 45.3  | 36.5  | 17.6   |
|                                       | 49.5 | 63.0 | 38.3 | 52.0 | 43.1 | 40.2 | 57.2                              | 51.4 | 47.6 | 44.2 | 42.8 | 46.4  | 42.9  | 35.0  | 16.7   |
|                                       | 46.9 | 62.0 | 37.2 | 48.7 | 41.4 | 39.6 | 57.8                              | 50.5 | 47.1 | 43.5 | 41.5 | 43.7  | 39.5  | 32.6  | 16.1   |
|                                       | 45.9 | 58.1 | 37.5 | 48.2 | 41.7 | 40.0 | 58.3                              | 51.3 | 47.5 | 44.2 | 41.4 | 41.7  | 38.9  | 31.6  | 15.7   |
|                                       | 45.6 | 59.5 | 37.7 | 46.4 | 41.2 | 39.9 | 57.4                              | 49.6 | 46.6 | 42.8 | 39.9 | 41.6  | 39.2  | 31.4  | 13.6   |
| 00:00 - 01:00                         | 42.7 | 57.7 | 36.7 | 43.9 | 40.4 | 38.9 | 57.3                              | 49.5 | 45.8 | 42.8 | 39.0 | 38.3  | 34.2  | 28.1  | 12.4   |
|                                       | 45.6 | 63.8 | 33.0 | 47.5 | 40.3 | 34.9 | 56.7                              | 52.2 | 48.8 | 43.4 | 40.1 | 42.0  | 38.1  | 30.8  | 15.6   |
|                                       | 45.2 | 62.6 | 32.9 | 44.2 | 37.9 | 34.9 | 50.8                              | 46.3 | 42.2 | 39.3 | 38.5 | 42.6  | 37.9  | 30.0  | 17.4   |
|                                       | 50.6 | 67.3 | 32.9 | 52.4 | 40.8 | 35.9 | 51.1                              | 51.6 | 44.8 | 42.7 | 43.7 | 48.0  | 43.6  | 35.4  | 17.1   |
|                                       | 47.2 | 67.2 | 33.3 | 46.4 | 38.4 | 35.2 | 51.4                              | 47.7 | 43.0 | 41.0 | 41.0 | 44.2  | 40.6  | 33.6  | 16.0   |
|                                       | 47.4 | 69.7 | 32.5 | 43.1 | 37.5 | 33.9 | 50.4                              | 45.6 | 44.2 | 40.4 | 39.6 | 45.3  | 39.6  | 31.4  | 13.8   |
|                                       | 40.6 | 55.0 | 33.1 | 43.1 | 39.8 | 37.1 | 57.6                              | 49.4 | 44.9 | 41.6 | 38.5 | 34.6  | 31.1  | 27.3  | 14.0   |
|                                       | 45.5 | 63.4 | 32.3 | 44.4 | 36.8 | 33.8 | 52.0                              | 45.6 | 42.0 | 40.5 | 38.5 | 41.9  | 39.6  | 31.4  | 13.3   |
|                                       | 46.3 | 68.7 | 31.9 | 43.8 | 36.0 | 33.3 | 49.4                              | 45.6 | 41.6 | 39.8 | 39.6 | 44.3  | 37.9  | 31.2  | 14.2   |
|                                       | 45.1 | 64.0 | 33.5 | 45.1 | 38.8 | 35.6 | 50.7                              | 45.8 | 42.1 | 40.0 | 38.5 | 42.3  | 38.0  | 30.4  | 14.4   |
|                                       | 46.7 | 66.0 | 33.8 | 44.8 | 37.9 | 35.3 | 49.5                              | 45.8 | 41.5 | 39.8 | 39.0 | 44.1  | 40.1  | 32.1  | 15.6   |
|                                       | 45.9 | 66.6 | 33.2 | 45.4 | 37.5 | 34.2 | 49.9                              | 46.6 | 42.6 | 39.1 | 38.8 | 43.6  | 38.2  | 31.9  | 18.5   |
| 01:00 - 02:00                         | 47.8 | 70.7 | 31.4 | 37.2 | 34.6 | 32.7 | 48.7                              | 44.7 | 40.9 | 37.8 | 38.8 | 45.3  | 41.0  | 34.5  | 17.6   |
|                                       | 46.5 | 66.9 | 34.0 | 44.5 | 37.7 | 35.5 | 50.2                              | 46.7 | 41.6 | 39.2 | 39.6 | 43.7  | 39.1  | 35.0  | 20.7   |
|                                       | 39.1 | 49.6 | 35.4 | 40.9 | 38.7 | 37.1 | 48.6                              | 43.7 | 39.7 | 37.0 | 34.5 | 32.0  | 32.0  | 31.2  | 23.0   |
|                                       | 45.2 | 62.5 | 35.2 | 45.3 | 39.2 | 36.9 | 50.8                              | 46.5 | 42.1 | 40.1 | 39.4 | 40.5  | 38.6  | 36.3  | 22.9   |

