Paragon
Acoustic Consultants

Woodley House,
65/73 Crockhamwell Road,
Woodley,
Reading,
Berkshire,
RG5 3JP

Tel: 0118-944-8444

| | | | | |
|---|---|---|---|---|
| **Project:** | 24 Park Square East, Regents Park. | | | |
| **Client:** | Slender Winter Partnership | | | |
| **Report Title:** | Environmental Noise Assessment and Mechanical Plant Assessment | | | |
| **Author:** | J A Gillott MIOA | | Date: | 8th Nov 10 |
| **Checked:** | P. Shortt MIOA | | Date: | 8th Nov 10 |
| **Revision:** | 0 | | | |
| **Report Status:** | **Final Issue** | | | |
| **Reference:** | 2361_MPA_2_JG | | | |

# Contents

# 1.0 Introduction

As part of refurbishment works to the property located at 24 Park Square East, Regents Park, it is proposed that an air-conditioning unit be installed within the site demise.

Paragon Acoustic Consultants Ltd has been commissioned to conduct an environmental noise survey to obtain statistical noise data to characterise the existing local background and ambient noise climate at the site. This is used to determine if the proposed new plant selection will meet with the Local Authority Noise Policy.

The assessments contained within this report will include the principles and recommendations contained within the following documents.

- **BS 8233:1999 "Sound insulation and noise reduction for buildings – Code of practice"**
- **BS 4142:1997 "Method for rating industrial noise affecting mixed industrial and residential areas".**

The client has advised that in certain instances the operational period of the proposed mechanical plant shall be 24 hours.

# 2.0 Site Description

## 2.1 Site Description

It is proposed that the external condensing units be located on the roof of the building. The following paragraphs describe the area proximal to 24 Park Square East, referred to as "the site".

24 Park Square East, Regents Park is located on the east elevation of Park Square East, approximately 20 metres north of the Marylebone Road. The building is four storeys in height (plus basement) and is elevated on storey higher than the adjoining dwellings.

The site is adjoined to the north by the terraced building of 23 Park Square East and to the south by the terraced building of number 1 Albany Terrace.

To the west of the site lies the two-way trafficked road of Park Square East, beyond which lies Regents Park. To the east of the site lies Peto Place, beyond which lies a large building of address 2 Albany Place.

The site is illustrated by plan in Appendix A.

# 3.0 Existing Noise Climate

## 3.1 Road Traffic

Noise emanating from vehicular road traffic was deemed to provide the primary contribution to the ambient noise climate proximal to the nearest affected residential premises. The overall noise comprises both individual "event" type emissions from

vehicles passing along local roads, and also continuous low frequency "rumble" due to middle distance traffic flows.

### 3.2 Rail traffic

Rail traffic noise events were not observed during the survey period.

### 3.3 Aircraft

Aircraft overflights were not observed during the manned survey period. Although it is likely that the noise levels measured will include contributions from medium and high altitude aircraft.

### 3.4 Mechanical Noise Sources

No other mechanical noise sources were observed at the site.

## 4.0 Environmental Noise Survey

### 4.1 Measurements

The environmental noise survey was carried out generally in accordance with the principles and procedures set out within **BS 4142:1997** "Method for rating industrial noise affecting mixed industrial and residential areas".

The noise monitoring commenced on 12th October 2010 at approximately 14:00 hours and continued until approximately 14:00 hours the following day. The monitoring was generally un-manned.

The measurements were made at the assessment location as described below.

- **MP1**: External to a fourth floor window on the east elevation of the building

The measurement location is illustrated on the site layout drawing in Appendix A.

Various statistical broad-band and spectral sound pressure level measurements were obtained during the survey. A measurement time interval $T_m$ = 15 minutes was used for sampling. Measurements of the percentile level $L_{A90,T}$ were made using the sound level meter fast time constant (125ms), as per clause 3.10 of BS 4142:1997.

The quantities recorded included:

- **$L_{Aeq}$: the equivalent continuous noise level over the measurement period**
- **$L_{Amax}$: the maximum sound pressure level (Fast time-weighting)**
- **$L_{A10}$: the noise level exceeded for 10% of the measurement period**
- **$L_{A90}$: the noise level exceeded for 90% of the measurement period**

## 4.2 Weather during survey period

The weather conditions at the start of the survey during the manned period of the survey were dry and mild with a slight breeze. At the end of the survey the weather conditions were similar. The weather forecast did not indicate that adverse weather conditions would occur for the survey duration.

