

**DRAGONFLY**  
acoustics



**UK Asset Resolution Ltd (UKAR)**

**21-27 Lamb's Conduit Street, London**

**DC0899 – R1**

**Noise Impact Assessment**

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**July 2012**

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## 1.0 INTRODUCTION

UK Asset Resolution Ltd (UKAR) has appointed Dragonfly Acoustics Limited to carry out a noise assessment relating to the installation of additional air conditioning condenser units on the roof area at 21-27 Lamb's Conduit Street, London.

It is understood that the noise assessment is required to establish the noise levels at the nearest noise sensitive receptor (NSR) due to the operation of the plant.

The noise assessment has been conducted in accordance with the National Planning Policy Framework. The noise assessment has also been conducted in accordance with Planning and Policy Guidance 24 (PPG24) and British Standard 4142 *Method for rating industrial noise affecting mixed residential and industrial areas*.

This report therefore describes a noise survey of the site and the subsequent analysis to determine the noise impact of the additional air conditioning units on the nearest noise sensitive receptor; it then compares the results with the adopted criteria.

Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature; to assist the reader, a glossary of terminology is included in Appendix A.

## **2.0 SITE DESCRIPTION**

### **2.1 Existing Site Conditions**

21-27 Lamb's Conduit Street is a 3 storey office building located on the corner of Lamb's Conduit Street and Dombey Street in Camden, London.

The area surrounding the property is a mix of residential and commercial properties. The properties at third floor level (immediately facing the location of the proposed additional plant), also on Lamb's Conduit Street, are residential dwellings.

### **2.2 Proposed Site Conditions**

It is proposed to expand the existing plant compound on the roof of 21-27 Lamb's Conduit Street because additional cooling capacity is required for the air conditioning system due to internal changes in the building. The additional capacity will be provided through the installation of 4 additional condenser units in an extension to the existing compound immediately adjacent to the existing plant compound, as detailed in the drawing issued by Rance Smith Booth Architects (Ref: 11715-205-A).

The 4 condenser units to be installed are as follows:

- 3x Toshiba 'RAV-SP564AT-E' Condenser Units
- 1x Toshiba 'RAV-SM563AT-E' Condenser Unit

In the manufacturer's documentation the 'RAV-SP564AT-E' has a stated Sound Power Level of 64dB. In the manufacturer's documentation the 'RAV-SP563AT-E' has a stated Sound Power Level of 65dB.

The proposed plant will operate from 0630hrs to 1830hrs only.

### 3.0 GUIDANCE

#### 3.1 Consultation with Camden Borough Council

Dragonfly Acoustics has consulted the planning authority, Camden Borough Council (CBC), to confirm its views and policies on noise-related issues.

The National Planning Policy Framework (NPPF) does not provide any specific or quantified guidance with respect to noise and has withdrawn all previous guidance documents on the assessment of noise for planning purposes, which was previously detailed in Planning and Policy Guidance 24 (PPG24). Instead the NPPF places the onus on a local authority to develop a suitable local development plan, within which noise is addressed, taking account of the guidance within the NPPF.

CBC's development policy D28 requires that all plant noise levels must be 5dB(A) below the measured background noise level ( $L_{90}$ ) at 1m from the façade of the nearest noise sensitive premises. Where the noise has a distinguishable discrete continuous note (whine, hiss, screech, hum) or distinct impulses (bangs, clicks, clatters, thumps) plant noise levels must be 10dB(A) below the measured background noise level ( $L_{90}$ ) at 1m from the façade of the nearest noise sensitive premises.

#### 3.2 Noise Policy Statement for England

The document "Noise Policy Statement for England" sets out the following vision for ongoing noise policy:

*"Promote good health and a a quality of life through the effective management of noise within the context of Government policy on sustainable development."*

This vision should be achieved through the following Noise Policy Aims:

*"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*

To achieve these objectives the Noise Policy Statement sets three noise levels to be defined by the assessor:

##### **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.

##### **SOAEL – Significant Observed Adverse Effect Level**

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

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

*"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development..... This does not mean that such adverse effects cannot occur."*

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change.

### 3.3 British Standard 4142

British Standard 4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas* is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.

