WATERLOO ACOUSTICS

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# ENVIRONMENTAL NOISE MEASUREMENT REPORT

| | |
|---|---|
| **Site Name:** | **279 Tottenham Court Road** |
| **Report Type:** | **Environmental Noise Assessment** |
| **Site Address:** | **Corinthian House<br>279 Tottenham Court Road<br>London<br>W1T 7RG** |
| **Date of Measurements:** | **5th – 6th September 2012** |
| **Client Project Ref;** | **C000226 (BOXX)** |
| **Client:** | **Edge DBS Ltd<br>2nd floor<br>76/77 Watling Street<br>London<br>EC4M 9BJ** |
| **Report Author:<br>Approved for Issue:** | **A. Jowitt<br>B. Costello B.E.** |
| **Report Date:<br>Report Ref:** | **7th September 2012<br>1706/01** |

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## Contents

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## Introduction

1.1 This survey was carried out on the instructions of David Smith of Edge DBS Ltd to determine the environmental impact of noise emissions from the installation of a new externally mounted air cooled condenser within the 6th floor plant room enclosure.

a) Externally mounted condensing unit consisting of 1 off Mitsubishi Electric units as follows:-

Serving Comms/Data room on the 3rd floor
1 off Type PUHZ-RP50VHA4 (44/46 dBA@1m free field)

1.2 The objective of the survey is to:-

a) Establish the noise climate in the vicinity of 279 Tottenham Court Road.

b) Determine any critical locations that may be affected by the noise emissions from the proposed plant equipment.

c) To determine the background noise levels at any critical location in accordance with BS4142: 1997 “Method for rating industrial noise affecting mixed residential and industrial areas”, and assess the likelihood of complaint.

d) Establish the limiting criteria for plant noise emissions to minimise the likelihood of complaint (when assessed in accordance with BS4142:1997) and to comply with the requirements of the local authority.

e) Comment/advise on the need for any acoustic treatment if required.

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## 2 Site Description

2.1 The property is located adjacent the Dominion Theatre on the eastern side of Tottenham Court Road at the junction with New Oxford Street. The main entrance to the building is via the ground floor reception entrance adjacent the Dominion Theatre. The property is a six storey building with retail premises at ground floor level with offices occupying the first to sixth floors. The building overlooks the junction of Tottenham Court Road, New Oxford Street and Tottenham Court Road underground station with the Cross rail construction site to the south east.

2.2 The proposed site on the sixth floor is within an enclosed space below roof level and is shielded from a direct line of sight to any adjacent properties commercial or residential. The proposed new unit is to be located adjacent existing plant within this area as shown in attached drawings and photographs.

2.3 The main source of background noise appears to be general road traffic noise although the roof itself is partially shielded from the direct road traffic noise. Existing plant noise from the roof plant area and from other commercial buildings within the vicinity also contributed to background noise levels.

2.4 The proposed plant equipment consists of 1 off external condenser as follows;-

Proposed Unit noise data

| **Manufacturers Noise Data –** | | |
|---|---|---|
| **Unit** | **Serving** | **Sound Pressure Level at 1m** |
| 1 off Mitsubishi Electric: PUHZ-RP50VHA4 External condenser unit on 6th floor | Comms/Data room 3rd floor | Cooling/heating 44/46 dBA @ 1m |

Manufacturer's noise data based upon free field measurements.

Calculations will be carried out to determine the extent (if any) of the noise control measures necessary to ensure plant noise emissions do not exceed the levels recommended in table 3.

The unit will be located within the sixth floor plant area of the property (see site photographs & attached roof plan). We understand that this unit may operate 24hrs a day.

2.5 The nearest affected noise sensitive locations to the new installation appear to be:-

i. The residential flats on the first and second floors at the south eastern section of the Centre Point Building at a distance of approximately 70m to the proposed unit. However there is no direct line of sight to the proposed new unit due to the enclosed nature of the location below roof level.

ii. The commercial and retail premises in the four storey building to the west in Tottenham Court Road and the offices of the Centre Point building to the south both at a distance of approximately 40m from the proposed new unit. Again there is no direct line of sight.

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## 3 Instrumentation

3.1 Cirrus Research plc Integrating Sound Level Meter:
Type: GR 821B Serial No: C19350FE
Compliance to IEC 61672-1: 2002 Class 1, IEC 60651: 1979 Type 1, IEC 60804: 2001 Type 1, IEC 61260: 1995 Class 1, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983 and ANSI S1.43-1997

3.2 Cirrus Research plc Calibrator:
Type: GR 511E Serial No: 43553

## 4 Weather Conditions

4.1 Temperature 11-14$^0$C night and 14-21$^0$C daytime with predominantly clear skies. The prevailing wind was from a predominantly north easterly direction turning southerly later in the survey approximately 7-9mph daytime and 2-6mph night time. As the survey was not manned throughout the measurement period, weather conditions throughout the survey period are based upon met-office reports.

## 5 Measurement Procedure

5.1 External measurements were taken on the sixth floor roof area away from existing plant noise sources as far as was practically feasible within the limits of the roof area. These readings were taken in order to establish representative noise levels likely to be experienced at the nearest affected noise sensitive properties.

5.2 Measurements were taken in accordance with the guide lines of BS 4142: 1997 “Method for rating industrial noise affecting mixed residential and industrial areas".

5.3 All measurements were taken between 12:15hrs on the 05/09/2012 and 12.30hrs on 06/09/2012.

5.4 The results are utilised to assess the likelihood of complaint based upon the requirements of BS 4142. External $L_{Aeq}$ and $L_{A90}$ measurements were taken over minimum 15 minute measurement intervals.

5.5 The meter was calibrated before and after the survey period and no deviation noted. All measurements are quoted to the nearest whole decibel. The sound level meter used was tripod mounted at a height of 1.5 metres and a wind shield was used during all measurements.

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## 6 Results

6.1 The results of the noise measurements when assessed in accordance BS 4142: 1997 "Method for rating industrial noise affecting mixed residential and industrial areas", were as follows:

The lowest $L_{Aeq,15mins}$ (ambient) and $L_{A90,15mins}$ (background) noise levels measured during the survey period {night time (23:00-07:00 hours) daytime 07:00–23:00 hours) are detailed in tables 1 and 2 below (details of individual measurement periods are included in the appendix):- .

**Table 1: Background Noise Levels –**

| **Lowest $L_{A90,15mins}$ dB(A) Noise Levels Measured** | |
|---|---|
| Day (07:00–23:00) | Night (23:00–07:00) |
| **56.1 dBA** | **53.8 dBA** |

**Table 2: Ambient Noise Levels –**

| **Lowest $L_{Aeq,15mins}$ dB(A) Noise Levels Measured** | |
|---|---|
| Day (07:00–23:00) | Night (23:00–07:00) |
| **58.4 dBA** | **55.8 dBA** |

**The lowest night-time background noise level for the purpose of assessment is an $L_{A90,15mins}$ of 54dBA.**

6.2 In Accordance with the local authorities Unitary Development Plan the total plant noise emissions should not exceed a level of background $L_{A90}$ minus 10dB when measured at 1 metre from the facade of the nearest affected residential property.