## 4.3 Alternative measurement locations

It was not possible to measure at 1 metre from all of the surrounding affected residential property windows, these being potential assessment locations. As such, the background noise levels were monitored external to a fourth floor window on the east elevation of the building where it was presumed to be equivalent to the potential assessment locations. The near and middle distance vehicular traffic noise levels are considered to provide the dominant noise contribution to the background noise levels at this site and as such it is considered reasonable that the monitoring location would be representative of the noise climate at the potential assessment locations.

## 4.4 Instrumentation

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of IEC 60651, IEC 60804, IEC 61260 and IEC 61672:

- **Norsonic Type 118 Sound level analyser, serial number 31990**
- **Norsonic Type 1225 ½" microphone**

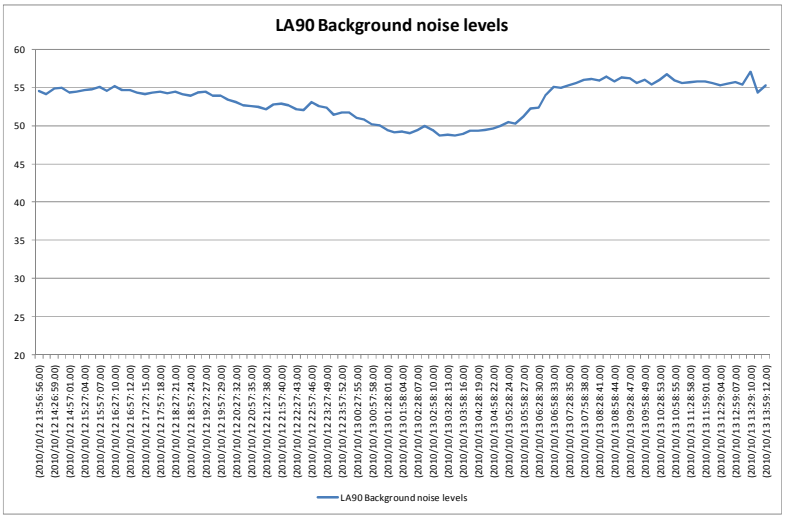
Additionally, the following equipment was used:

- **Norsonic CA-1317 Weather protection kit**
- **NOR 1212 microphone outdoor protection kit**
- **Tripod**
- **Leica laser distance measuring tool**
- **Camera**

Calibration checks were made prior to and after completion of measurements using a Norsonic Type 1251 acoustical calibrator complying with Class 1 of IEC 942 (1988), calibration level 114.0 dB ± 0.3 dB, @ 1.0 kHz. All instrumentation carries a current manufacturer's certificate of conformance a copy of which is attached to Appendix C.

## 4.5 Results

The recorded statistical broadband sound pressure levels are shown within Appendix B, and the LA90 background noise levels indicated graphically below:




The recorded statistical broad-band sound pressure levels are shown within Appendix B, and the lowest representative daytime, evening and night-time background noise levels obtained are rounded to the nearest integer and summarised in Table 1.

**Table 1:** Lowest Background Sound Pressure Level Measurements

| Measurement Position | Day time $L_{A90(07:00\text{-}19:00)}$ | Day time – evening $L_{A90(19:00\text{-}23:00)}$ | Night time $L_{A90(23:00\text{-}07:00)}$ |
|---|---|---|---|
| MP1 | 54 dB | 52 dB | 49 dB |

# 5.0 Evaluation of external Noise Criteria

The local vicinity contains mixed commercial and residential premises, both of which must be given due consideration in terms of acceptable levels of noise exposure from the new plant.

## 5.1 Residential properties.

BS4142:1997 “Method for rating industrial noise affecting mixed residential and industrial areas” describes a method of determining the level of the noise of an industrial nature, together with procedures for assessing whether the noise under investigation is likely to give rise to complaints from persons living in the vicinity. In general, the likelihood of complaint in response to a noise depends upon factors including the margin by which it exceeds the background noise level.

In order to establish the Local Authority Noise Policy this practice visited the Camden Council web site and downloaded their noise strategy from the following web page:

http://search.camden.gov.uk/search?site=default_collection&client=camden_frontend&output=xml_no_dtd&proxystylesheet=camden_frontend&sort=date%3AD%3AL%3Ad1&oe=UTF-8&ie=UTF-8&ud=1&q=mechanical+plant+noise+policy+&x=15&y=7

The policy is reproduced in italicised text as follows:

***Ventilation ducts and air handling equipment***
*16.33 The following standard applies to all air-cooling, heating, ventilation, extraction and conditioning systems and to any ancillary plant, ducting and equipment which would have an impact on the external environment. The Council seeks to ensure that noise level output from all such systems does not increase existing ambient noise levels, in order to protect existing levels and prevent "creep" (a rise in background noise levels). 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.*

*16.34 The Council considers that for new developments involving noisy plant/equipment or other uses, design measures should be taken to ensure that noise levels predicted at a point 1 metre external to sensitive facades are at least 5dB(A) less than the existing background measurement (LA90) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses in the noise (bangs, clicks, clatters, thumps), special attention should be given to reducing the noise levels from plant and equipment at any sensitive facade to at least 10dB(A) below the LA90 level.*

Our interpretation of the wordage relating to "*sensitive facades"* is that this will refer to third party noise sensitive facades, i.e. not including the facades of the dwelling known as 24 Park Square East..