FIGURE 2  
PAGE 2

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 |
| 01:00 - 02:00 <i>Continued</i>        | 45.7 | 65.7 | 34.6 | 45.0 | 38.1 | 36.0 | 51.5                              | 47.6 | 46.3 | 39.8 | 37.9 | 41.3  | 39.5  | 36.4  | 31.6  | 24.0   |
|                                       | 37.8 | 50.6 | 33.8 | 39.6 | 36.8 | 35.3 | 52.3                              | 45.3 | 39.7 | 36.6 | 34.1 | 31.3  | 30.0  | 28.7  | 25.6  | 20.3   |
|                                       | 39.3 | 53.1 | 35.7 | 41.3 | 38.2 | 36.7 | 56.7                              | 49.7 | 42.6 | 37.5 | 34.8 | 31.9  | 31.7  | 31.0  | 29.0  | 24.6   |
|                                       | 42.3 | 62.6 | 36.4 | 44.7 | 39.5 | 37.7 | 50.5                              | 45.4 | 41.4 | 41.0 | 39.5 | 35.6  | 34.2  | 33.1  | 31.1  | 26.8   |
|                                       | 40.7 | 58.9 | 33.7 | 42.3 | 38.6 | 35.7 | 51.0                              | 45.9 | 41.8 | 40.1 | 38.3 | 34.5  | 32.3  | 30.6  | 27.6  | 22.5   |
|                                       | 45.6 | 67.8 | 33.4 | 42.7 | 37.5 | 34.8 | 49.7                              | 45.2 | 42.4 | 40.3 | 39.4 | 41.2  | 39.3  | 35.5  | 30.1  | 20.0   |
|                                       | 49.5 | 66.8 | 32.7 | 47.7 | 38.2 | 35.1 | 50.3                              | 46.9 | 42.4 | 41.1 | 41.2 | 45.3  | 43.7  | 39.8  | 33.6  | 23.2   |
| 02:00 - 03:00                         | 48.4 | 69.5 | 34.7 | 47.4 | 40.4 | 37.7 | 54.8                              | 56.0 | 47.8 | 43.3 | 42.0 | 44.7  | 41.4  | 37.4  | 32.2  | 22.5   |
|                                       | 47.0 | 63.6 | 37.1 | 49.6 | 43.4 | 40.1 | 55.2                              | 49.9 | 45.8 | 45.1 | 43.8 | 41.8  | 39.5  | 36.0  | 32.6  | 27.3   |
|                                       | 46.5 | 66.7 | 37.1 | 45.7 | 41.6 | 39.5 | 55.3                              | 49.3 | 43.8 | 42.3 | 41.0 | 41.7  | 39.6  | 37.3  | 32.8  | 26.1   |
|                                       | 47.4 | 65.7 | 36.9 | 48.2 | 41.0 | 38.9 | 64.0                              | 55.0 | 50.8 | 43.5 | 41.4 | 42.5  | 41.0  | 37.2  | 32.1  | 25.2   |
|                                       | 44.9 | 62.1 | 36.1 | 45.3 | 41.2 | 38.5 | 63.6                              | 54.7 | 47.7 | 42.7 | 40.0 | 39.7  | 38.2  | 33.8  | 28.5  | 21.8   |
|                                       | 43.6 | 57.7 | 35.6 | 46.0 | 40.8 | 37.7 | 65.1                              | 56.6 | 49.0 | 43.6 | 39.9 | 37.8  | 34.8  | 32.1  | 27.5  | 21.2   |
|                                       | 45.1 | 61.1 | 37.8 | 46.2 | 40.7 | 39.1 | 62.5                              | 54.8 | 47.9 | 42.5 | 39.5 | 39.0  | 38.6  | 36.2  | 31.4  | 25.1   |
|                                       | 43.7 | 62.7 | 37.2 | 46.4 | 41.0 | 38.7 | 64.5                              | 56.5 | 49.5 | 44.2 | 41.2 | 37.0  | 34.1  | 31.9  | 28.5  | 22.8   |
|                                       | 50.2 | 71.8 | 37.6 | 48.3 | 42.5 | 39.8 | 67.3                              | 60.4 | 57.1 | 55.0 | 43.9 | 43.6  | 41.2  | 38.0  | 32.8  | 23.9   |
|                                       | 47.8 | 66.7 | 37.4 | 48.8 | 41.7 | 39.6 | 65.4                              | 57.5 | 50.6 | 45.1 | 42.1 | 42.6  | 41.1  | 37.9  | 32.5  | 23.6   |
|                                       | 43.7 | 64.1 | 37.9 | 45.6 | 41.2 | 39.4 | 64.7                              | 57.6 | 50.1 | 44.7 | 41.5 | 36.7  | 33.3  | 31.0  | 27.6  | 22.0   |
|                                       | 44.5 | 62.7 | 36.9 | 45.2 | 40.1 | 38.1 | 66.5                              | 58.6 | 50.8 | 43.9 | 38.9 | 37.9  | 37.1  | 34.4  | 29.9  | 22.6   |
| 03:00 - 04:00                         | 42.6 | 57.9 | 36.6 | 44.7 | 40.9 | 38.0 | 61.7                              | 54.9 | 48.1 | 43.7 | 40.6 | 36.0  | 32.7  | 29.6  | 25.1  | 17.7   |
|                                       | 43.0 | 61.2 | 35.5 | 42.3 | 39.1 | 37.4 | 61.3                              | 53.5 | 47.1 | 41.9 | 38.1 | 37.7  | 35.4  | 32.4  | 26.5  | 17.4   |
|                                       | 46.7 | 62.5 | 35.5 | 46.1 | 39.2 | 37.2 | 58.5                              | 52.8 | 47.8 | 47.1 | 41.3 | 41.1  | 40.0  | 36.7  | 30.1  | 19.4   |
|                                       | 41.6 | 61.2 | 35.4 | 42.9 | 39.6 | 37.3 | 57.4                              | 51.3 | 45.8 | 42.5 | 39.8 | 35.5  | 31.9  | 28.1  | 22.6  | 14.5   |
|                                       | 45.1 | 62.7 | 35.6 | 45.2 | 39.9 | 37.7 | 58.5                              | 52.3 | 46.9 | 42.5 | 39.6 | 40.9  | 38.3  | 33.4  | 27.0  | 16.7   |
|                                       | 54.5 | 81.5 | 35.9 | 57.0 | 49.1 | 38.9 | 81.6                              | 73.0 | 65.4 | 58.2 | 50.0 | 44.0  | 40.0  | 34.5  | 29.2  | 23.5   |
|                                       | 48.6 | 63.4 | 37.1 | 51.9 | 45.9 | 39.7 | 71.3                              | 64.0 | 56.6 | 50.3 | 44.9 | 42.8  | 38.2  | 32.1  | 26.3  | 19.6   |
|                                       | 43.9 | 60.6 | 34.3 | 44.3 | 40.4 | 38.4 | 62.6                              | 54.7 | 48.1 | 43.4 | 39.7 | 38.6  | 36.3  | 32.2  | 25.1  | 14.8   |
|                                       | 40.9 | 49.1 | 34.4 | 43.1 | 40.1 | 37.8 | 62.2                              | 55.0 | 49.0 | 43.6 | 38.1 | 33.5  | 29.8  | 26.1  | 21.1  | 13.8   |
|                                       | 47.7 | 68.0 | 36.7 | 46.8 | 41.2 | 39.0 | 71.6                              | 63.9 | 55.8 | 48.3 | 42.5 | 42.7  | 37.9  | 32.2  | 26.3  | 18.9   |
|                                       | 48.0 | 67.5 | 37.1 | 47.2 | 40.5 | 39.0 | 72.2                              | 63.4 | 54.7 | 47.5 | 41.7 | 43.4  | 39.7  | 34.1  | 28.2  | 20.3   |
|                                       | 52.4 | 69.1 | 34.9 | 55.7 | 46.5 | 39.6 | 77.7                              | 69.1 | 60.8 | 52.6 | 45.9 | 46.5  | 44.3  | 37.9  | 31.5  | 24.5   |
| 04:00 - 05:00                         | 48.2 | 65.7 | 33.6 | 50.4 | 40.9 | 35.7 | 73.0                              | 63.9 | 55.4 | 47.5 | 41.8 | 43.3  | 39.7  | 36.1  | 30.6  | 23.4   |
|                                       | 48.1 | 65.7 | 33.7 | 48.7 | 38.5 | 35.3 | 57.4                              | 50.2 | 43.8 | 40.1 | 39.8 | 44.2  | 42.1  | 37.9  | 31.0  | 20.3   |