Based on this assumption we would note the criteria for plant noise affecting residential properties as follows;-

**Table 3: Noise Criteria**

| **Limiting plant noise emissions when measured at 1 meter from the facade of the nearest affected residential property.** | |
|---|---|
| Day (07:00–23:00) | Night Time (23:00 – 07:00) |
| **46 dBA** | **44 dBA** |

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## 7 Assessment

### 7.1 Daytime Assessment (Residential):

Impact upon nearest affected residential properties i.e. Flats above the Centre Point building to south east in St Giles High Street.

**Daytime Operation; (07:00-23:00)**

| Comments | | | BS4142 clause |
|---|---|---|---|
| Lowest Daytime Background $L_{A90}$ (07:00-23:00hrs) | | 46 dBA | *Table 1* |
| PUHZ-RP50VHA4 @1m | 44/46 dBA | | *Manufacturers Data* |
| Distance correction to 70m | - 36 dBA | | *-20log(r)* |
| Site corrections | + 6 dBA | | |
| Screening effects from below roof location of equipment | - 10 dBA | | *Estimated minimum* |
| Specific Noise at Residents | | 6 dBA | *3.4* |
| Tonal Qualities | | + 5 dBA | *8.2* |
| Rating Level | | 11 dBA | *3.6* |
| Excess of Rating over Background | | - 35 dBA | *9* |
| **Assessment:** | **Positive indication that complaints are unlikely (when assessed to BS4142).** | | *9* |

### 7.2 Night-time Assessment (Residential):

Impact upon nearest affected residential properties i.e. Flats above the Centre Point building to south east in St Giles High Street.

**Night time Operation; (23:00-07:00)**

| Comments | | | BS4142 clause |
|---|---|---|---|
| Lowest Night Time Background $L_{A90}$ (23:00-07:00hrs) | | 44 dBA | *Table 1* |
| PUHZ-RP50VHA4 @1m | 44/46 dBA | | *Manufacturers Data* |
| Distance correction to 70m | - 36 dBA | | *-20log(r)* |
| Site correction | + 6 dBA | | |
| Screening effects from below roof location of equipment | - 10 dBA | | *Estimated minimum* |
| Specific Noise at Residents | | 6 dBA | *3.4* |
| Tonal Qualities | | + 5 dBA | *8.2* |
| Rating Level | | 11 dBA | *3.6* |
| Excess of Rating over Background | | - 33 dBA | *9* |
| **Assessment:** | **Positive indication that complaints are unlikely (when assessed to BS4142).** | | *9* |

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## 7 Assessment (continued)

**7.3 Daytime Assessment (Commercial):**
Impact upon nearest affected Commercial properties.

**Daytime Operation; (07:00-23:00)**

| Comments | | | BS4142 clause |
|---|---|---|---|
| Lowest Daytime Background $L_{A90}$ (07:00-23:00hrs) | | 46 dBA | *Table 1* |
| PUHZ-RP50VHA4 @1m | 44/46 dBA | | *Manufacturers Data* |
| Distance correction to 40m | - 31 dBA | | *-20log(r)* |
| Site correction | + 6 dBA | | |
| Screening effects from below roof location of equipment | - 10 dBA | | *Estimated minimum* |
| Specific Noise at Residents | | 11 dBA | *3.4* |
| Tonal Qualities | | + 5 dBA | *8.2* |
| Rating Level | | 16 dBA | *3.6* |
| Excess of Rating over Background | | - 30 dBA | *9* |
| **Assessment:** | **Positive indication that complaints are unlikely (when assessed to BS4142).** | | *9* |

**7.4 Night-time Assessment (Commercial):**
Impact upon nearest affected Commercial properties..

**Night time Operation; (23:00-07:00)**

| Comments | | | BS4142 clause |
|---|---|---|---|
| Lowest Night Time Background $L_{A90}$ (23:00-07:00hrs) | | 44 dBA | *Table 1* |
| PUHZ-RP50VHA4 @1m | 44/46 dBA | | *Manufacturers Data* |
| Distance correction to 40m | - 31 dBA | | *-20log(r)* |
| Site correction | + 6 dBA | | |
| Screening effects from below roof location of equipment | - 10 dBA | | *Estimated minimum* |
| Specific Noise at Residents | | 11 dBA | *3.4* |
| Tonal Qualities | | + 5 dBA | *8.2* |
| Rating Level | | 16 dBA | *3.6* |
| Excess of Rating over Background | | - 28 dBA | *9* |
| **Assessment:** | **Positive indication that complaints are unlikely (when assessed to BS4142).** | | *9* |

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## 7 Assessment (continued)

**7.5 Table 4: Assessment Summary to nearest residential Property**

| Comparison of predicted plant noise emissions against the limiting criteria. | | |
|---|---|---|
| | Day (07:00–23:00) | Night Time (23:00 – 07:00) |
| **Criteria** | **46 dBA** | **44 dBA** |
| **Predicted Rating Levels** | **11 dBA** | **11 dBA** |

**7.6 Table 5: Assessment Summary to nearest Commercial Property**

| Comparison of predicted plant noise emissions against the limiting criteria. | | |
|---|---|---|
| | Day (07:00–23:00) | Night Time (23:00 – 07:00) |
| **Criteria** | **46 dBA** | **44 dBA** |
| **Predicted Rating Levels** | **16 dBA** | **16 dBA** |

**7.7** Extract from London Borough of Camden (Replacement) Unitary Development Plan (Adopted June 2006)

Table E: Noise levels from plant and machinery at which planning permission will not be granted

| Noise description and location of measurement | Period | Time | Noise level |
|---|---|---|---|
| Noise at 1 metre external to a sensitive façade | Day, evening and night | 0000-2400 | 5dB(A) <LA90 |
| Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive facade | Day, evening and night | 0000-2400 | 10dB(A) <LA90 |
| Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade | Day, evening and night | 0000-2400 | 10dB(A) <LA90 |
| Noise at 1 metre external to sensitive façade where LA90 >60dB | Day, evening and night | 0000-2400 | 55dB $_{LAeq}$ |

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## 8 Observations

8.1 In order to assess the acceptability of the proposed installation it is necessary to compare the plant noise level with the background noise at any critical location. Detailed guidance on the assessment procedure is given in BS 4142: 1997.