## 5.2 External noise criteria

The derived external noise criteria to which the new building services plant shall be required to achieve are summarised in Table 2:

**Table 2:** Limiting Noise Criteria Applicable @ 1m From the Affected Premises

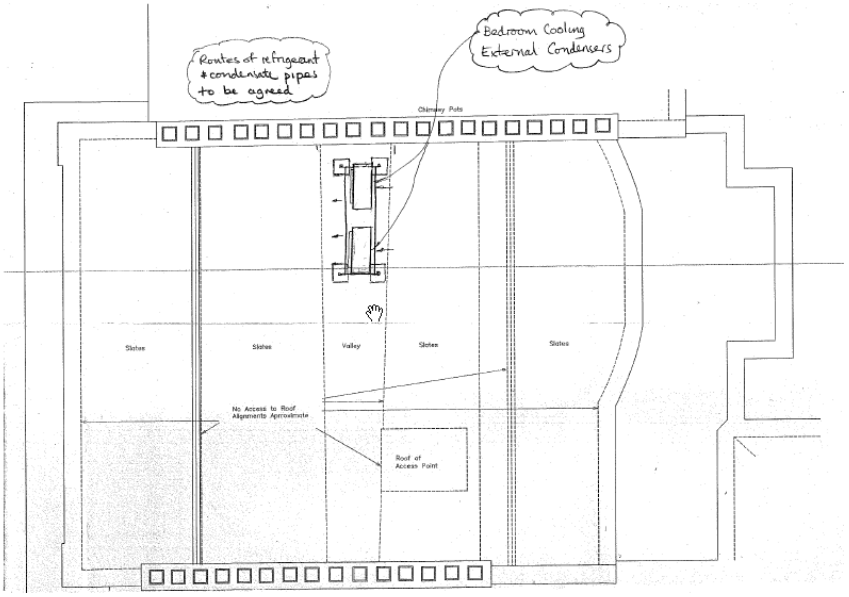
| Mechanical plant | Receptor | Day time $L_{ArT\ (07:00\text{-}19:00)}$ | Day time – evening $L_{ArT\ (19:00\text{-}23:00)}$ | Night time $L_{ArT\ (23:00\text{-}07:00)}$ |
|---|---|---|---|---|
| All plant | All third party properties | 49 dB | 47 dB | 44 dB |

Where it is anticipated that any plant/equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps) a 5 dB penalty shall be included within the assessment as described within BS 4142:1997 "Method for rating industrial noise affecting mixed industrial and residential areas".

# 6.0 Review of Proposed External Condensers

Detailed calculations have been carried out in order to determine the likely level of airborne noise transmission outside the identified assessment locations due to the operation of the proposed new plant to be installed on the roof of the clients building.

The below sketch indicates the proposed location of plant on the roof:

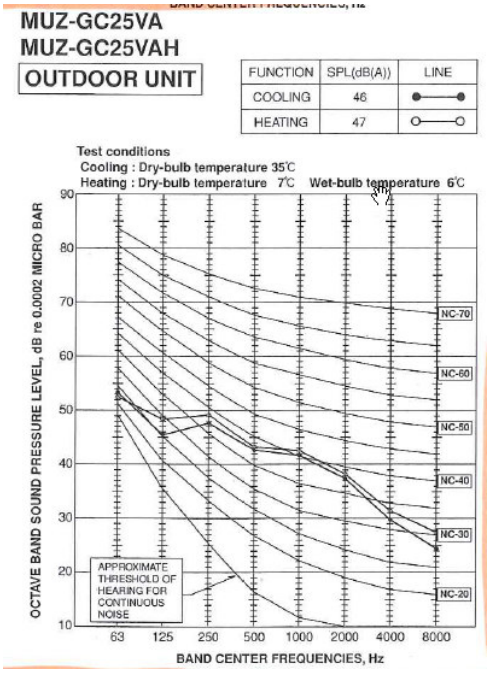



The following sections provide a record of the proposed new plant and the operational sound levels used as the basis for this assessment.