|                                       | 40.8 | 57.3 | 32.4 | 43.3 | 38.8 | 34.3 | 52.0                              | 46.8 | 43.0 | 41.3 | 39.1 | 34.8  | 31.6  | 28.2  | 23.4  | 14.7   |
|                                       | 40.6 | 54.2 | 34.9 | 43.6 | 38.8 | 36.4 | 50.6                              | 46.0 | 43.0 | 41.2 | 38.4 | 34.2  | 32.1  | 29.5  | 25.5  | 18.7   |
|                                       | 41.5 | 56.5 | 33.3 | 44.0 | 39.0 | 36.2 | 65.7                              | 56.9 | 49.1 | 43.0 | 38.3 | 33.7  | 31.5  | 29.2  | 25.7  | 20.2   |
|                                       | 47.1 | 63.7 | 33.2 | 49.5 | 40.3 | 35.7 | 52.2                              | 47.6 | 44.2 | 43.3 | 42.0 | 42.7  | 40.6  | 36.0  | 30.2  | 21.7   |
|                                       | 40.9 | 56.5 | 36.3 | 42.9 | 39.4 | 37.6 | 61.3                              | 53.1 | 46.2 | 40.8 | 37.3 | 34.0  | 32.8  | 30.7  | 26.9  | 21.2   |
|                                       | 49.8 | 66.6 | 36.9 | 52.5 | 45.5 | 39.9 | 73.2                              | 64.6 | 56.4 | 49.3 | 44.6 | 43.2  | 42.0  | 39.3  | 34.2  | 26.3   |
|                                       | 47.0 | 62.2 | 37.8 | 49.9 | 43.0 | 39.9 | 71.1                              | 62.9 | 54.7 | 47.7 | 42.4 | 40.6  | 37.8  | 34.6  | 30.1  | 24.1   |
|                                       | 51.8 | 70.5 | 37.2 | 51.6 | 41.5 | 39.0 | 58.0                              | 57.1 | 48.3 | 46.1 | 45.4 | 46.8  | 45.4  | 43.4  | 38.1  | 28.1   |
|                                       | 53.0 | 70.1 | 38.5 | 54.5 | 43.4 | 40.0 | 54.9                              | 51.3 | 46.4 | 44.9 | 45.0 | 48.4  | 47.2  | 44.0  | 37.9  | 28.4   |
|                                       | 52.8 | 70.0 | 38.1 | 56.1 | 43.8 | 39.8 | 63.4                              | 56.0 | 48.2 | 44.2 | 44.4 | 48.4  | 47.2  | 43.4  | 37.0  | 26.7   |
| 05:00 - 06:00                         | 50.4 | 67.8 | 37.1 | 53.0 | 42.1 | 39.5 | 64.4                              | 56.7 | 49.6 | 46.5 | 43.5 | 46.7  | 43.8  | 39.2  | 33.8  | 28.8   |
|                                       | 51.8 | 68.3 | 35.3 | 52.3 | 42.2 | 37.7 | 59.6                              | 51.9 | 46.7 | 44.0 | 44.1 | 48.0  | 45.9  | 40.5  | 34.0  | 23.7   |
|                                       | 50.4 | 67.2 | 38.3 | 54.2 | 43.8 | 40.1 | 54.4                              | 55.3 | 47.3 | 46.1 | 45.5 | 46.0  | 43.9  | 39.3  | 32.8  | 23.8   |
|                                       | 53.0 | 71.0 | 37.0 | 55.6 | 43.5 | 39.7 | 50.6                              | 48.9 | 47.9 | 45.3 | 44.9 | 49.2  | 47.4  | 41.8  | 34.1  | 23.2   |
|                                       | 54.3 | 68.3 | 38.1 | 58.8 | 47.2 | 40.6 | 53.2                              | 50.7 | 47.1 | 47.2 | 47.4 | 51.0  | 47.9  | 42.3  | 35.4  | 24.9   |
|                                       | 54.2 | 67.3 | 40.5 | 58.8 | 46.7 | 42.9 | 53.5                              | 53.1 | 48.6 | 46.9 | 47.4 | 50.6  | 47.9  | 43.1  | 36.0  | 25.3   |
|                                       | 52.7 | 67.7 | 40.2 | 56.1 | 47.0 | 42.5 | 50.9                              | 51.8 | 46.5 | 45.6 | 45.6 | 49.2  | 46.6  | 41.2  | 33.6  | 23.0   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                       |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 05:00 - 06:00 <i>Continued</i>        | 57.0 | 77.0 | 40.2 | 59.1 | 48.4 | 42.4 | 53.4                              | 51.7 | 49.2 | 48.5 | 49.8 | 52.7  | 51.2  | 47.6  | 29.7   |
|                                       | 53.9 | 67.8 | 40.5 | 56.1 | 47.2 | 43.1 | 53.6                              | 52.5 | 50.4 | 47.7 | 47.0 | 49.9  | 47.6  | 43.5  | 32.4   |
|                                       | 55.3 | 69.4 | 39.9 | 59.8 | 47.4 | 42.2 | 55.4                              | 53.4 | 49.0 | 47.7 | 48.1 | 52.0  | 49.1  | 43.4  | 25.3   |
|                                       | 55.4 | 67.3 | 39.7 | 60.0 | 50.6 | 42.4 | 53.9                              | 54.9 | 48.3 | 47.4 | 47.1 | 52.2  | 49.4  | 43.3  | 24.1   |
|                                       | 57.7 | 70.4 | 39.9 | 62.3 | 51.2 | 43.9 | 51.7                              | 53.6 | 48.1 | 48.1 | 49.5 | 54.8  | 51.5  | 45.3  | 26.2   |
| 06:00 - 07:00                         | 55.5 | 66.6 | 41.9 | 60.7 | 49.4 | 43.4 | 52.3                              | 53.8 | 49.5 | 47.1 | 47.6 | 52.0  | 49.7  | 43.7  | 26.5   |
|                                       | 56.4 | 67.5 | 39.9 | 61.2 | 51.3 | 43.7 | 54.3                              | 53.1 | 49.5 | 47.6 | 48.4 | 53.4  | 50.4  | 43.8  | 25.3   |
|                                       | 55.6 | 70.5 | 39.6 | 59.5 | 50.9 | 42.9 | 52.5                              | 52.5 | 47.3 | 46.7 | 47.3 | 52.6  | 49.6  | 43.0  | 24.7   |
|                                       | 59.8 | 72.5 | 39.0 | 64.1 | 52.5 | 42.9 | 54.0                              | 58.8 | 58.3 | 54.7 | 53.8 | 55.8  | 53.5  | 48.9  | 32.0   |
|                                       | 55.4 | 68.1 | 37.6 | 59.4 | 49.3 | 41.8 | 56.5                              | 55.0 | 47.5 | 45.7 | 46.9 | 52.4  | 49.2  | 42.8  | 24.5   |
|                                       | 59.5 | 70.5 | 39.1 | 64.5 | 50.0 | 41.2 | 54.0                              | 56.6 | 51.1 | 51.1 | 53.0 | 55.9  | 53.1  | 48.4  | 30.8   |
|                                       | 57.2 | 69.4 | 40.9 | 61.9 | 53.1 | 45.9 | 56.0                              | 57.1 | 50.7 | 48.7 | 49.2 | 54.0  | 51.2  | 44.7  | 26.8   |
|                                       | 58.8 | 70.0 | 41.3 | 62.9 | 54.9 | 46.9 | 54.9                              | 58.9 | 52.8 | 50.3 | 50.6 | 55.6  | 52.8  | 46.3  | 27.9   |
|                                       | 57.8 | 70.1 | 39.3 | 62.7 | 52.5 | 43.8 | 56.7                              | 58.8 | 52.0 | 49.9 | 50.3 | 54.1  | 51.9  | 46.5  | 28.0   |
|                                       | 58.5 | 71.1 | 42.2 | 62.9 | 54.3 | 48.1 | 54.6                              | 58.4 | 50.9 | 49.0 | 50.5 | 55.6  | 52.2  | 45.3  | 26.9   |
|                                       | 59.8 | 74.3 | 41.1 | 64.5 | 54.0 | 45.9 | 55.1                              | 56.1 | 51.4 | 49.9 | 51.1 | 56.3  | 54.2  | 47.5  | 30.1   |
|                                       | 59.2 | 68.5 | 45.2 | 63.6 | 55.8 | 49.2 | 56.1                              | 59.4 | 54.6 | 52.7 | 51.3 | 56.2  | 53.0  | 46.2  | 27.6   |