8.2 Should the specific noise contain any distinguishable characteristics, e.g. whine, hiss, clicks, bangs, etc., or be of cyclic nature, 5dB should be added to the specific noise prior to the assessment.

8.3 BS4142 requires a comparison to be made between the specific noise (i.e. plant noise under consideration) when measured in $L_{Aeq}$ mode and the background noise when measured in the $L_{A90}$ mode. The reference time interval (T) being 1 hour during the day and 5 minutes during the night.

8.4 We would normally expect that the likelihood of complaint should be minimised provided that the noise emissions from the units at the nearest affected residential property are at least 5dB below background. Typically, we would expect that the local authority may specify this noise limit at 1 metre from the facade of the nearest affected residential property. However, we understand that this local authority specifies a level of background minus 10dBA inclusive of the correction for tonal characteristics where the plant is considered to be tonal (see 8.2 above). Criteria as noted in London Borough of Camden (Replacement) Unitary Development Plan (UDP) (Adopted June 2006)

8.5 We note below the extract from Camden's UDP where the Council will only grant planning permission for plant or machinery, including ventilation or air handling equipment, if it can be operated without causing a loss to local amenity and does not exceed the thresholds set out in Appendix 1 - Noise and Vibration (Table E).

***"Disturbance from plant or machinery***

*1.51 Plant and machinery, including ventilation and air handling equipment and any ancillary plant, ducting and equipment can have undesirable impacts on nearby properties. This can relate to their appearance and location as well as the odour and fumes and noise/vibration pollution that can be created.*

*1.52 The Council seeks to ensure that the level of noise/vibration from all plant and machinery does not increase existing ambient noise levels, therefore planning permission will only be granted for plant or machinery if it can be operated without causing a loss to local amenity and does not exceed the thresholds set out in Table E. In determining whether a proposal may be acceptable, the Council will require planning applications to include details of all proposed plant and machinery associated with a development, including an acoustic report. This may require close co-operation between an environmental or air handling engineer and the architect to agree an acceptable design solution for the particular premises and uses for which the system is designed. Supplementary guidance contains general guidance on minimising the impacts of plant and machinery."*

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## 9 Conclusion and Recommendations

9.1 As a result of the assessments and in accordance with Camden's UDP (as noted in 7.7 and 8.5 above), we would recommend that the plant noise emissions do not exceed the levels stated in tables 3 (i.e. at least 10dBA below the lowest background $L_{A90}$ at 1 metre from the facade of the nearest affected properties).

9.2 The results of the assessments to the nearest affected properties indicate a rating levels of 11dBA and 16dBA at 1m from the facade of the nearest residential and commercial properties. These are 28-33dBA below the lowest recorded background noise levels $L_{A90}$ night time (2300 to 0700) and 30-35dBA below the lowest recorded background $L_{A90}$ daytime (0700 to 2300).

9.3 The results are compliant with the assessment to BS 4142: 1997 and are a positive indication that complaints are unlikely. The results are also well within the local authority criteria as noted in 9.1 above. We would not anticipate complaints due to the proposed installation and would consider that this would acceptable to the local authority criteria.

9.4 Summary of assessment to the nearest affected properties.

| Unit | Rating Level | Excess of Rating Level over Background 2300-0700 | Excess of Rating Level over Background 0700-2300 | BS4142 Assessment Result | Comments |
|---|---|---|---|---|---|
| 1 off Mitsubishi external condenser unit Ref; PUHZ-RP50VHA4 Affecting the nearest residential properties | 11dBA | - 33 dBA | - 35 dBA | Positive indication that complaints are unlikely | Complaints not anticipated |
| 1 off Mitsubishi external condenser unit Ref; PUHZ-RP50VHA4 Affecting the nearest Commercial properties | 16dBA | - 28 dBA | - 32 dBA | | |

**Warnings:**

**Please ensure acceptance criteria are agreed with the relevant local authority.**

**"Compliance with a British Standard does not of itself confer immunity from legal obligations"**

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## Appendix 1

**Decibel** The units of sound level

**Sound Pressure** The sound pressure is a fluctuation in air pressure over the static ambient pressure. The measured sound level is the measured sound pressure relative to the standard reference pressure of 20x10-6 Pascals on a decibel scale.

**Equivalent Continuous Sound Pressure Level -( $L_{Aeq}$)**

The equivalent continuous A-weighted sound pressure level in decibels at the measurement position over a given reference time interval. This is used to provide an equivalent steady state noise level when a fluctuating noise is measured. **$L_{Aeq}$** is quoted to the nearest whole number of decibels.

**Background Sound Pressure Level - ($L_{A90}$)**

The A-weighted sound pressure level of the residual noise in decibels exceeded for 90% of a given time interval. **$L_{A90}$** is quoted to the nearest whole number of decibels.

**Specific Noise Level - ( $L_{Aeq, Tr}$)**

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

**Rating Level**

The specific noise level plus any adjustment for the character of the noise

**Specific Noise Level - $L_{Aeq,Tr}$ ****

The equivalent continuous A-weighted sound pressure level in decibels at the measurement position produced by the specific noise source over a given reference time interval. The specific noise level is quoted to the nearest whole number of decibels.

**Ambient Noise**

Total encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

**Residual Noise**

The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise. Usually expressed as the equivalent continuous A-weighted sound pressure level of the residual noise.

****** Definitions as noted in BS4142

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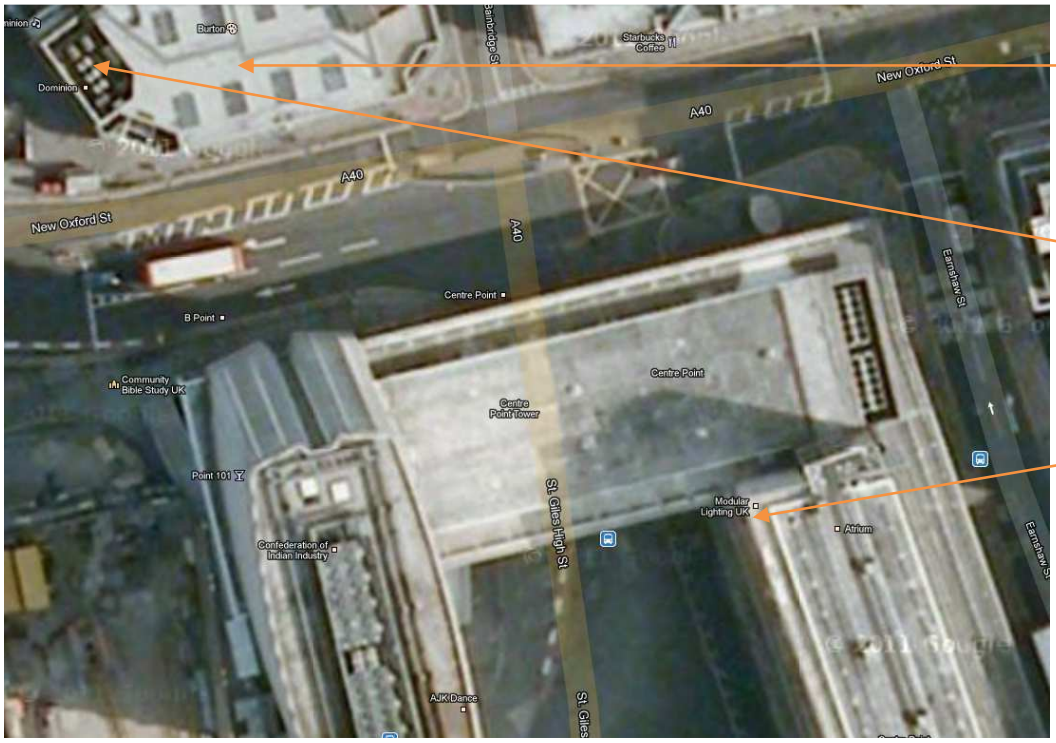
## Appendix 2 – Site Photographs