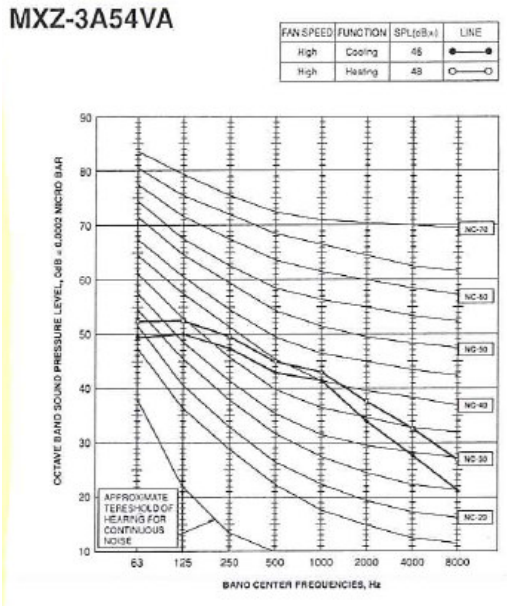
## 6.1 Condenser Noise Levels

The manufacturers published operational noise levels for the selected items of plant are reproduced as follows:

One number Mitsubishi MUZ-GC25VA



One number Mitsubishi MXZ-3A54VA




## 6.2 Predicted Condenser Noise Levels

Calculations have been carried out utilising the noise data presented in Section 6.1 and using CADNA A software to predict the resultant sound pressure levels due to airborne transmitted noise outside the nearest exposed noise assessment positions. The model is based on the condensing unit as shown in Section 6.0, on the roof. The predicted results are summarised in Table 3 as follows.

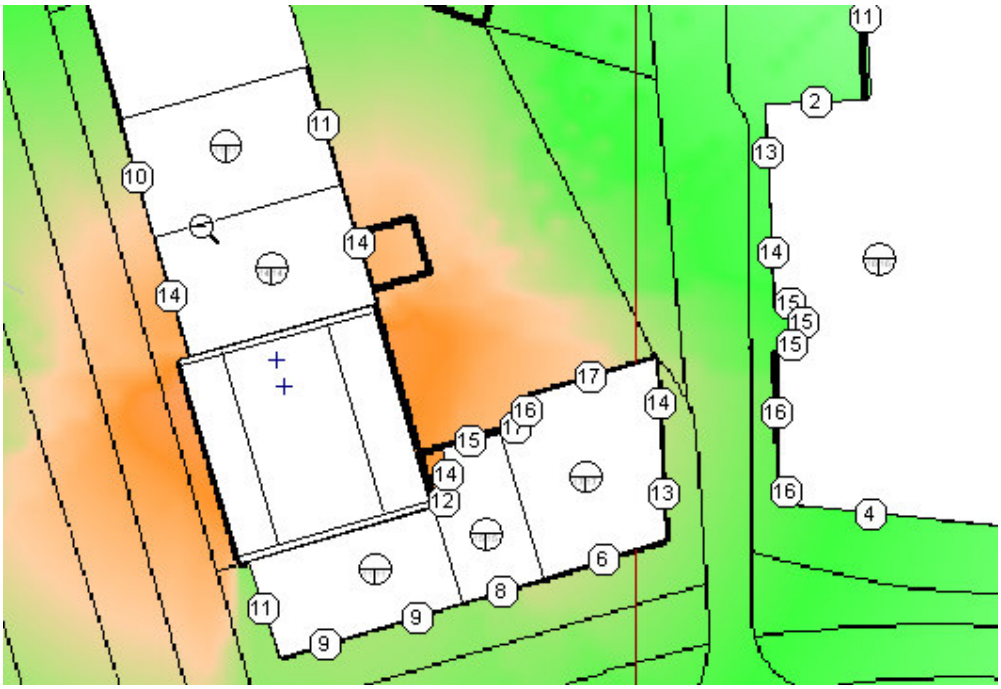
**Table 3:** Predicted Noise Levels @ Nearest Exposed Residential Dwelling

| Plant under consideration | Worst case Assessment location | Predicted Lp at receiver | Derived noise limit Night time |
|---|---|---|---|
| One number Mitsubishi MUZ-GC25VA<br>One number Mitsubishi MXZ-3A54VA | 23 Park Square East | 14 dB | 47 dB Day / Evening / 44 dB night time |
| | 1 Albany Terrace | 15 dB | |
| | 2 Albany Terrace | 17 dB | |
| | 2 Albany Place | 16 dB | |

It can be seen from the results indicated in Table 3 that the proposed plant will maintain the Local Authority Noise Policy requirements for residential properties during the daytime and night time periods.