The procedure contained in BS4142 for assessing the likelihood of complaint requires the calculation of the noise level from the source to be assessed at a location immediately outside the relevant dwelling; this is described as the 'specific noise level'. Where the specific noise source already exists its noise level can be derived by measuring the total noise present, or 'ambient noise', and subtracting from it the noise from sources that are not under consideration. Noises not under consideration are called the 'residual noise'. The specific noise level is then compared with the background noise level at that measurement location. If the specific noise source does not yet exist but the details of the intended plant are known, the specific noise level can be derived from first principles using manufacturers' and other data.

The specific, ambient and residual noise levels are measured in terms of  $L_{Aeq,T}$  values and the background noise level is measured in terms of an  $L_{A90}$  value.

BS4142 considers that certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level.

These features are:

- The noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.);
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps); and
- The noise is irregular enough to attract attention.

When such features are present a +5dB correction is added to the specific noise level and this corrected value, which is then used in the assessment, is known as the 'rating level'.

In order to rate the likelihood of complaints, the background noise level is subtracted from the rating level. The standard considers that the greater the difference, the greater the likelihood of complaints.

A difference of around +10 dB or higher indicates that complaints are likely. A difference of around +5 dB is of marginal significance. A difference of -10 dB is a positive indication that complaints are unlikely.

BS4142 does not give clear direction on how to quantify either the background or residual noise levels when there are existing sources of industrial or commercial noise. This is of particular interest where the existing industrial or commercial noise sources are within the control of the owner of the sources under consideration.

#### 4.0 ENVIRONMENTAL NOISE SURVEY

Measurements were undertaken from 23<sup>rd</sup> to 24<sup>th</sup> July 2012 to establish existing ambient and background noise levels incident on the façade of the nearest noise sensitive receptors.

During the survey all existing roof plant was switched off. The survey methodology and results are set out below.

#### 4.1 Survey Methodology

The measurement location is shown in Appendix B and has been identified throughout the report as follows:

- 'Location 1' – sound level meter positioned externally at the edge of the roof of 21-27 Lamb's Conduit Street.

The microphone was placed approximately 1.5 metres above the roof level in what were considered to be free-field conditions. All measurements were 5 minutes in duration.

The equipment used during the survey is detailed in Appendix C. The sound level meter was calibrated before and after the measurements and no significant calibration drifts were found to have occurred. All of the noise monitoring equipment had been calibrated by the manufacturer to a traceable standard within the twelve months preceding the survey. Calibration certificates are available on request.

#### 4.2 Survey Results

The weather during the survey was suitable for noise measurements, it being mild and clear with low wind speeds. The full set of data recorded during the survey is given in Appendix D. A summary of the measured noise levels is given in Table 4.1 below.

**Table 4.1**  
**Summary of Measured Noise Levels – free-field, dB**

| Location   | Date                 | Period (h)     | L <sub>Aeq,T</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>AFmax</sub> |
|------------|----------------------|----------------|--------------------|------------------|------------------|--------------------|
| Location 1 | 23/07/12 to 24/07/12 | 2300h to 0630h | 52.9               | 54.3             | 49.6             | 79.3               |

#### 4.3 Observations and Comments

For the night time assessment it is considered that the noise levels measured are representative of the typical noise environment at the survey location and of the 8 hour average L<sub>Aeq</sub> at the location. For the purposes of this assessment it is considered that the noise levels measured at the survey location are representative of those noise levels that would be incident the nearest noise sensitive receptor on the other side of Lamb's Conduit Street immediately facing the site.

The noise levels consisted of noise from vehicles and pedestrians on the surrounding road network and from overflying aircraft.

## 5.0 ASSESSMENT

### 5.1 Assessment of Noise from Fixed Plant

For this assessment the values of the NOEL, LOAEL and SOAEL are drawn from the criteria and values detailed in BS4142. The standard sets very clear limit values and these are interpreted as follows:

**NOEL – No Observed Effect Level** – Rating Noise Level is 10dBA below the lowest measured background noise level. This is the point at which complaints are considered to be unlikely.