Plan view showing proposed plant location, nearest residential windows and measurement location




Measurement Location on sixth floor roof facing south towards the nearest residential properties.

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## Appendix 2 – Site Photographs – (continued)

Location of plant room below roof level on sixth floor overlooking Tottenham Court Road.

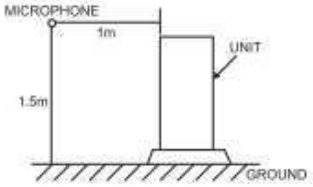

Location of plant room below roof level on sixth floor viewed from Tottenham Court Road with New Oxford Street right of picture..

## Appendix 3 – Manufacturer's Noise Data



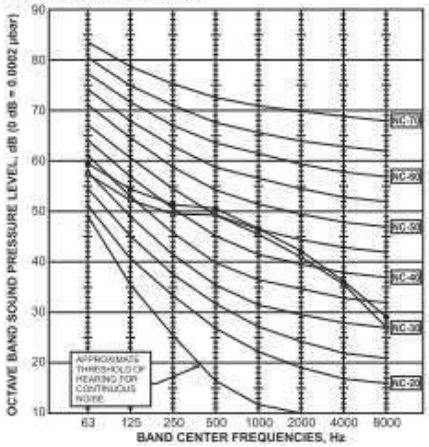
### A.8.5 NOISE CRITERIA CURVES

#### A.8.5.1 INVERTER MODELS Heat pump type



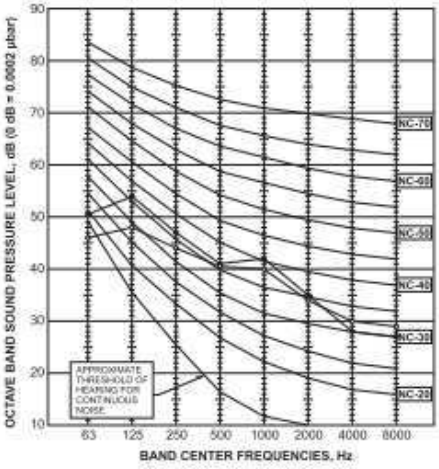

**PUHZ-HRP71VHA2**
**PUHZ-HRP100VHA2**
**PUHZ-HRP100YHA2**
**PUHZ-HRP125YHA2**

| MODE | SPL(dB) | LINE |
|---|---|---|
| COOLING | 51 | |
| HEATING | 52 | |



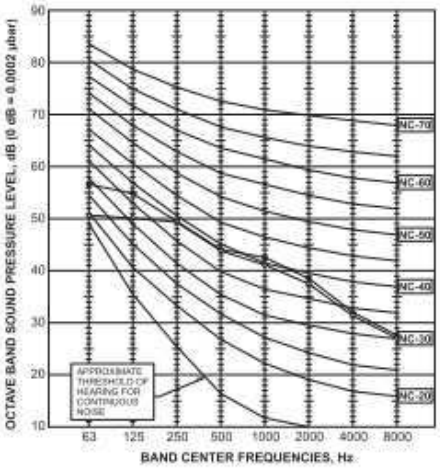

**PUHZ-RP35VHA4**
**PUHZ-RP50VHA4**

| MODE | SPL(dB) | LINE |
|---|---|---|
| COOLING | 44 | |
| HEATING | 46 | |



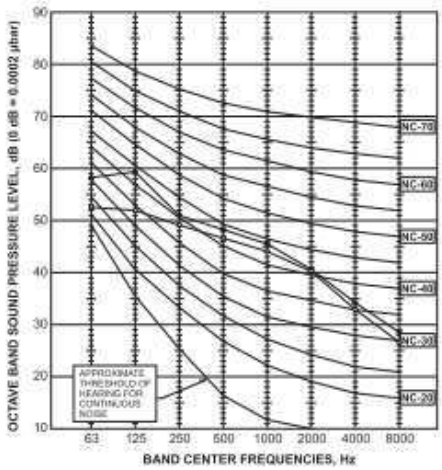

**PUHZ-RP60VHA4**
**PUHZ-RP71VHA4**

| MODE | SPL(dB) | LINE |
|---|---|---|
| COOLING | 47 | |
| HEATING | 48 | |




**PUHZ-RP100VKA**
**PUHZ-RP100YKA**

| MODE | SPL(dB) | LINE |
|---|---|---|
| COOLING | 49 | |
| HEATING | 51 | |



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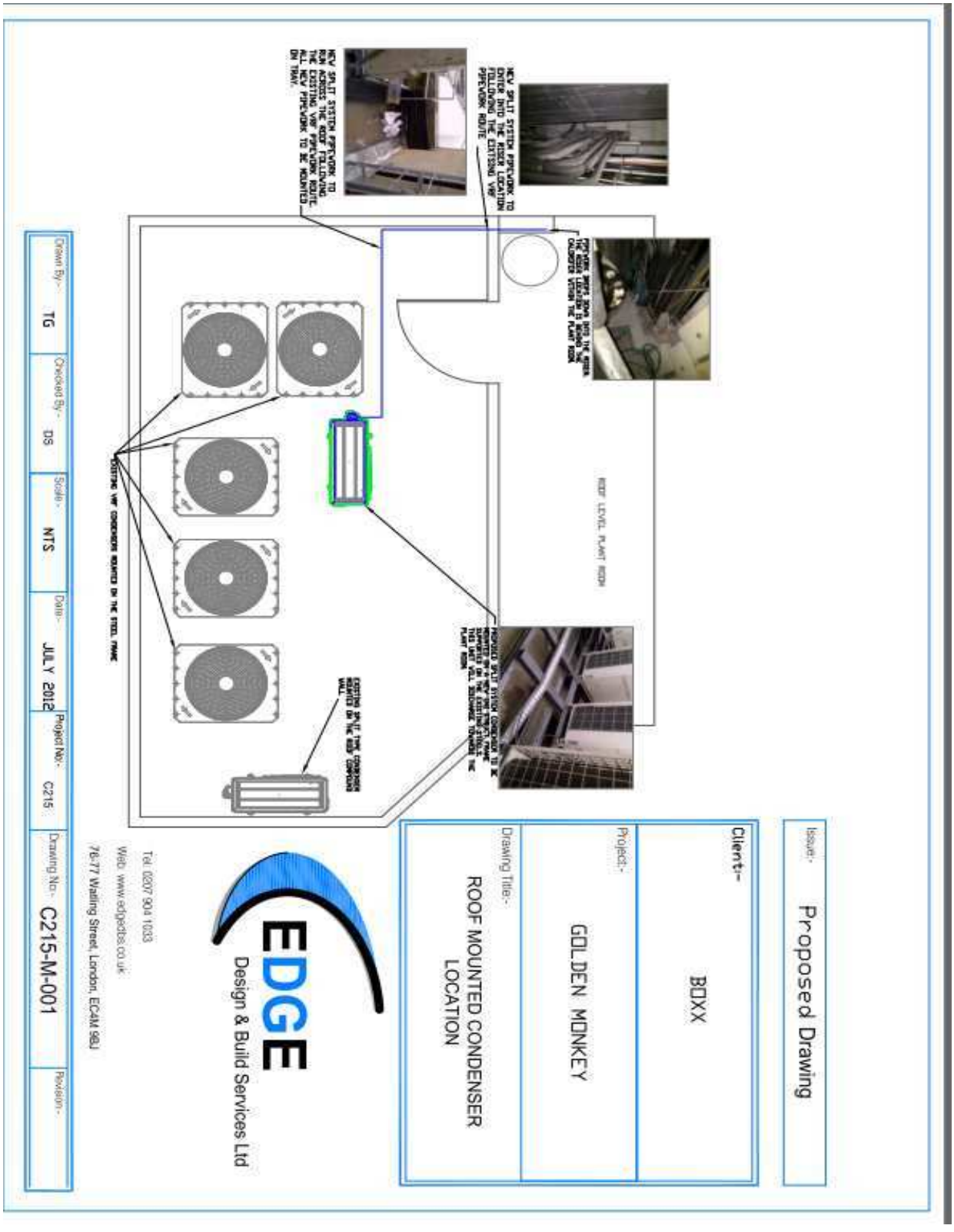
## Appendix 4 – Proposal Drawing & Measured Noise Data



# Environmental Noise Measurement Report

**Measurement Details**

Location: 279 Tottenham Court Road
Description: 24 hour survey
Date of Measurement: 06/09/2012 11:45

**Instrumentation Details**

Sound Level Meter: Cirrus Research plc CR:800B C17066FD
Acoustic Calibrator: Cirrus Research plc CR:511E
Calibration: Calibrated to 93.7dB on 05/09/2012 at 12:11:30
Recalibration Due: 31/10/2012
Level Range: 20-90 dB
Time Weighting: Fast (for Lmax and Lns)

**Measurement Data**

Start of Measurements: 05/09/2012 12:16
No. of Measurements: 97
Total Duration: 24:12:33
Highest Lmax: 82.3
Lmax Exceedance Count: 0, at or above 115dB

| Date | Time | Run Duration (hh:mm:ss) | Leq dB | Lmax dB | Peak dBC | L1 | L5 | L10 | L50 | L90 | Lmin |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/09/2012 | 12:15:00 | 00:14:59 | 64.2 | 72.6 | 96.1 | 68.6 | 67.1 | 66.4 | 63.7 | 61.3 | 59.2 |