| NOISE LEVEL SUMMARY ASSESSMENT                                               |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|------------------------------------------------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                                                                  | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 - 23:00<br>DAYTIME AVERAGE<br><small>L<sub>Aeq</sub> 16 HOUR</small>   | 60.3 | 72.9 | 46.9 | 63.7 | 58.5 | 51.7 | 60.4                              | 61.9 | 56.3 | 52.7 | 52.0 | 56.6  | 54.4  | 49.5  | 43.3  | 35.3   |
| 23:00 - 07:00<br>NIGHT TIME AVERAGE<br><small>L<sub>Aeq</sub> 8 HOUR</small> | 51.0 | 66.0 | 40.8 | 54.0 | 46.4 | 42.9 | 64.8                              | 58.3 | 51.6 | 46.8 | 44.6 | 47.3  | 44.5  | 37.6  | 30.6  | 22.2   |

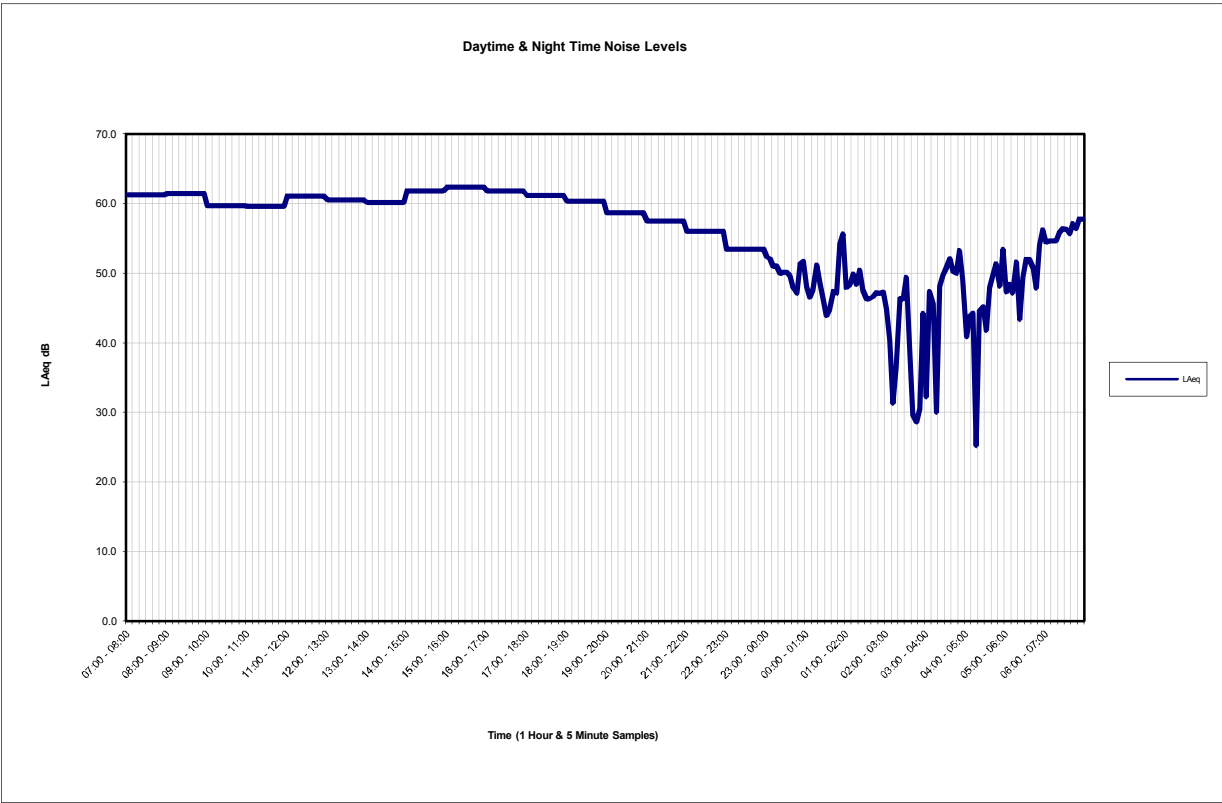


FIGURE 3  
PAGE 1

| DAYTIME NOISE LEVELS 07:00 - 23:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                        | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                    |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 07:00 - 08:00                      | 61.3 | 71.0 | 47.8 | 64.7 | 60.1 | 53.1 | 58.8                              | 62.9 | 58.3 | 54.3 | 53.6 | 58.2  | 55.1  | 48.1  | 40.9   |
| 08:00 - 09:00                      | 61.5 | 71.0 | 48.6 | 64.8 | 60.4 | 53.3 | 60.3                              | 63.4 | 57.1 | 54.3 | 53.7 | 58.5  | 55.2  | 47.6  | 41.3   |
| 09:00 - 10:00                      | 59.7 | 68.9 | 46.2 | 63.3 | 57.9 | 51.1 | 58.7                              | 61.9 | 55.1 | 52.4 | 52.2 | 56.8  | 53.5  | 45.8  | 37.8   |
| 10:00 - 11:00                      | 59.7 | 69.1 | 45.1 | 63.3 | 57.8 | 50.9 | 57.8                              | 61.3 | 57.6 | 53.7 | 52.1 | 56.3  | 53.4  | 47.2  | 40.6   |
| 11:00 - 12:00                      | 61.1 | 73.7 | 52.0 | 64.0 | 59.8 | 55.6 | 63.2                              | 65.6 | 58.7 | 55.0 | 54.2 | 57.8  | 54.7  | 48.4  | 41.9   |
| 12:00 - 13:00                      | 60.6 | 80.0 | 44.0 | 62.8 | 56.9 | 49.9 | 57.9                              | 61.1 | 58.0 | 52.3 | 51.4 | 57.6  | 54.8  | 45.1  | 36.3   |
| 13:00 - 14:00                      | 60.1 | 72.3 | 49.8 | 63.2 | 58.7 | 54.1 | 63.8                              | 64.1 | 57.3 | 53.4 | 52.9 | 57.1  | 53.8  | 46.3  | 38.8   |
| 14:00 - 15:00                      | 61.8 | 75.6 | 47.3 | 65.1 | 60.2 | 52.8 | 58.7                              | 61.5 | 55.5 | 52.6 | 52.1 | 56.1  | 56.5  | 54.3  | 48.5   |
| 15:00 - 16:00                      | 62.4 | 72.2 | 47.9 | 66.1 | 60.6 | 52.9 | 58.5                              | 61.9 | 58.2 | 53.8 | 52.7 | 56.5  | 57.1  | 55.0  | 49.4   |
| 16:00 - 17:00                      | 61.8 | 74.0 | 46.9 | 65.3 | 60.5 | 51.9 | 57.4                              | 61.2 | 55.7 | 53.9 | 52.7 | 57.0  | 56.3  | 53.4  | 47.2   |
| 17:00 - 18:00                      | 61.2 | 70.1 | 47.2 | 64.3 | 60.5 | 53.1 | 56.8                              | 61.8 | 58.0 | 53.3 | 52.7 | 58.0  | 55.3  | 48.6  | 40.7   |
| 18:00 - 19:00                      | 60.4 | 69.9 | 45.0 | 63.9 | 59.0 | 51.3 | 56.0                              | 60.7 | 54.9 | 51.7 | 52.0 | 57.4  | 54.4  | 47.1  | 39.1   |
| 19:00 - 20:00                      | 58.7 | 69.1 | 43.7 | 62.8 | 55.8 | 48.3 | 57.6                              | 60.4 | 52.6 | 49.8 | 50.0 | 55.6  | 52.7  | 45.8  | 38.1   |
| 20:00 - 21:00                      | 57.5 | 69.3 | 41.6 | 62.4 | 52.2 | 44.8 | 60.5                              | 60.2 | 52.9 | 48.9 | 48.5 | 53.3  | 51.7  | 48.2  | 42.1   |
| 21:00 - 22:00                      | 56.1 | 70.3 | 34.8 | 60.5 | 49.8 | 41.1 | 60.8                              | 56.1 | 47.8 | 46.5 | 47.3 | 52.9  | 50.0  | 43.5  | 41.3   |
| 22:00 - 23:00                      | 53.4 | 68.5 | 39.5 | 57.2 | 45.8 | 41.8 | 65.3                              | 58.5 | 50.6 | 47.1 | 45.9 | 50.2  | 47.0  | 40.7  | 34.2   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | Octave Band Centre Frequency (Hz) |      |      |      |      |       |       |       |        |
|                                       |      |      |      |      |      |      | 31.5                              | 63   | 125  | 250  | 500  | 1.0 k | 2.0 k | 4.0 k | 16.0 k |
| 23:00 - 00:00                         | 52.4 | 65.3 | 41.1 | 56.7 | 46.0 | 43.8 | 63.1                              | 59.5 | 50.3 | 46.6 | 44.2 | 48.7  | 46.3  | 40.8  | 33.6   |
|                                       | 52.1 | 65.7 | 33.5 | 56.7 | 44.5 | 39.7 | 57.5                              | 56.9 | 49.1 | 45.9 | 44.0 | 48.9  | 45.7  | 40.0  | 33.2   |
|                                       | 51.0 | 66.3 | 29.8 | 55.0 | 44.1 | 34.5 | 52.9                              | 56.7 | 49.8 | 46.0 | 43.4 | 46.8  | 45.1  | 40.3  | 33.3   |
|                                       | 51.1 | 64.4 | 38.3 | 55.5 | 43.4 | 41.6 | 65.0                              | 58.2 | 49.3 | 45.3 | 43.0 | 47.4  | 45.2  | 39.2  | 32.4   |
|                                       | 50.0 | 63.0 | 41.2 | 54.2 | 43.9 | 42.6 | 55.3                              | 62.4 | 50.6 | 46.0 | 42.8 | 45.1  | 44.1  | 40.0  | 33.6   |
|                                       | 50.2 | 66.1 | 42.2 | 50.7 | 43.7 | 42.9 | 54.9                              | 61.2 | 49.7 | 45.7 | 42.8 | 45.9  | 44.3  | 38.9  | 33.1   |
|                                       | 50.2 | 66.7 | 42.7 | 51.0 | 44.1 | 43.3 | 55.5                              | 59.8 | 51.5 | 47.0 | 43.6 | 45.1  | 43.8  | 40.6  | 34.5   |
|                                       | 49.7 | 65.3 | 42.7 | 51.7 | 43.7 | 43.2 | 51.4                              | 59.7 | 49.2 | 46.5 | 42.8 | 45.0  | 43.5  | 39.8  | 33.0   |
|                                       | 48.0 | 64.7 | 42.5 | 47.1 | 43.5 | 43.0 | 50.6                              | 59.4 | 49.1 | 46.2 | 42.2 | 43.2  | 41.5  | 35.6  | 29.0   |
|                                       | 47.1 | 64.0 | 42.5 | 45.5 | 43.4 | 43.0 | 57.6                              | 58.3 | 49.1 | 46.1 | 41.7 | 42.8  | 39.6  | 34.9  | 29.0   |
|                                       | 51.4 | 68.2 | 43.8 | 49.9 | 46.3 | 45.8 | 59.1                              | 53.0 | 52.1 | 49.6 | 45.9 | 47.4  | 44.5  | 38.9  | 32.2   |
|                                       | 51.7 | 69.4 | 44.8 | 51.4 | 47.0 | 46.1 | 62.0                              | 54.2 | 52.3 | 50.2 | 46.6 | 47.7  | 44.3  | 38.8  | 32.4   |
| 00:00 - 01:00                         | 48.1 | 63.1 | 44.9 | 47.3 | 46.8 | 46.5 | 60.8                              | 53.4 | 52.6 | 49.9 | 45.3 | 42.4  | 38.6  | 32.8  | 26.8   |
|                                       | 46.6 | 61.7 | 43.5 | 47.2 | 45.3 | 44.3 | 63.9                              | 56.1 | 51.0 | 47.9 | 44.0 | 41.0  | 37.1  | 32.9  | 26.5   |
|                                       | 47.7 | 62.9 | 43.8 | 47.0 | 45.2 | 44.5 | 62.3                              | 53.9 | 50.6 | 47.4 | 43.7 | 43.0  | 39.9  | 35.4  | 28.4   |
|                                       | 51.2 | 65.4 | 44.7 | 52.3 | 46.1 | 45.2 | 61.0                              | 56.6 | 51.5 | 48.2 | 45.6 | 47.2  | 44.4  | 39.1  | 32.8   |
|                                       | 48.6 | 63.5 | 33.7 | 48.7 | 46.3 | 46.0 | 61.4                              | 55.3 | 50.1 | 48.4 | 45.1 | 44.2  | 40.6  | 35.2  | 28.9   |
|                                       | 46.3 | 64.4 | 27.5 | 46.3 | 41.2 | 30.4 | 68.6                              | 55.7 | 46.6 | 43.3 | 41.3 | 42.1  | 39.4  | 33.1  | 28.7   |
|                                       | 43.9 | 50.2 | 26.7 | 47.2 | 43.0 | 29.0 | 69.4                              | 56.5 | 47.1 | 45.7 | 42.4 | 37.7  | 32.9  | 28.2  | 26.3   |
|                                       | 44.8 | 48.1 | 26.7 | 46.7 | 45.2 | 38.7 | 72.9                              | 59.8 | 48.1 | 45.9 | 43.3 | 38.4  | 33.7  | 28.9  | 27.0   |
|                                       | 47.4 | 66.8 | 25.0 | 46.4 | 44.6 | 40.3 | 72.8                              | 61.1 | 49.2 | 45.2 | 43.6 | 43.0  | 39.4  | 33.5  | 28.6   |
|                                       | 47.1 | 57.6 | 35.4 | 47.6 | 46.8 | 45.3 | 71.3                              | 60.3 | 51.5 | 49.0 | 45.1 | 41.2  | 36.4  | 31.1  | 26.2   |
| 01:00 - 02:00                         | 54.2 | 77.3 | 42.1 | 50.5 | 47.6 | 46.2 | 66.7                              | 58.3 | 52.4 | 50.8 | 47.5 | 50.3  | 48.4  | 41.8  | 34.4   |
|                                       | 55.7 | 74.1 | 41.2 | 51.2 | 47.0 | 46.0 | 67.3                              | 62.0 | 54.2 | 51.9 | 49.4 | 52.3  | 48.7  | 43.9  | 37.3   |
|                                       | 48.0 | 49.0 | 40.3 | 48.4 | 48.1 | 47.3 | 66.1                              | 57.0 | 50.4 | 51.2 | 46.6 | 42.0  | 36.8  | 31.3  | 26.7   |
|                                       | 48.4 | 49.0 | 44.2 | 48.8 | 48.5 | 48.0 | 68.1                              | 59.9 | 50.8 | 50.9 | 46.9 | 42.6  | 37.1  | 31.2  | 26.8   |