**LOAEL – Lowest Observed Adverse Effect Level** – Based on the policy requirements of CBC, this has been set as a Rating Noise Level of 5dBA below the background noise level. The standard makes no comment about this rating noise level.

**SOAEL – Significant Observed Adverse Effect Level** – Rating Noise Level is 10dBA above background noise level. The standard considers this to be the level at which complaints are likely.

The nearest noise sensitive receptor is considered to be a 3 storey high terraced residence to the East of the proposed development. An assessment has been carried out in accordance with the requirements of BS4142 to quantify the likelihood of complaints by residents of the property due to the noise generated by the proposed condenser units.

The specific noise level has been obtained by calculating the noise level at the nearest noise sensitive receptor due to the operation condenser units, using the source noise level taken from the manufacturer's datasheets. The calculations assume the equipment is operating at maximum capacity. These calculations have been undertaken using standard acoustic formulae.

The calculated specific noise level at the nearest noise sensitive receptor (NSR) is shown in Table 5.1.

**Table 5.1**  
**Specific Noise Level Incident on Façade of Noise Sensitive Receptor, dB**

| Plant Item            | Number of Units | Sound Power Level | Noise Level at Noise Sensitive Receptor in dB(A) | Combined Level at Noise Sensitive Receptor for All Units in dB(A) |
|-----------------------|-----------------|-------------------|--------------------------------------------------|-------------------------------------------------------------------|
| Toshiba RAV-SP564AT-E | 3               | 64.0              | 34.3                                             | 35.9                                                              |
| Toshiba RAV-SP563AT-E | 1               | 65.0              | 30.6                                             |                                                                   |

The background noise level for the 5 minute period with the lowest measured  $L_{90}$  noise levels during the survey period has been used in the calculations.

Due to the presence of existing plant on the roof immediately adjacent to the proposed condenser units, it is not considered that the plant will have any characteristics unusual to the local noise environment that would attract a penalty as detailed by BS4142 .

The results of the assessment are shown in Table 5.2 below:

**Table 5.2**  
**Comparison of Noise Level and Background Noise Level, free-field, dB**

| Location                        | Rating Noise<br>Level $L_{Aeq,T}$ | Lowest Background<br>Noise Level $L_{A90}$ | Difference |
|---------------------------------|-----------------------------------|--------------------------------------------|------------|
| NSR on Lamb's<br>Conduit Street | 35.9                              | 47.1                                       | -11.2      |

BS4142 states that:

"A difference of around 10dB or higher indicates that complaints are likely. A difference of around 5dB is of marginal significance. A difference of -10dB is a positive indication that complaints are unlikely."

Table 5.2 shows that the level of noise generated at the nearest noise-sensitive property by the operation of the units, falls in the category of "complaints unlikely".

This rating noise level is below the NOEL level. It is considered that the noise level would produce no observed effect and should be considered to be acceptable.

## 6.0 CONCLUSION

UK Asset Resolution Ltd (UKAR) has appointed Dragonfly Acoustics Limited to carry out a noise assessment relating to the installation of additional air conditioning condenser units on the roof area at 21-27 Lamb's Conduit Street, London.

It is understood that the noise assessment is required to establish the noise levels at the nearest noise sensitive receptor due to the operation of the plant.

The noise assessment has been conducted in accordance with the National Planning Policy Framework. The noise assessment has also been conducted in accordance with Planning and Policy Guidance 24 (PPG24) and British Standard 4142 *Method for rating industrial noise affecting mixed residential and industrial areas*.

This report therefore describes a noise survey of the site and the subsequent analysis to determine the noise impact of the proposed condenser units on the nearest noise sensitive receptor; it then compares the results with the adopted criteria.

The assessment has shown that rating noise level for the proposed plant will be 11dB(A) below the lowest measured background noise level at the nearest noise sensitive receptor.

Therefore no mitigation measures are required. The assessment shows that the level of noise generated at the nearest noise-sensitive property by the operation of the units falls in the category of "complaints unlikely".

This rating noise level is below the NOABL level set and complies with the requirements of Policy D28 of the CBC Local Development Plan.

## 7.0 CLOSURE

This report has been prepared by Dragonfly Acoustics with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of The Planning and Design Partnership and their client, UK Asset Resolution Ltd (UKAR); no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Dragonfly Acoustics.