| 06/09/2012 | 12:00:00 | 00:14:59 | 64.4 | 72.8 | 99.2 | 69.2 | 67.7 | 66.8 | 63.6 | 61.1 | 59.1 |
| 06/09/2012 | 11:45:00 | 00:15:00 | 62.7 | 70.1 | 94.8 | 66.6 | 65.3 | 64.4 | 62.2 | 60.6 | 58.7 |
| 06/09/2012 | 11:30:00 | 00:14:59 | 61.8 | 78.3 | 94.5 | 66.4 | 63.8 | 63.1 | 60.8 | 58.6 | 57.0 |
| 06/09/2012 | 11:15:00 | 00:14:59 | 60.6 | 72.5 | 92.0 | 66.5 | 63.5 | 62.2 | 59.7 | 58.6 | 57.0 |
| 06/09/2012 | 11:00:00 | 00:14:59 | 62.5 | 80.7 | 93.0 | 73.5 | 63.4 | 62.2 | 60.3 | 59.1 | 57.1 |
| 06/09/2012 | 10:45:00 | 00:14:59 | 61.1 | 77.7 | 95.3 | 65.3 | 62.8 | 62.2 | 60.6 | 59.3 | 57.4 |
| 06/09/2012 | 10:30:00 | 00:15:00 | 60.6 | 68.2 | 92.9 | 64.1 | 62.5 | 61.9 | 60.2 | 59.1 | 57.6 |
| 06/09/2012 | 10:15:00 | 00:15:00 | 60.0 | 67.6 | 92.2 | 63.3 | 61.9 | 61.2 | 59.7 | 58.8 | 57.5 |
| 06/09/2012 | 10:00:00 | 00:15:00 | 60.8 | 73.6 | 91.2 | 66.5 | 63.4 | 62.0 | 59.9 | 58.8 | 57.6 |
| 06/09/2012 | 09:45:00 | 00:15:00 | 61.5 | 68.1 | 91.3 | 64.9 | 63.5 | 62.9 | 61.2 | 59.5 | 57.7 |
| 06/09/2012 | 09:30:00 | 00:15:00 | 62.5 | 74.7 | 92.8 | 66.5 | 64.7 | 64.0 | 62.0 | 60.4 | 58.4 |
| 06/09/2012 | 09:15:00 | 00:15:00 | 63.0 | 73.3 | 91.9 | 66.6 | 65.2 | 64.6 | 62.7 | 60.8 | 59.0 |
| 06/09/2012 | 09:00:00 | 00:14:59 | 63.2 | 72.0 | 91.6 | 66.6 | 65.4 | 64.8 | 62.9 | 61.2 | 59.5 |
| 06/09/2012 | 08:45:00 | 00:14:59 | 63.2 | 70.4 | 92.3 | 66.7 | 65.4 | 64.9 | 62.9 | 61.0 | 58.9 |
| 06/09/2012 | 08:30:00 | 00:14:59 | 62.4 | 71.0 | 92.3 | 66.4 | 64.5 | 63.9 | 61.9 | 60.6 | 59.2 |
| 06/09/2012 | 08:15:00 | 00:15:00 | 61.3 | 70.4 | 94.4 | 65.1 | 63.4 | 62.8 | 60.8 | 59.7 | 58.3 |
| 06/09/2012 | 08:00:00 | 00:15:00 | 61.0 | 73.7 | 96.3 | 67.3 | 63.8 | 62.6 | 60.1 | 59.0 | 57.4 |
| 06/09/2012 | 07:45:00 | 00:15:00 | 59.9 | 72.5 | 90.7 | 64.0 | 62.1 | 61.2 | 59.5 | 58.3 | 56.6 |
| 06/09/2012 | 07:30:00 | 00:15:00 | 59.7 | 66.5 | 92.3 | 63.2 | 61.8 | 61.0 | 59.4 | 58.2 | 56.4 |
| 06/09/2012 | 07:15:00 | 00:14:59 | 59.8 | 67.5 | 91.8 | 63.3 | 62.2 | 61.6 | 59.3 | 57.6 | 56.2 |
| 06/09/2012 | 07:00:00 | 00:15:01 | 59.5 | 68.0 | 92.3 | 63.9 | 61.2 | 60.6 | 59.0 | 57.8 | 56.2 |
| 06/09/2012 | 06:45:00 | 00:15:01 | 58.5 | 65.0 | 91.2 | 62.1 | 60.5 | 59.9 | 58.2 | 56.9 | 55.1 |
| 06/09/2012 | 06:30:00 | 00:15:01 | 58.0 | 70.3 | 90.5 | 61.9 | 60.0 | 59.2 | 57.6 | 56.3 | 55.1 |