|               |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 01:00 - 02:00 | 49.9 | 63.4 | 45.5 | 49.4 | 48.7 | 48.4 | 61.5 | 53.8 | 48.1 | 51.9 | 47.1 | 44.8 | 41.2 | 34.1 | 27.8 |
|               | 48.4 | 49.6 | 47.1 | 48.7 | 48.5 | 48.1 | 62.7 | 54.6 | 48.6 | 51.4 | 46.4 | 42.8 | 37.5 | 31.8 | 26.7 |
|               |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 |
| 01:00 - 02:00 <i>Continued</i>        | 50.4 | 65.6 | 45.0 | 49.1 | 48.2 | 47.8 | 68.4                              | 61.4 | 55.9 | 50.3 | 47.5 | 45.4  | 40.8  | 37.0  | 30.9  | 21.5   |
|                                       | 47.6 | 59.6 | 40.9 | 48.8 | 45.8 | 45.1 | 62.2                              | 63.1 | 52.9 | 49.8 | 44.8 | 40.2  | 38.0  | 34.1  | 27.6  | 19.3   |
|                                       | 46.3 | 48.5 | 44.8 | 47.2 | 46.1 | 45.8 | 66.0                              | 60.9 | 55.4 | 48.9 | 43.3 | 35.2  | 36.8  | 30.5  | 24.8  | 17.4   |
|                                       | 46.4 | 48.0 | 45.5 | 47.0 | 46.3 | 45.9 | 67.5                              | 63.4 | 55.5 | 49.0 | 43.3 | 34.9  | 37.0  | 30.5  | 24.9  | 17.6   |
|                                       | 46.7 | 48.7 | 45.8 | 47.2 | 46.6 | 46.3 | 62.0                              | 58.3 | 57.7 | 50.0 | 44.0 | 35.7  | 37.1  | 31.2  | 25.6  | 18.5   |
|                                       | 47.2 | 48.5 | 46.8 | 47.4 | 47.1 | 47.0 | 52.3                              | 45.6 | 56.5 | 48.9 | 45.2 | 35.7  | 38.5  | 31.9  | 26.7  | 19.5   |
|                                       | 47.1 | 48.2 | 46.4 | 47.3 | 47.1 | 46.8 | 49.3                              | 44.6 | 56.7 | 48.9 | 44.6 | 37.1  | 38.5  | 32.2  | 26.8  | 19.6   |
| 02:00 - 03:00                         | 47.3 | 49.1 | 46.6 | 48.0 | 47.2 | 46.9 | 62.1                              | 55.0 | 57.4 | 49.9 | 44.7 | 37.5  | 38.1  | 32.6  | 27.0  | 20.0   |
|                                       | 44.8 | 48.7 | 26.7 | 47.5 | 47.0 | 28.0 | 58.9                              | 58.0 | 56.0 | 47.9 | 42.4 | 34.1  | 34.8  | 29.4  | 23.9  | 17.1   |
|                                       | 40.4 | 61.0 | 24.6 | 30.1 | 26.2 | 25.5 | 48.6                              | 44.2 | 38.3 | 34.2 | 32.2 | 37.0  | 34.6  | 26.6  | 17.4  | 7.3    |
|                                       | 31.3 | 50.0 | 24.1 | 30.7 | 26.5 | 25.2 | 48.8                              | 43.9 | 37.9 | 33.0 | 28.7 | 25.0  | 21.0  | 16.6  | 12.7  | 8.1    |
|                                       | 36.5 | 52.7 | 23.5 | 37.5 | 26.4 | 25.0 | 45.5                              | 45.6 | 38.4 | 31.3 | 29.3 | 32.3  | 29.8  | 26.1  | 21.3  | 13.0   |
|                                       | 46.4 | 63.6 | 25.1 | 45.2 | 29.5 | 26.5 | 46.0                              | 43.1 | 38.0 | 34.8 | 36.8 | 43.3  | 40.9  | 32.8  | 24.0  | 13.7   |
|                                       | 46.3 | 65.3 | 25.2 | 40.6 | 28.2 | 26.7 | 45.9                              | 41.7 | 37.3 | 35.8 | 38.2 | 43.7  | 40.1  | 31.7  | 23.8  | 14.2   |
|                                       | 49.4 | 72.6 | 25.4 | 42.1 | 28.1 | 26.5 | 64.8                              | 53.8 | 44.0 | 41.4 | 42.6 | 46.1  | 42.5  | 38.1  | 31.0  | 19.8   |
|                                       | 39.4 | 59.5 | 25.1 | 35.7 | 28.1 | 26.4 | 46.4                              | 41.5 | 35.4 | 30.8 | 31.9 | 36.3  | 33.2  | 26.2  | 20.8  | 15.0   |
|                                       | 29.7 | 45.8 | 24.6 | 31.7 | 29.1 | 26.3 | 49.9                              | 43.6 | 37.3 | 31.2 | 26.0 | 21.9  | 19.6  | 18.5  | 18.4  | 15.1   |
|                                       | 28.6 | 38.2 | 24.8 | 30.1 | 28.2 | 26.6 | 49.5                              | 43.1 | 36.7 | 30.6 | 24.9 | 20.2  | 18.2  | 16.8  | 16.7  | 12.8   |
|                                       | 30.6 | 48.1 | 25.8 | 32.0 | 29.5 | 27.9 | 48.3                              | 42.3 | 36.1 | 30.1 | 25.2 | 22.3  | 21.9  | 22.0  | 22.8  | 19.0   |
| 03:00 - 04:00                         | 44.3 | 64.1 | 26.5 | 38.3 | 30.9 | 28.6 | 52.0                              | 50.9 | 41.6 | 36.8 | 35.0 | 38.8  | 39.2  | 35.7  | 29.2  | 21.4   |
|                                       | 32.2 | 47.6 | 26.8 | 34.6 | 30.2 | 28.4 | 56.3                              | 46.3 | 38.1 | 31.4 | 25.9 | 24.6  | 24.9  | 22.8  | 21.9  | 17.4   |
|                                       | 47.4 | 67.0 | 26.7 | 42.4 | 32.4 | 29.6 | 49.8                              | 45.4 | 42.8 | 37.5 | 38.8 | 43.9  | 41.7  | 36.0  | 29.9  | 21.6   |
|                                       | 45.6 | 64.5 | 24.2 | 42.1 | 29.6 | 26.3 | 46.7                              | 41.5 | 37.9 | 33.5 | 35.0 | 41.5  | 40.4  | 35.2  | 29.8  | 19.7   |
|                                       | 30.0 | 44.3 | 25.4 | 32.6 | 28.5 | 26.9 | 48.1                              | 42.8 | 36.7 | 31.2 | 26.2 | 22.5  | 20.6  | 19.3  | 19.4  | 15.2   |
|                                       | 48.1 | 66.7 | 26.7 | 48.4 | 36.2 | 29.2 | 49.5                              | 47.6 | 39.7 | 37.8 | 39.0 | 44.5  | 42.7  | 37.1  | 29.3  | 19.8   |
|                                       | 49.7 | 60.2 | 27.2 | 51.7 | 50.8 | 29.6 | 76.6                              | 68.3 | 57.1 | 49.6 | 46.5 | 43.2  | 39.2  | 32.4  | 28.2  | 23.5   |
|                                       | 50.7 | 64.1 | 48.7 | 51.1 | 50.1 | 49.3 | 75.6                              | 68.3 | 58.9 | 50.7 | 47.8 | 44.1  | 39.0  | 35.8  | 30.5  | 23.9   |
|                                       | 52.1 | 66.8 | 48.2 | 52.0 | 49.7 | 48.7 | 72.5                              | 65.1 | 58.0 | 50.7 | 47.8 | 47.0  | 43.9  | 38.5  | 32.8  | 24.7   |
|                                       | 50.3 | 64.4 | 47.9 | 51.0 | 48.9 | 48.2 | 66.9                              | 59.8 | 55.8 | 51.2 | 46.3 | 43.8  | 42.3  | 37.6  | 31.6  | 23.8   |
|                                       | 50.0 | 51.4 | 47.7 | 50.8 | 50.0 | 48.9 | 71.3                              | 64.7 | 59.2 | 51.0 | 47.4 | 42.9  | 38.0  | 34.6  | 29.8  | 23.4   |
|                                       | 53.3 | 65.6 | 49.0 | 53.1 | 50.9 | 50.5 | 71.2                              | 66.9 | 61.0 | 52.1 | 48.9 | 48.3  | 44.7  | 40.5  | 34.8  | 25.3   |
| 04:00 - 05:00                         | 49.1 | 62.7 | 26.4 | 51.0 | 44.8 | 28.2 | 67.6                              | 63.0 | 56.2 | 47.3 | 44.5 | 44.4  | 40.8  | 35.2  | 28.9  | 20.0   |
|                                       | 40.9 | 61.0 | 24.6 | 38.0 | 27.0 | 25.8 | 46.4                              | 41.6 | 35.5 | 31.0 | 31.0 | 37.7  | 35.5  | 25.5  | 16.1  | 7.8    |
|                                       | 43.8 | 63.0 | 23.3 | 38.7 | 25.9 | 24.5 | 45.6                              | 42.5 | 37.1 | 32.8 | 35.0 | 41.1  | 37.5  | 30.5  | 22.9  | 11.2   |
|                                       | 44.3 | 61.7 | 23.8 | 47.6 | 27.8 | 25.2 | 47.6                              | 42.9 | 37.0 | 35.2 | 34.5 | 41.4  | 38.2  | 32.6  | 25.3  | 13.2   |
|                                       | 25.2 | 34.4 | 21.9 | 26.3 | 24.6 | 23.5 | 46.2                              | 40.0 | 33.5 | 27.1 | 22.0 | 17.9  | 15.2  | 11.7  | 8.8   | 5.9    |
|                                       | 44.6 | 60.5 | 22.6 | 44.8 | 25.6 | 23.8 | 46.7                              | 44.5 | 35.9 | 33.1 | 35.8 | 41.1  | 39.3  | 30.8  | 23.2  | 11.6   |
|                                       | 45.2 | 63.9 | 23.8 | 37.9 | 26.3 | 25.0 | 46.4                              | 42.8 | 36.6 | 34.4 | 36.6 | 42.1  | 39.3  | 32.1  | 24.4  | 12.5   |
|                                       | 41.8 | 63.7 | 23.7 | 33.6 | 26.1 | 25.0 | 48.7                              | 47.1 | 38.9 | 40.6 | 36.7 | 34.8  | 35.7  | 30.9  | 25.5  | 15.7   |
|                                       | 48.0 | 68.5 | 23.6 | 43.0 | 29.1 | 26.0 | 49.7                              | 58.7 | 48.1 | 41.9 | 42.5 | 44.5  | 40.8  | 36.1  | 30.0  | 18.4   |
|                                       | 49.7 | 66.2 | 24.8 | 50.8 | 29.4 | 26.5 | 51.8                              | 47.6 | 41.4 | 40.3 | 41.7 | 46.3  | 43.9  | 37.7  | 30.2  | 18.6   |
|                                       | 51.4 | 64.9 | 25.3 | 55.0 | 40.6 | 28.2 | 55.2                              | 55.0 | 44.8 | 42.6 | 43.9 | 47.9  | 45.3  | 39.9  | 34.2  | 21.0   |
|                                       | 48.1 | 65.2 | 24.7 | 50.5 | 34.5 | 26.8 | 58.2                              | 54.3 | 42.2 | 38.2 | 38.5 | 45.3  | 41.9  | 34.6  | 25.6  | 14.0   |
| 05:00 - 06:00                         | 53.5 | 68.3 | 22.7 | 54.4 | 52.5 | 31.8 | 62.5                              | 55.1 | 46.4 | 44.2 | 52.1 | 49.0  | 46.0  | 38.7  | 31.8  | 27.3   |
|                                       | 47.3 | 65.2 | 23.1 | 46.9 | 27.9 | 24.4 | 45.0                              | 41.4 | 35.6 | 34.0 | 36.9 | 44.6  | 41.8  | 31.6  | 22.5  | 11.1   |
|                                       | 48.4 | 65.3 | 24.1 | 52.1 | 29.2 | 25.5 | 46.8                              | 47.2 | 42.1 | 40.8 | 39.4 | 45.5  | 42.5  | 34.7  | 25.6  | 14.3   |
|                                       | 47.1 | 61.9 | 22.8 | 50.6 | 34.5 | 24.4 | 55.0                              | 48.9 | 43.1 | 39.5 | 40.1 | 44.1  | 40.8  | 33.0  | 24.7  | 13.9   |
|                                       | 51.6 | 66.6 | 25.0 | 55.6 | 38.9 | 27.7 | 52.4                              | 49.7 | 43.3 | 40.2 | 42.8 | 49.0  | 45.6  | 35.8  | 26.2  | 14.6   |
|                                       | 43.4 | 61.3 | 23.7 | 40.8 | 29.0 | 25.2 | 52.9                              | 44.2 | 36.5 | 31.7 | 33.3 | 40.6  | 37.7  | 28.4  | 19.9  | 8.9    |
|                                       | 49.4 | 68.8 | 25.5 | 53.0 | 43.4 | 30.2 | 47.4                              | 46.7 | 42.7 | 40.6 | 40.3 | 46.1  | 43.8  | 37.6  | 28.6  | 17.2   |