Dragonfly Acoustics disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

## APPENDIX A

### Appendix A – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

**Table A-1**  
**Sound Levels Commonly Found in the Environment**

| Sound Level     | Location                   |
|-----------------|----------------------------|
| 0dB(A)          | Threshold of hearing       |
| 20 to 30dB(A)   | Quiet bedroom at night     |
| 30 to 40dB(A)   | Living room during the day |
| 40 to 50dB(A)   | Typical office             |
| 50 to 60dB(A)   | Inside a car               |
| 60 to 70dB(A)   | Typical high street        |
| 70 to 90dB(A)   | Inside factory             |
| 100 to 110dB(A) | Burglar alarm at 1m away   |
| 110 to 130dB(A) | Jet aircraft on take off   |
| 140dB(A)        | Threshold of Pain          |

### Acoustic Terminology

**dB (decibel)** The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ( $2 \times 10^{-5}$  Pa).

**dB(A)** A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

**$L_{Aeq}$**  Defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

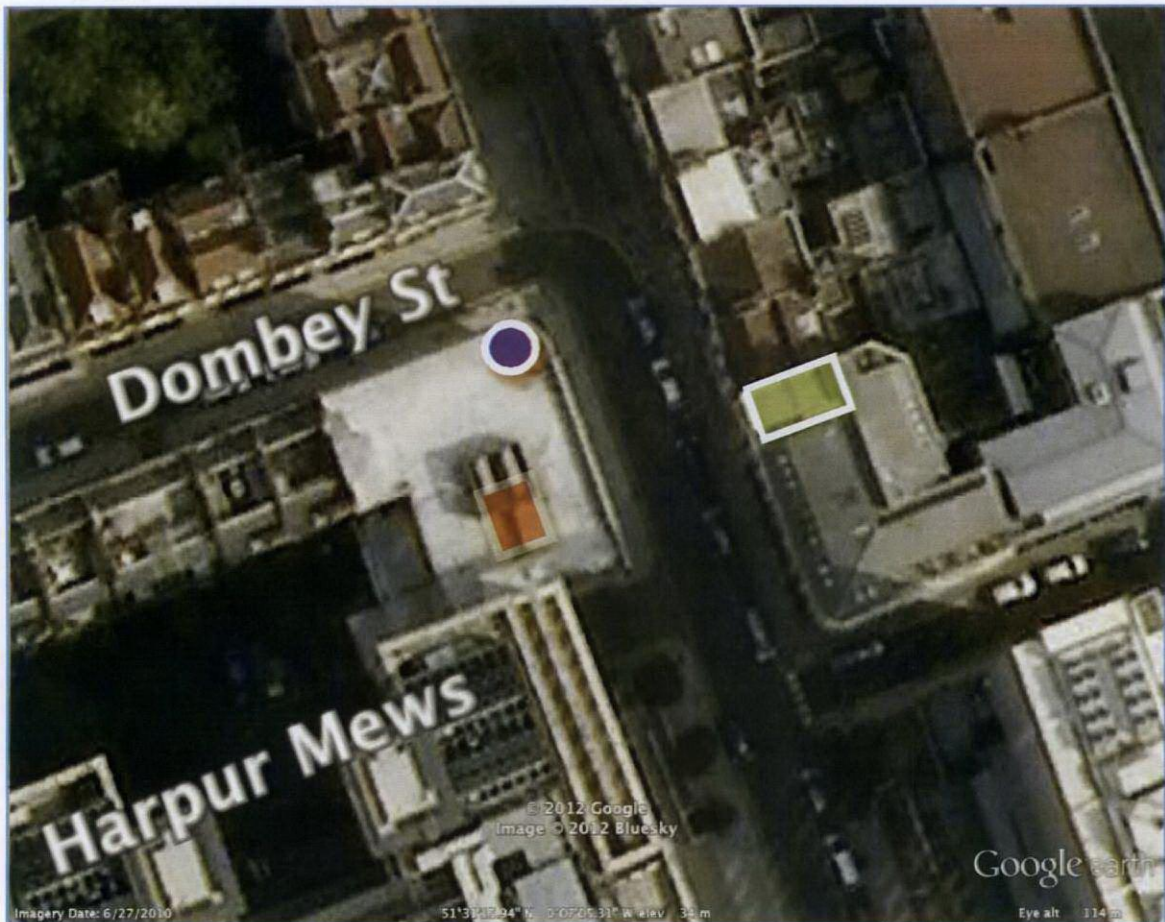
**$L_{10}$  &  $L_{90}$**  If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The  $L_n$  indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence  $L_{10}$  is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly,  $L_{90}$  is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the  $L_{10}$  index when describing traffic noise.