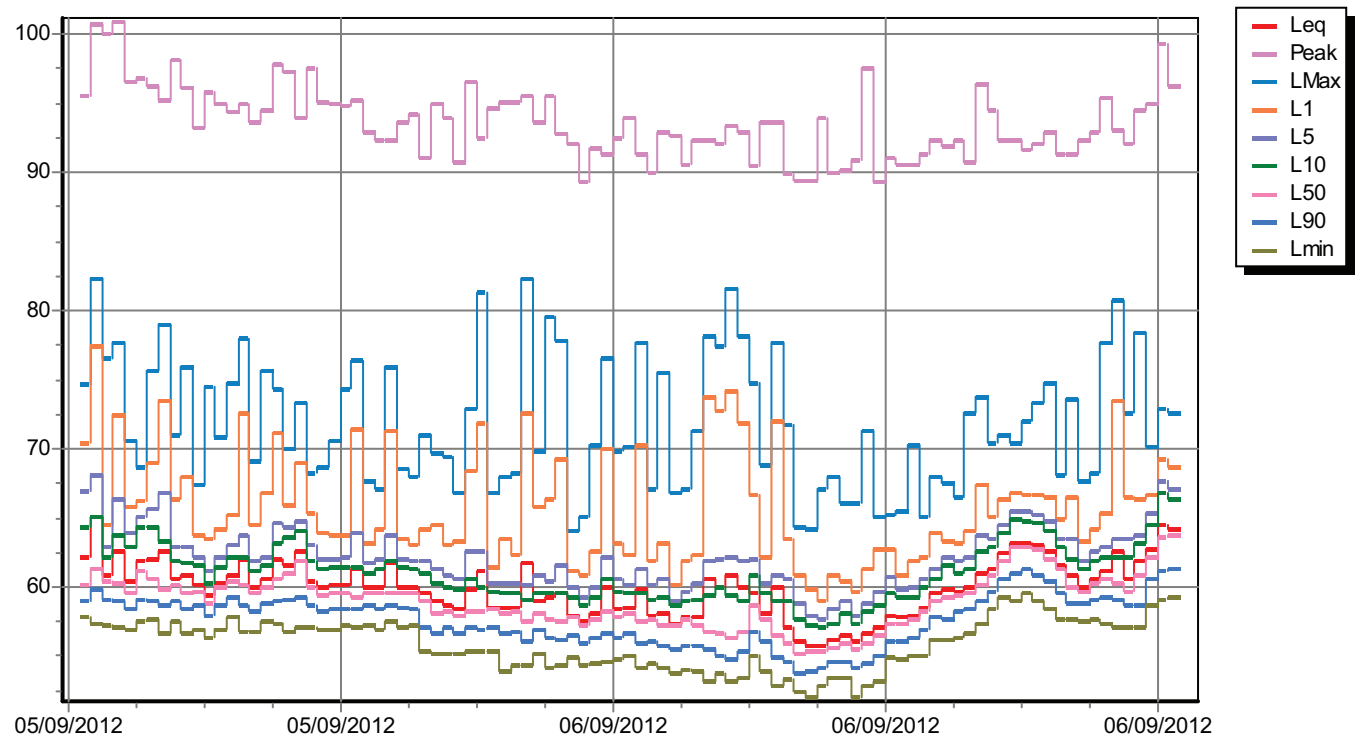
# Environmental Noise Measurement Report