| NIGHT TIME NOISE LEVELS 23:00 - 07:00 |      |      |      |      |      |      |                                   |      |      |      |      |       |       |       |       |        |
|---------------------------------------|------|------|------|------|------|------|-----------------------------------|------|------|------|------|-------|-------|-------|-------|--------|
| Date / Time                           | LAeq | Lmax | Lmin | LA10 | LA50 | LA90 | 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 |
| 05:00 - 06:00 <i>Continued</i>        | 52.0 | 68.2 | 25.9 | 55.8 | 39.7 | 28.4 | 46.9                              | 48.0 | 41.9 | 40.9 | 43.1 | 49.4  | 45.8  | 37.5  | 28.2  | 17.0   |
|                                       | 52.0 | 66.8 | 24.6 | 55.0 | 38.3 | 27.3 | 51.5                              | 48.1 | 42.4 | 41.2 | 42.6 | 49.0  | 46.4  | 38.4  | 29.5  | 28.5   |
|                                       | 50.8 | 66.5 | 25.1 | 52.4 | 36.8 | 29.4 | 48.5                              | 48.4 | 46.5 | 40.8 | 41.8 | 48.1  | 44.6  | 37.1  | 30.4  | 19.2   |
|                                       | 47.9 | 61.6 | 27.2 | 51.9 | 41.2 | 32.2 | 53.3                              | 48.8 | 40.6 | 38.8 | 39.1 | 45.0  | 42.0  | 34.0  | 26.5  | 23.4   |
|                                       | 54.1 | 68.2 | 28.5 | 59.0 | 44.3 | 31.8 | 56.5                              | 52.6 | 45.9 | 44.5 | 45.5 | 50.8  | 48.5  | 40.8  | 32.2  | 21.8   |
| 06:00 - 07:00                         | 56.2 | 70.4 | 35.5 | 60.8 | 48.7 | 39.2 | 48.5                              | 51.6 | 46.6 | 45.2 | 47.1 | 53.3  | 50.4  | 41.7  | 32.6  | 20.9   |
|                                       | 54.5 | 68.6 | 30.1 | 58.6 | 45.5 | 34.8 | 61.1                              | 55.2 | 47.5 | 44.4 | 45.5 | 51.8  | 48.5  | 40.0  | 30.6  | 34.4   |
|                                       | 54.7 | 67.6 | 35.5 | 58.5 | 48.7 | 39.8 | 63.5                              | 60.5 | 50.6 | 45.2 | 46.0 | 51.6  | 48.9  | 40.6  | 31.6  | 22.0   |
|                                       | 54.7 | 68.8 | 29.5 | 58.8 | 48.2 | 37.0 | 51.2                              | 52.8 | 45.9 | 45.1 | 46.5 | 51.6  | 48.7  | 41.2  | 32.7  | 20.8   |
|                                       | 54.7 | 66.2 | 34.6 | 59.0 | 51.0 | 38.7 | 52.1                              | 56.3 | 48.9 | 46.7 | 46.4 | 51.7  | 48.7  | 40.7  | 32.0  | 20.0   |
|                                       | 55.9 | 68.4 | 38.0 | 60.2 | 49.7 | 41.6 | 55.6                              | 55.4 | 48.6 | 46.7 | 47.2 | 52.8  | 50.1  | 42.2  | 33.7  | 23.6   |
|                                       | 56.4 | 71.4 | 36.1 | 61.1 | 49.8 | 41.0 | 54.4                              | 58.4 | 53.2 | 48.0 | 47.7 | 53.1  | 50.6  | 43.3  | 37.6  | 28.5   |
|                                       | 56.3 | 68.6 | 37.6 | 61.1 | 50.8 | 43.0 | 54.8                              | 54.3 | 47.5 | 46.2 | 47.4 | 53.5  | 50.3  | 41.5  | 32.4  | 20.5   |
|                                       | 55.7 | 65.3 | 38.9 | 60.3 | 51.8 | 43.9 | 56.8                              | 55.2 | 54.4 | 49.1 | 47.7 | 52.5  | 49.7  | 41.5  | 33.6  | 22.7   |
|                                       | 57.2 | 68.1 | 40.0 | 61.7 | 52.5 | 45.5 | 54.0                              | 59.3 | 52.3 | 48.6 | 49.1 | 54.3  | 51.0  | 43.4  | 36.4  | 23.4   |
|                                       | 56.4 | 67.5 | 40.8 | 60.6 | 52.6 | 45.8 | 56.3                              | 56.5 | 55.5 | 51.0 | 48.5 | 53.0  | 50.4  | 42.8  | 36.5  | 23.9   |
|                                       | 57.8 | 67.8 | 41.1 | 62.1 | 53.9 | 46.2 | 56.5                              | 57.5 | 50.5 | 47.5 | 49.0 | 55.0  | 51.9  | 43.0  | 33.4  | 22.3   |