**$L_{Amax}$**  The maximum A - weighted sound pressure level recorded over the period stated.  $L_{Amax}$  is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall  $L_{eq}$  noise level but will still affect the noise environment.

APPENDIX B

Appendix B – Measurement Locations

Figure B-1  
Measurement Location Plan



Measurement Location



Nearest Noise Sensitive Receptor (NSR)



Approximate location of proposed plant

APPENDIX C

**Appendix C – Noise Monitoring Equipment**

**Table C-1**  
**Noise Monitoring Equipment**

| <b>Equipment</b>                  | <b>Serial Number</b> |
|-----------------------------------|----------------------|
| Norsonic NOR140 Sound Level Meter | 1403879              |
| Norsonic NOR1209 pre-amplifier    | 13359                |
| Norsonic NOR1225 Microphone       | 112799               |
| Castle GA607 Calibrator           | 039063               |

# APPENDIX D

## Appendix D – Full Survey Results

**Table D-1**  
**Measured Noise Levels, Location 1, 23/07/12 to 24/07/12 – free-field, dB**

| Time (h) | Measurement Duration | L <sub>Aeq</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>AMax</sub> |
|----------|----------------------|------------------|------------------|------------------|-------------------|
| 23:00    | 5 minutes            | 54.6             | 55.0             | 50.6             | 69.8              |
| 23:05    | 5 minutes            | 52.6             | 54.5             | 50.5             | 60.5              |
| 23:10    | 5 minutes            | 52.4             | 54.1             | 50.0             | 62.1              |
| 23:15    | 5 minutes            | 52.3             | 54.2             | 50.1             | 59.9              |
| 23:20    | 5 minutes            | 54.4             | 56.5             | 50.7             | 67.0              |
| 23:25    | 5 minutes            | 60.8             | 58.5             | 50.6             | 79.3              |
| 23:30    | 5 minutes            | 53.9             | 55.9             | 51.2             | 61.9              |
| 23:35    | 5 minutes            | 52.3             | 54.0             | 50.1             | 61.0              |
| 23:40    | 5 minutes            | 52.8             | 55.2             | 50.3             | 62.0              |
| 23:45    | 5 minutes            | 54.1             | 56.3             | 51.1             | 64.5              |
| 23:50    | 5 minutes            | 53.6             | 54.8             | 50.8             | 68.6              |
| 23:55    | 5 minutes            | 60.2             | 64.4             | 51.9             | 71.2              |
| 00:00    | 5 minutes            | 56.6             | 59.9             | 51.6             | 68.5              |
| 00:05    | 5 minutes            | 54.4             | 56.8             | 51.3             | 62.2              |
| 00:10    | 5 minutes            | 52.9             | 54.6             | 50.1             | 64.0              |
| 00:15    | 5 minutes            | 52.6             | 54.7             | 50.1             | 59.2              |
| 00:20    | 5 minutes            | 51.8             | 53.3             | 50.0             | 59.1              |
| 00:25    | 5 minutes            | 52.2             | 54.0             | 50.1             | 59.9              |
| 00:30    | 5 minutes            | 52.5             | 54.4             | 50.2             | 61.0              |
| 00:35    | 5 minutes            | 51.3             | 53.0             | 49.5             | 55.8              |
| 00:40    | 5 minutes            | 51.6             | 53.6             | 49.6             | 57.6              |
| 00:45    | 5 minutes            | 52.0             | 54.1             | 49.7             | 62.0              |
| 00:50    | 5 minutes            | 51.9             | 53.7             | 49.9             | 58.8              |
| 00:55    | 5 minutes            | 51.6             | 53.6             | 49.7             | 60.5              |
| 01:00    | 5 minutes            | 51.9             | 54.1             | 49.6             | 60.0              |
| 01:05    | 5 minutes            | 52.6             | 54.2             | 49.9             | 66.1              |
| 01:10    | 5 minutes            | 51.6             | 53.7             | 49.5             | 60.0              |
| 01:15    | 5 minutes            | 51.5             | 53.1             | 49.5             | 60.9              |
| 01:20    | 5 minutes            | 52.6             | 54.5             | 49.8             | 64.0              |
| 01:25    | 5 minutes            | 52.7             | 54.0             | 49.6             | 68.0              |
| 01:30    | 5 minutes            | 52.2             | 54.1             | 49.7             | 59.3              |
| 01:35    | 5 minutes            | 51.1             | 52.7             | 49.5             | 54.9              |
| 01:40    | 5 minutes            | 52.4             | 54.6             | 49.8             | 63.0              |
| 01:45    | 5 minutes            | 51.5             | 53.3             | 49.9             | 60.6              |
| 01:50    | 5 minutes            | 53.0             | 55.7             | 50.0             | 60.2              |
| 01:55    | 5 minutes            | 51.7             | 53.8             | 49.5             | 59.6              |
| 02:00    | 5 minutes            | 51.7             | 53.3             | 49.9             | 59.6              |
| 02:05    | 5 minutes            | 54.3             | 55.7             | 49.9             | 69.0              |