| Date | Time | Run Duration (hh:mm:ss) | Leq dB | Lmax dB | Peak dBC | L1 | L5 | L10 | L50 | L90 | Lmin |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/09/2012 | 06:15:00 | 00:15:00 | 57.8 | 65.5 | 90.5 | 60.8 | 59.8 | 59.2 | 57.4 | 56.1 | 54.8 |
| 06/09/2012 | 06:00:00 | 00:14:59 | 57.9 | 65.2 | 91.0 | 62.7 | 60.7 | 59.6 | 57.3 | 56.0 | 54.9 |
| 06/09/2012 | 05:45:00 | 00:14:59 | 57.1 | 65.1 | 89.2 | 62.7 | 59.7 | 58.7 | 56.5 | 55.0 | 53.1 |
| 06/09/2012 | 05:30:00 | 00:14:59 | 56.6 | 71.2 | 97.4 | 61.3 | 58.8 | 58.2 | 55.9 | 54.4 | 52.9 |
| 06/09/2012 | 05:15:00 | 00:14:59 | 56.0 | 66.0 | 90.8 | 59.7 | 58.0 | 57.3 | 55.5 | 54.1 | 52.0 |
| 06/09/2012 | 05:00:00 | 00:15:01 | 56.5 | 66.0 | 90.1 | 60.4 | 58.9 | 58.1 | 55.9 | 54.6 | 53.4 |
| 06/09/2012 | 04:45:00 | 00:14:59 | 56.2 | 68.0 | 90.0 | 60.8 | 58.3 | 57.4 | 55.6 | 54.6 | 53.4 |
| 06/09/2012 | 04:30:00 | 00:15:01 | 55.8 | 67.0 | 93.9 | 58.9 | 57.6 | 57.1 | 55.3 | 54.1 | 52.9 |
| 06/09/2012 | 04:15:00 | 00:15:02 | 55.8 | 64.2 | 89.3 | 59.8 | 58.0 | 57.2 | 55.3 | 53.9 | 52.0 |
| 06/09/2012 | 04:00:00 | 00:15:01 | 56.0 | 64.3 | 89.3 | 60.9 | 58.8 | 57.7 | 55.2 | 53.8 | 52.4 |
| 06/09/2012 | 03:45:00 | 00:14:59 | 57.1 | 71.7 | 89.8 | 63.4 | 60.5 | 58.9 | 55.9 | 54.6 | 53.3 |
| 06/09/2012 | 03:30:00 | 00:15:00 | 60.0 | 77.6 | 93.6 | 72.0 | 60.9 | 58.9 | 56.5 | 54.9 | 52.8 |
| 06/09/2012 | 03:15:00 | 00:15:00 | 58.1 | 68.8 | 93.5 | 62.1 | 60.2 | 59.5 | 57.6 | 56.0 | 53.9 |
| 06/09/2012 | 03:00:00 | 00:15:01 | 59.6 | 74.7 | 90.4 | 66.6 | 62.0 | 60.9 | 58.6 | 56.8 | 55.0 |
| 06/09/2012 | 02:45:00 | 00:14:59 | 60.0 | 78.1 | 92.8 | 71.8 | 61.9 | 59.0 | 56.8 | 55.4 | 53.5 |
| 06/09/2012 | 02:30:00 | 00:15:00 | 60.8 | 81.6 | 93.3 | 74.1 | 62.1 | 59.4 | 56.3 | 54.8 | 53.1 |
| 06/09/2012 | 02:15:00 | 00:14:59 | 60.0 | 77.3 | 92.0 | 72.7 | 62.0 | 59.9 | 56.6 | 55.1 | 53.8 |
| 06/09/2012 | 02:00:00 | 00:14:59 | 60.5 | 78.0 | 92.3 | 73.7 | 61.8 | 59.4 | 56.8 | 55.5 | 53.2 |
| 06/09/2012 | 01:45:00 | 00:15:00 | 57.8 | 71.3 | 92.2 | 62.3 | 60.3 | 59.1 | 57.2 | 55.7 | 53.9 |
| 06/09/2012 | 01:30:00 | 00:14:59 | 57.8 | 67.1 | 90.5 | 61.8 | 59.7 | 59.0 | 57.6 | 55.7 | 54.0 |
| 06/09/2012 | 01:15:00 | 00:14:59 | 57.4 | 66.7 | 92.6 | 60.1 | 59.0 | 58.6 | 57.2 | 55.5 | 53.8 |
| 06/09/2012 | 01:00:00 | 00:15:02 | 58.1 | 75.5 | 92.9 | 63.1 | 60.5 | 59.3 | 57.2 | 55.8 | 54.2 |
| 06/09/2012 | 00:45:00 | 00:15:00 | 57.9 | 67.0 | 89.9 | 61.8 | 60.1 | 59.1 | 57.6 | 56.0 | 54.5 |
| 06/09/2012 | 00:30:00 | 00:15:00 | 59.8 | 77.7 | 91.2 | 70.3 | 61.2 | 59.5 | 57.5 | 55.9 | 54.1 |
| 06/09/2012 | 00:15:00 | 00:14:59 | 58.5 | 70.1 | 93.9 | 62.3 | 60.1 | 59.6 | 58.1 | 56.7 | 55.0 |
| 06/09/2012 | 00:00:00 | 00:14:59 | 58.3 | 69.8 | 92.4 | 63.2 | 60.6 | 59.7 | 57.8 | 56.4 | 54.8 |
| 05/09/2012 | 23:45:00 | 00:14:59 | 60.0 | 76.5 | 91.3 | 70.0 | 62.1 | 60.5 | 58.2 | 56.7 | 54.6 |
| 05/09/2012 | 23:30:00 | 00:14:59 | 58.1 | 70.2 | 91.7 | 62.6 | 60.0 | 59.3 | 57.7 | 56.3 | 54.5 |
| 05/09/2012 | 23:15:00 | 00:14:59 | 57.5 | 65.0 | 89.2 | 60.8 | 59.2 | 58.6 | 57.2 | 55.9 | 54.3 |
| 05/09/2012 | 23:00:00 | 00:14:59 | 58.0 | 64.0 | 92.0 | 61.1 | 59.9 | 59.3 | 57.8 | 56.5 | 54.9 |
| 05/09/2012 | 22:45:00 | 00:15:00 | 59.5 | 77.8 | 92.7 | 69.2 | 61.6 | 59.6 | 57.5 | 56.2 | 54.3 |
| 05/09/2012 | 22:30:00 | 00:14:59 | 59.2 | 79.5 | 95.4 | 66.4 | 60.4 | 59.6 | 57.6 | 56.4 | 54.1 |
| 05/09/2012 | 22:15:00 | 00:14:59 | 58.9 | 69.8 | 93.6 | 65.7 | 60.9 | 59.5 | 58.1 | 56.9 | 55.2 |
| 05/09/2012 | 22:00:00 | 00:15:00 | 61.7 | 82.3 | 95.4 | 72.6 | 60.1 | 59.1 | 57.5 | 56.1 | 54.3 |
| 05/09/2012 | 21:45:00 | 00:14:59 | 58.5 | 68.2 | 95.0 | 62.3 | 60.2 | 59.6 | 58.2 | 56.8 | 54.3 |
| 05/09/2012 | 21:30:00 | 00:14:59 | 58.5 | 67.9 | 95.0 | 63.4 | 60.2 | 59.6 | 58.1 | 56.6 | 53.9 |
| 05/09/2012 | 21:15:00 | 00:15:00 | 58.5 | 66.8 | 94.6 | 61.4 | 60.3 | 59.7 | 58.3 | 57.1 | 55.3 |
| 05/09/2012 | 21:00:00 | 00:15:00 | 61.1 | 81.2 | 92.4 | 71.9 | 62.5 | 59.9 | 58.2 | 56.9 | 55.4 |
| 05/09/2012 | 20:45:00 | 00:14:59 | 59.8 | 72.8 | 96.5 | 68.3 | 62.5 | 60.5 | 58.2 | 57.0 | 55.3 |
| 05/09/2012 | 20:30:00 | 00:15:00 | 58.4 | 66.8 | 90.7 | 63.3 | 60.5 | 59.8 | 57.9 | 56.7 | 55.2 |
| 05/09/2012 | 20:15:00 | 00:15:00 | 58.7 | 69.4 | 93.8 | 63.0 | 60.8 | 59.9 | 58.2 | 57.1 | 55.2 |
| 05/09/2012 | 20:00:00 | 00:14:59 | 58.9 | 69.7 | 94.8 | 64.5 | 61.3 | 60.3 | 58.1 | 56.7 | 55.2 |
| 05/09/2012 | 19:45:00 | 00:14:59 | 59.5 | 71.0 | 91.0 | 64.1 | 61.8 | 61.0 | 58.9 | 57.0 | 55.4 |