# Calculation Sheet BS 8233:2014 (Table 2 / 4)

|               |                      |
|---------------|----------------------|
| <b>Client</b> | Highwood Group Ltd   |
| <b>Site</b>   | Land at Dukes Meadow |
| <b>Figure</b> | 4                    |

| <b>Maximum Criteria</b> |            |
|-------------------------|------------|
| Daytime                 | Night Time |
| 35                      | 30         |

|              |              |
|--------------|--------------|
| <b>Floor</b> | Ground Floor |
| <b>Room</b>  | Lounge       |

|                |     |
|----------------|-----|
| <b>Daytime</b> | MET |
| <b>Evening</b> | MET |

|                                      |                                                 |
|--------------------------------------|-------------------------------------------------|
| <b>Proposed Window Configuration</b> | 4 / 14 / 6 with standard through frame slotvent |
|--------------------------------------|-------------------------------------------------|

|              |                                                                                              |
|--------------|----------------------------------------------------------------------------------------------|
| <b>Leqff</b> | The equivalent continuous sound pressure level outside the room elements under consideration |
| <b>A0</b>    | The reference absorption area of 10m <sup>2</sup> and is independent of frequency            |
| <b>Sf</b>    | The total façade area of the room in question                                                |
| <b>Swi</b>   | The area of the windows in the room                                                          |
| <b>Sew</b>   | The area of the external wall of the room                                                    |
| <b>Srr</b>   | The area of the ceiling of the room (if applicable)                                          |
| <b>S</b>     | The total area of the elements through which sound enters the room                           |
| <b>Dne</b>   | The insulation value of the trickle ventilator (if applicable)                               |
| <b>Rwi</b>   | The sound reduction index of the window                                                      |
| <b>Rew</b>   | The sound reduction index of the external wall                                               |
| <b>Rrr</b>   | The sound reduction index of the ceiling/roof (if applicable)                                |
| <b>A</b>     | The equivalent absorption area of the receiving room where $A=0.163V/T$                      |

|                |                                                                                                                                                                |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Formula</b> | $Leq2 = Leqff + 10 \log[A0/S \cdot 10^{(-Dne/10)} + Swi/S \cdot 10^{(-Rwi/10)} + Sew/10 \cdot 10^{(-Rew/10)} + Srr/S \cdot 10^{(-Rrr/10)}] + 10 \log(S/A) + 3$ |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         | Octave Band Centre Frequency (Hz) |      |      |      |      |      |
|-------------------------|-----------------------------------|------|------|------|------|------|
|                         | 125                               | 250  | 500  | 1000 | 2000 | 4000 |
| <b>Sf</b>               | 9                                 | 9    | 9    | 9    | 9    | 9    |
| <b>Sr</b>               | 0                                 | 0    | 0    | 0    | 0    | 0    |
| <b>Swi</b>              | 3                                 | 3    | 3    | 3    | 3    | 3    |
| <b>Sew</b>              | 6                                 | 6    | 6    | 6    | 6    | 6    |
| <b>Srr</b>              | 0                                 | 0    | 0    | 0    | 0    | 0    |
| <b>S</b>                | 9                                 | 9    | 9    | 9    | 9    | 9    |
| <b>A0</b>               | 10                                | 10   | 10   | 10   | 10   | 10   |
| <b>V</b>                | 40                                | 40   | 40   | 40   | 40   | 40   |
| <b>T (BS8233)</b>       | 0.50                              | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| <b>A</b>                | 13                                | 13   | 13   | 13   | 13   | 13   |
| <b>Daytime Leqff</b>    | 56.3                              | 52.7 | 52.0 | 56.6 | 54.4 | 49.5 |
| <b>Night time Leqff</b> | 51.6                              | 47.0 | 45.2 | 48.6 | 45.9 | 40.3 |
| <b>Dne</b>              | 33.0                              | 32.0 | 29.0 | 29.0 | 31.0 | 33.0 |
| <b>Rwi</b>              | 24.4                              | 26.5 | 36.2 | 41.7 | 40.3 | 42.6 |
| <b>Rew</b>              | 40.0                              | 44.0 | 45.0 | 51.0 | 56.0 | 61.0 |
| <b>Rrr</b>              | 28.0                              | 34.0 | 40.0 | 45.0 | 49.0 | 53.0 |

\*estimated

|                                                                                |                                |             |              |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00) | <b>L<sub>Aeq</sub> 16 HOUR</b> | <b>32.3</b> | <b>dB(A)</b> |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|

|                                                                                   |                               |             |              |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) | <b>L<sub>Aeq</sub> 8 HOUR</b> | <b>24.4</b> | <b>dB(A)</b> |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|

# Calculation Sheet BS 8233:2014 (Table 2 / 4)

|               |                      |
|---------------|----------------------|
| <b>Client</b> | Highwood Group Ltd   |
| <b>Site</b>   | Land at Dukes Meadow |
| <b>Figure</b> | 5                    |

| <b>Maximum Criteria</b> |            |
|-------------------------|------------|
| Daytime                 | Night Time |
| 35                      | 30         |

|              |              |
|--------------|--------------|
| <b>Floor</b> | Ground Floor |
| <b>Room</b>  | Bedroom      |

|                |     |
|----------------|-----|
| <b>Daytime</b> | MET |
| <b>Evening</b> | MET |

|                                      |                                                 |
|--------------------------------------|-------------------------------------------------|
| <b>Proposed Window Configuration</b> | 4 / 14 / 6 with standard through frame slotvent |
|--------------------------------------|-------------------------------------------------|

|              |                                                                                              |
|--------------|----------------------------------------------------------------------------------------------|
| <b>Leqff</b> | The equivalent continuous sound pressure level outside the room elements under consideration |
| <b>A0</b>    | The reference absorption area of 10m <sup>2</sup> and is independent of frequency            |
| <b>Sf</b>    | The total façade area of the room in question                                                |
| <b>Swi</b>   | The area of the windows in the room                                                          |
| <b>Sew</b>   | The area of the external wall of the room                                                    |
| <b>Srr</b>   | The area of the ceiling of the room (if applicable)                                          |
| <b>S</b>     | The total area of the elements through which sound enters the room                           |
| <b>Dne</b>   | The insulation value of the trickle ventilator (if applicable)                               |
| <b>Rwi</b>   | The sound reduction index of the window                                                      |
| <b>Rew</b>   | The sound reduction index of the external wall                                               |
| <b>Rrr</b>   | The sound reduction index of the ceiling/roof (if applicable)                                |
| <b>A</b>     | The equivalent absorption area of the receiving room where $A=0.163V/T$                      |

|                |                                                                                                                                                                |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Formula</b> | $Leq2 = Leqff + 10 \log[A0/S \cdot 10^{(-Dne/10)} + Swi/S \cdot 10^{(-Rwi/10)} + Sew/10 \cdot 10^{(-Rew/10)} + Srr/S \cdot 10^{(-Rrr/10)}] + 10 \log(S/A) + 3$ |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         | Octave Band Centre Frequency (Hz) |      |      |      |      |      |
|-------------------------|-----------------------------------|------|------|------|------|------|
|                         | 125                               | 250  | 500  | 1000 | 2000 | 4000 |
| <b>Sf</b>               | 9                                 | 9    | 9    | 9    | 9    | 9    |
| <b>Sr</b>               | 0                                 | 0    | 0    | 0    | 0    | 0    |
| <b>Swi</b>              | 1.3                               | 1.3  | 1.3  | 1.3  | 1.3  | 1.3  |
| <b>Sew</b>              | 7.7                               | 7.7  | 7.7  | 7.7  | 7.7  | 7.7  |
| <b>Srr</b>              | 0                                 | 0    | 0    | 0    | 0    | 0    |
| <b>S</b>                | 9                                 | 9    | 9    | 9    | 9    | 9    |
| <b>A0</b>               | 10                                | 10   | 10   | 10   | 10   | 10   |
| <b>V</b>                | 31                                | 31   | 31   | 31   | 31   | 31   |
| <b>T (BS8233)</b>       | 0.50                              | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| <b>A</b>                | 10                                | 10   | 10   | 10   | 10   | 10   |
| <b>Daytime Leqff</b>    | 56.3                              | 52.7 | 52.0 | 56.6 | 54.4 | 49.5 |
| <b>Night time Leqff</b> | 51.6                              | 47.0 | 45.2 | 48.6 | 45.9 | 40.3 |
| <b>Dne</b>              | 33.0                              | 32.0 | 29.0 | 29.0 | 31.0 | 33.0 |
| <b>Rwi</b>              | 24.4                              | 26.5 | 36.2 | 41.7 | 40.3 | 42.6 |
| <b>Rew</b>              | 40.0                              | 44.0 | 45.0 | 51.0 | 56.0 | 61.0 |
| <b>Rrr</b>              | 28.0                              | 34.0 | 40.0 | 45.0 | 49.0 | 53.0 |

\*estimated

|                                                                                |                                |             |              |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00) | <b>L<sub>Aeq</sub> 16 HOUR</b> | <b>33.2</b> | <b>dB(A)</b> |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|

|                                                                                   |                               |             |              |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) | <b>L<sub>Aeq</sub> 8 HOUR</b> | <b>25.3</b> | <b>dB(A)</b> |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|