## APPENDIX D

| Time (h) | Measurement Duration | L <sub>Aeq</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>AMax</sub> |
|----------|----------------------|------------------|------------------|------------------|-------------------|
| 02:10    | 5 minutes            | 51.0             | 52.7             | 49.4             | 55.9              |
| 02:15    | 5 minutes            | 51.2             | 53.3             | 49.5             | 56.8              |
| 02:20    | 5 minutes            | 51.8             | 53.5             | 49.7             | 58.9              |
| 02:25    | 5 minutes            | 51.1             | 52.8             | 49.5             | 57.4              |
| 02:30    | 5 minutes            | 51.0             | 52.6             | 49.5             | 56.5              |
| 02:35    | 5 minutes            | 52.3             | 54.0             | 49.7             | 61.4              |
| 02:40    | 5 minutes            | 51.4             | 53.3             | 49.6             | 60.1              |
| 02:45    | 5 minutes            | 54.3             | 52.9             | 49.8             | 73.5              |
| 02:50    | 5 minutes            | 51.3             | 53.2             | 49.7             | 60.0              |
| 02:55    | 5 minutes            | 51.6             | 53.5             | 50.0             | 56.9              |
| 03:00    | 5 minutes            | 51.6             | 53.5             | 49.6             | 60.2              |
| 03:05    | 5 minutes            | 51.6             | 53.6             | 49.8             | 57.6              |
| 03:10    | 5 minutes            | 50.6             | 52.0             | 49.5             | 54.3              |
| 03:15    | 5 minutes            | 51.6             | 53.8             | 49.7             | 59.5              |
| 03:20    | 5 minutes            | 51.7             | 53.6             | 49.7             | 57.5              |
| 03:25    | 5 minutes            | 51.2             | 53.0             | 49.6             | 56.6              |
| 03:30    | 5 minutes            | 51.7             | 53.5             | 49.6             | 60.4              |
| 03:35    | 5 minutes            | 51.6             | 53.5             | 49.6             | 59.0              |
| 03:40    | 5 minutes            | 51.6             | 53.8             | 49.5             | 58.9              |
| 03:45    | 5 minutes            | 51.5             | 53.5             | 49.5             | 60.5              |
| 03:50    | 5 minutes            | 52.2             | 54.3             | 49.8             | 60.7              |
| 03:55    | 5 minutes            | 51.6             | 53.2             | 49.6             | 64.0              |
| 04:00    | 5 minutes            | 50.9             | 52.5             | 49.5             | 55.5              |
| 04:05    | 5 minutes            | 54.8             | 53.3             | 49.6             | 73.8              |
| 04:10    | 5 minutes            | 51.9             | 54.0             | 49.8             | 58.6              |
| 04:15    | 5 minutes            | 51.6             | 53.8             | 49.7             | 60.3              |
| 04:20    | 5 minutes            | 52.9             | 55.0             | 49.6             | 67.3              |
| 04:25    | 5 minutes            | 51.5             | 53.7             | 49.1             | 61.1              |
| 04:30    | 5 minutes            | 53.9             | 56.9             | 49.3             | 69.9              |
| 04:35    | 5 minutes            | 51.4             | 53.3             | 49.2             | 64.7              |
| 04:40    | 5 minutes            | 49.8             | 51.6             | 47.9             | 60.8              |
| 04:45    | 5 minutes            | 52.6             | 54.8             | 48.7             | 65.8              |
| 04:50    | 5 minutes            | 52.0             | 52.1             | 47.1*            | 73.1              |
| 04:55    | 5 minutes            | 51.8             | 53.7             | 48.2             | 67.0              |
| 05:00    | 5 minutes            | 50.5             | 53.2             | 47.4             | 59.6              |
| 05:05    | 5 minutes            | 50.8             | 53.2             | 47.1*            | 63.7              |
| 05:10    | 5 minutes            | 50.1             | 52.6             | 47.2             | 61.6              |
| 05:15    | 5 minutes            | 51.0             | 53.0             | 48.4             | 61.3              |
| 05:20    | 5 minutes            | 50.2             | 52.2             | 47.5             | 62.0              |
| 05:25    | 5 minutes            | 50.2             | 52.3             | 47.3             | 64.2              |
| 05:30    | 5 minutes            | 52.1             | 54.4             | 48.7             | 59.0              |
| 05:35    | 5 minutes            | 50.4             | 52.6             | 47.8             | 57.4              |