# Environmental Noise Measurement Report

| Date | Time | Run Duration (hh:mm:ss) | Leq dB | Lmax dB | Peak dBC | L1 | L5 | L10 | L50 | L90 | Lmin |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 05/09/2012 | 19:30:00 | 00:14:59 | 59.9 | 68.0 | 94.2 | 63.0 | 61.8 | 61.2 | 59.5 | 58.4 | 57.2 |
| 05/09/2012 | 19:15:00 | 00:15:00 | 60.0 | 68.5 | 93.6 | 63.4 | 62.0 | 61.4 | 59.6 | 58.5 | 57.1 |
| 05/09/2012 | 19:00:00 | 00:14:59 | 61.7 | 75.9 | 92.2 | 71.2 | 63.7 | 61.9 | 59.6 | 58.6 | 57.5 |
| 05/09/2012 | 18:45:00 | 00:14:59 | 59.9 | 67.0 | 92.2 | 64.2 | 62.0 | 61.2 | 59.5 | 58.4 | 56.9 |
| 05/09/2012 | 18:30:00 | 00:14:59 | 59.9 | 67.6 | 92.8 | 63.1 | 61.7 | 61.0 | 59.6 | 58.6 | 57.2 |
| 05/09/2012 | 18:15:00 | 00:14:59 | 61.2 | 76.3 | 95.2 | 71.4 | 63.9 | 61.4 | 59.3 | 58.3 | 57.0 |
| 05/09/2012 | 18:00:00 | 00:15:00 | 60.1 | 74.3 | 94.7 | 63.7 | 62.1 | 61.4 | 59.5 | 58.4 | 57.2 |
| 05/09/2012 | 17:45:00 | 00:15:00 | 60.1 | 70.6 | 94.9 | 63.8 | 62.0 | 61.4 | 59.5 | 58.4 | 56.9 |
| 05/09/2012 | 17:30:00 | 00:14:59 | 59.9 | 68.6 | 95.0 | 63.9 | 62.0 | 61.3 | 59.4 | 58.2 | 56.9 |
| 05/09/2012 | 17:15:00 | 00:14:59 | 60.4 | 68.2 | 97.5 | 65.3 | 63.0 | 61.9 | 59.9 | 58.6 | 57.1 |
| 05/09/2012 | 17:00:00 | 00:15:00 | 62.5 | 73.3 | 93.9 | 68.9 | 64.7 | 64.0 | 61.8 | 59.3 | 57.0 |
| 05/09/2012 | 16:45:00 | 00:14:59 | 61.6 | 69.9 | 97.2 | 65.9 | 64.3 | 63.6 | 61.0 | 59.1 | 56.8 |
| 05/09/2012 | 16:30:00 | 00:15:00 | 62.0 | 74.3 | 97.7 | 71.1 | 64.6 | 63.1 | 60.6 | 59.0 | 57.3 |
| 05/09/2012 | 16:15:00 | 00:14:59 | 60.6 | 75.6 | 94.5 | 66.7 | 62.1 | 61.5 | 59.9 | 58.8 | 57.5 |
| 05/09/2012 | 16:00:00 | 00:15:00 | 60.0 | 69.1 | 93.5 | 64.4 | 61.9 | 61.1 | 59.6 | 58.2 | 56.8 |
| 05/09/2012 | 15:45:00 | 00:14:59 | 62.0 | 77.9 | 94.8 | 72.6 | 63.8 | 62.2 | 60.1 | 58.7 | 56.8 |
| 05/09/2012 | 15:30:00 | 00:15:00 | 60.9 | 74.7 | 94.3 | 65.2 | 63.0 | 62.1 | 60.4 | 59.3 | 57.8 |
| 05/09/2012 | 15:15:00 | 00:15:01 | 60.3 | 70.8 | 94.9 | 64.2 | 62.1 | 61.4 | 59.9 | 58.6 | 56.9 |
| 05/09/2012 | 15:00:00 | 00:14:59 | 59.4 | 74.5 | 95.8 | 63.4 | 61.1 | 60.3 | 58.8 | 57.9 | 56.4 |
| 05/09/2012 | 14:45:00 | 00:15:02 | 60.1 | 67.4 | 93.1 | 63.7 | 62.2 | 61.5 | 59.7 | 58.6 | 56.9 |
| 05/09/2012 | 14:30:00 | 00:15:01 | 60.8 | 75.9 | 96.0 | 68.0 | 62.8 | 61.7 | 59.6 | 58.3 | 56.6 |
| 05/09/2012 | 14:15:00 | 00:15:00 | 60.6 | 71.0 | 98.0 | 66.3 | 62.8 | 61.9 | 60.1 | 58.9 | 57.5 |
| 05/09/2012 | 14:00:00 | 00:15:00 | 62.6 | 78.9 | 95.1 | 73.5 | 66.8 | 63.3 | 59.8 | 58.6 | 56.7 |
| 05/09/2012 | 13:45:00 | 00:15:00 | 62.0 | 75.6 | 96.2 | 68.9 | 65.6 | 64.3 | 60.5 | 58.9 | 57.6 |
| 05/09/2012 | 13:30:00 | 00:15:01 | 61.9 | 68.6 | 96.7 | 66.2 | 65.1 | 64.3 | 61.1 | 59.1 | 57.5 |
| 05/09/2012 | 13:15:00 | 00:14:59 | 60.4 | 70.6 | 96.5 | 65.7 | 63.9 | 62.8 | 59.5 | 58.3 | 56.9 |
| 05/09/2012 | 13:00:00 | 00:15:01 | 62.5 | 77.6 | 100.8 | 72.4 | 66.3 | 63.7 | 60.3 | 59.0 | 57.1 |
| 05/09/2012 | 12:45:00 | 00:14:59 | 60.8 | 76.4 | 99.9 | 64.5 | 62.8 | 62.1 | 60.4 | 59.1 | 57.2 |
| 05/09/2012 | 12:30:00 | 00:15:00 | 65.1 | 82.3 | 100.6 | 77.4 | 68.1 | 65.0 | 61.2 | 59.8 | 57.4 |
| 05/09/2012 | 12:16:56 | 00:13:03 | 62.2 | 74.6 | 95.5 | 70.4 | 66.9 | 64.3 | 60.1 | 59.0 | 57.8 |

# Environmental Noise Measurement Report




Assessment made by:

Date: 07/09/2012