# Calculation Sheet BS 8233:2014 (Table 2 / 4)

|               |                      |
|---------------|----------------------|
| <b>Client</b> | Highwood Group Ltd   |
| <b>Site</b>   | Land at Dukes Meadow |
| <b>Figure</b> | 6                    |

| <b>Maximum Criteria</b> |            |
|-------------------------|------------|
| Daytime                 | Night Time |
| 35                      | 30         |

|              |              |
|--------------|--------------|
| <b>Floor</b> | Second Floor |
| <b>Room</b>  | Living Room  |

|                |     |
|----------------|-----|
| <b>Daytime</b> | MET |
| <b>Evening</b> | MET |

|                                      |                                                 |
|--------------------------------------|-------------------------------------------------|
| <b>Proposed Window Configuration</b> | 4 / 14 / 6 with standard through frame slotvent |
|--------------------------------------|-------------------------------------------------|

|              |                                                                                              |
|--------------|----------------------------------------------------------------------------------------------|
| <b>Leqff</b> | The equivalent continuous sound pressure level outside the room elements under consideration |
| <b>A0</b>    | The reference absorption area of 10m <sup>2</sup> and is independent of frequency            |
| <b>Sf</b>    | The total façade area of the room in question                                                |
| <b>Swi</b>   | The area of the windows in the room                                                          |
| <b>Sew</b>   | The area of the external wall of the room                                                    |
| <b>Srr</b>   | The area of the ceiling of the room (if applicable)                                          |
| <b>S</b>     | The total area of the elements through which sound enters the room                           |
| <b>Dne</b>   | The insulation value of the trickle ventilator (if applicable)                               |
| <b>Rwi</b>   | The sound reduction index of the window                                                      |
| <b>Rew</b>   | The sound reduction index of the external wall                                               |
| <b>Rrr</b>   | The sound reduction index of the ceiling/roof (if applicable)                                |
| <b>A</b>     | The equivalent absorption area of the receiving room where $A=0.163V/T$                      |

|                |                                                                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Formula</b> | $Leq2 = Leqff + 10 \log [A0/S \cdot 10^{(-Dne/10)} + Swi/S \cdot 10^{(-Rwi/10)} + Sew/10 \cdot 10^{(-Rew/10)} + Srr/S \cdot 10^{(-Rrr/10)}] + 10 \log (S/A) + 3$ |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         | Octave Band Centre Frequency (Hz) |      |      |      |      |      |
|-------------------------|-----------------------------------|------|------|------|------|------|
|                         | 125                               | 250  | 500  | 1000 | 2000 | 4000 |
| <b>Sf</b>               | 9                                 | 9    | 9    | 9    | 9    | 9    |
| <b>Sr</b>               | 17                                | 17   | 17   | 17   | 17   | 17   |
| <b>Swi</b>              | 3                                 | 3    | 3    | 3    | 3    | 3    |
| <b>Sew</b>              | 6                                 | 6    | 6    | 6    | 6    | 6    |
| <b>Srr</b>              | 17                                | 17   | 17   | 17   | 17   | 17   |
| <b>S</b>                | 26                                | 26   | 26   | 26   | 26   | 26   |
| <b>A0</b>               | 10                                | 10   | 10   | 10   | 10   | 10   |
| <b>V</b>                | 40                                | 40   | 40   | 40   | 40   | 40   |
| <b>T (BS8233)</b>       | 0.50                              | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| <b>A</b>                | 13                                | 13   | 13   | 13   | 13   | 13   |
| <b>Daytime Leqff</b>    | 56.3                              | 52.7 | 52.0 | 56.6 | 54.4 | 49.5 |
| <b>Night time Leqff</b> | 51.6                              | 47.0 | 45.2 | 48.6 | 45.9 | 40.3 |
| <b>Dne</b>              | 33.0                              | 32.0 | 29.0 | 29.0 | 31.0 | 33.0 |
| <b>Rwi</b>              | 24.4                              | 26.5 | 36.2 | 41.7 | 40.3 | 42.6 |
| <b>Rew</b>              | 40.0                              | 44.0 | 45.0 | 51.0 | 56.0 | 61.0 |
| <b>Rrr</b>              | 28.0                              | 34.0 | 40.0 | 45.0 | 49.0 | 53.0 |

\*estimated

|                                                                                |                                |             |              |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00) | <b>L<sub>Aeq</sub> 16 HOUR</b> | <b>32.6</b> | <b>dB(A)</b> |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|

|                                                                                   |                               |             |              |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) | <b>L<sub>Aeq</sub> 8 HOUR</b> | <b>24.9</b> | <b>dB(A)</b> |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|

# Calculation Sheet BS 8233:2014 (Table 2 / 4)

|               |                      |
|---------------|----------------------|
| <b>Client</b> | Highwood Group Ltd   |
| <b>Site</b>   | Land at Dukes Meadow |
| <b>Figure</b> | 7                    |

| <b>Maximum Criteria</b> |            |
|-------------------------|------------|
| Daytime                 | Night Time |
| 35                      | 30         |

|              |              |
|--------------|--------------|
| <b>Floor</b> | Second Floor |
| <b>Room</b>  | Bedroom      |

|                |     |
|----------------|-----|
| <b>Daytime</b> | MET |
| <b>Evening</b> | MET |

|                                      |                                                 |
|--------------------------------------|-------------------------------------------------|
| <b>Proposed Window Configuration</b> | 4 / 14 / 6 with standard through frame slotvent |
|--------------------------------------|-------------------------------------------------|

|              |                                                                                              |
|--------------|----------------------------------------------------------------------------------------------|
| <b>Leqff</b> | The equivalent continuous sound pressure level outside the room elements under consideration |
| <b>A0</b>    | The reference absorption area of 10m <sup>2</sup> and is independent of frequency            |
| <b>Sf</b>    | The total façade area of the room in question                                                |
| <b>Swi</b>   | The area of the windows in the room                                                          |
| <b>Sew</b>   | The area of the external wall of the room                                                    |
| <b>Srr</b>   | The area of the ceiling of the room (if applicable)                                          |
| <b>S</b>     | The total area of the elements through which sound enters the room                           |
| <b>Dne</b>   | The insulation value of the trickle ventilator (if applicable)                               |
| <b>Rwi</b>   | The sound reduction index of the window                                                      |
| <b>Rew</b>   | The sound reduction index of the external wall                                               |
| <b>Rrr</b>   | The sound reduction index of the ceiling/roof (if applicable)                                |
| <b>A</b>     | The equivalent absorption area of the receiving room where $A=0.163V/T$                      |

|                |                                                                                                                                                                |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Formula</b> | $Leq2 = Leqff + 10 \log[A0/S \cdot 10^{(-Dne/10)} + Swi/S \cdot 10^{(-Rwi/10)} + Sew/10 \cdot 10^{(-Rew/10)} + Srr/S \cdot 10^{(-Rrr/10)}] + 10 \log(S/A) + 3$ |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         | Octave Band Centre Frequency (Hz) |      |      |      |      |      |
|-------------------------|-----------------------------------|------|------|------|------|------|
|                         | 125                               | 250  | 500  | 1000 | 2000 | 4000 |
| <b>Sf</b>               | 9                                 | 9    | 9    | 9    | 9    | 9    |
| <b>Sr</b>               | 13                                | 13   | 13   | 13   | 13   | 13   |
| <b>Swi</b>              | 1.3                               | 1.3  | 1.3  | 1.3  | 1.3  | 1.3  |
| <b>Sew</b>              | 7.7                               | 7.7  | 7.7  | 7.7  | 7.7  | 7.7  |
| <b>Srr</b>              | 13                                | 13   | 13   | 13   | 13   | 13   |
| <b>S</b>                | 22                                | 22   | 22   | 22   | 22   | 22   |
| <b>A0</b>               | 10                                | 10   | 10   | 10   | 10   | 10   |
| <b>V</b>                | 31                                | 31   | 31   | 31   | 31   | 31   |
| <b>T (BS8233)</b>       | 0.50                              | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| <b>A</b>                | 10                                | 10   | 10   | 10   | 10   | 10   |
| <b>Daytime Leqff</b>    | 56.3                              | 52.7 | 52.0 | 56.6 | 54.4 | 49.5 |
| <b>Night time Leqff</b> | 51.6                              | 47.0 | 45.2 | 48.6 | 45.9 | 40.3 |
| <b>Dne</b>              | 33.0                              | 32.0 | 29.0 | 29.0 | 31.0 | 33.0 |
| <b>Rwi</b>              | 24.4                              | 26.5 | 36.2 | 41.7 | 40.3 | 42.6 |
| <b>Rew</b>              | 40.0                              | 44.0 | 45.0 | 51.0 | 56.0 | 61.0 |
| <b>Rrr</b>              | 28.0                              | 34.0 | 40.0 | 45.0 | 49.0 | 53.0 |

\*estimated

|                                                                                |                                |             |              |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Daytime Hours (07:00-23:00) | <b>L<sub>Aeq</sub> 16 HOUR</b> | <b>33.5</b> | <b>dB(A)</b> |
|--------------------------------------------------------------------------------|--------------------------------|-------------|--------------|

|                                                                                   |                               |             |              |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|
| Predicted dB(A) Level Within The Above Room During Night Time Hours (23:00-07:00) | <b>L<sub>Aeq</sub> 8 HOUR</b> | <b>25.7</b> | <b>dB(A)</b> |
|-----------------------------------------------------------------------------------|-------------------------------|-------------|--------------|