APPENDIX D

| Time (h) | Measurement Duration | L <sub>Aeq</sub> | L <sub>A10</sub> | L <sub>A90</sub> | L <sub>AMax</sub> |
|----------|----------------------|------------------|------------------|------------------|-------------------|
| 05:40    | 5 minutes            | 51.5             | 54.0             | 47.8             | 63.4              |
| 05:45    | 5 minutes            | 50.4             | 53.0             | 47.6             | 58.2              |
| 05:50    | 5 minutes            | 50.7             | 52.8             | 48.2             | 59.4              |
| 05:55    | 5 minutes            | 54.8             | 58.3             | 49.3             | 65.0              |
| 06:00    | 5 minutes            | 53.8             | 56.5             | 49.9             | 61.3              |
| 06:05    | 5 minutes            | 54.4             | 56.7             | 50.9             | 60.1              |
| 06:10    | 5 minutes            | 52.2             | 54.8             | 49.1             | 60.9              |
| 06:15    | 5 minutes            | 54.7             | 56.6             | 50.5             | 70.6              |
| 06:20    | 5 minutes            | 52.6             | 55.1             | 50.1             | 58.5              |
| 06:25    | 5 minutes            | 54.8             | 58.0             | 50.4             | 61.3              |
| 06:30    | 5 minutes            | 53.9             | 56.5             | 50.5             | 61.8              |

\*Lowest measured background (L<sub>A90</sub>)

## APPENDIX E

### **Appendix E – Limitations to this Report**

This entails a physical investigation of the site with a sufficient number of sample measurements to provide quantitative information concerning the type and degree of noise and vibration affecting the site. The objectives of the investigation have been limited to establishing sources of noise and vibration material to carrying out an appropriate assessment.

The number and duration of noise and vibration measurements have been chosen to give reasonably representative information on the environment within the agreed time, and the locations of measurements have been restricted to the areas unoccupied by building(s) that are easily accessible without undue risk to our staff.

As with any sampling, the number of sampling points and the methods of sampling and testing cannot preclude the existence of "hotspots" where noise or vibration levels may be significantly higher than those actually measured due to previously unknown or unrecognised noise or vibration emitters. Furthermore, noise or vibration sources may be intermittent or fluctuate in intensity and consequently may not be present or may not be present in full intensity for some or all of the survey duration.