A screenshot of the plan of the Cadna A model is reproduced as follows:

Fig 1: plan view of area local to the proposed plant




### 6.3 Vibration – condensing units

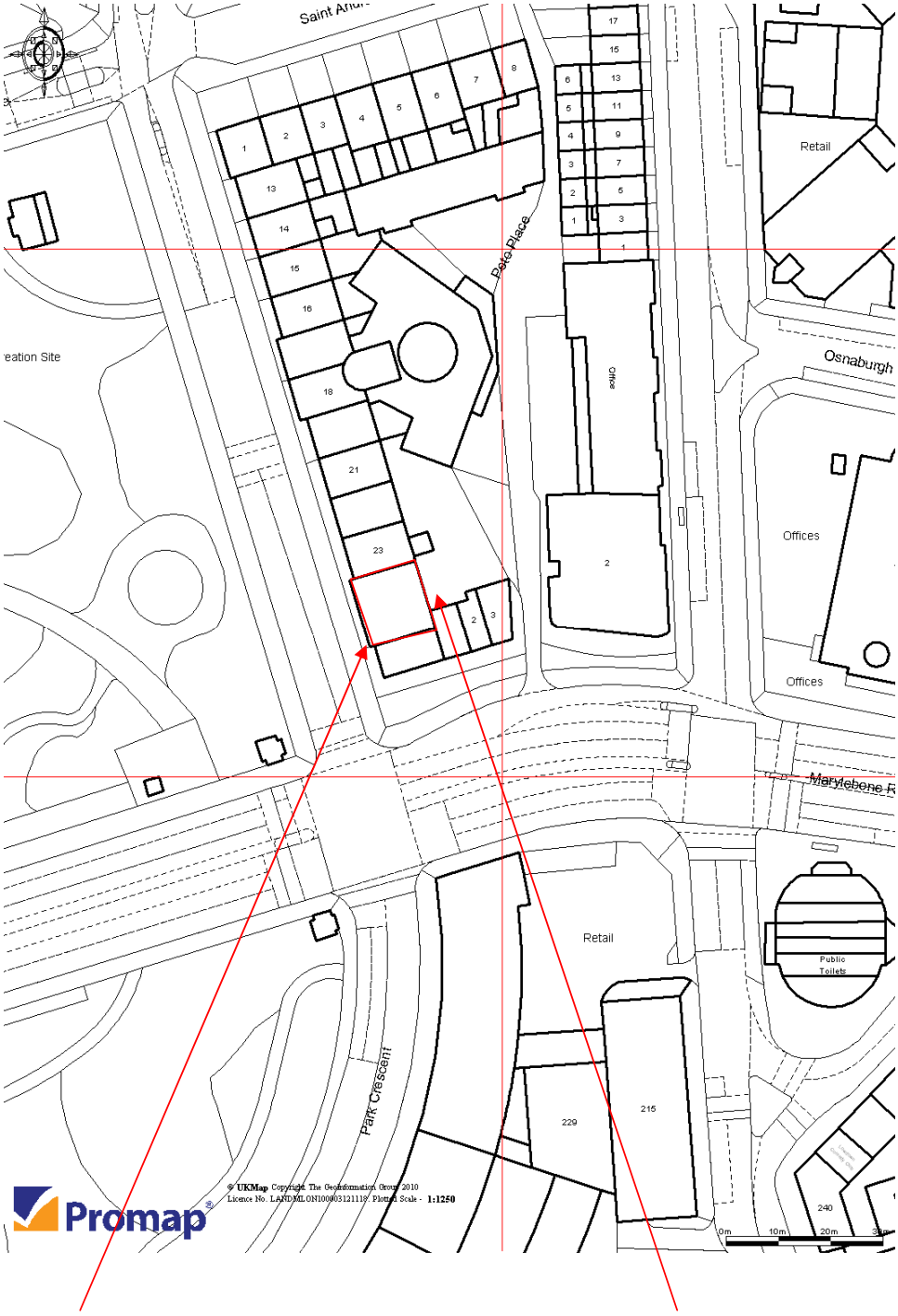
It is recommended that the client provisions for appropriate vibration isolation mountings for the proposed mechanical plant items. It is proposed that the condensing unit be placed upon the roof that is structurally connected to a residential property. It is recommended that the plant be installed on vibration isolation mounts providing a minimum of 98% isolation efficiency at the lowest forcing frequency using an isolation mount system approved by the condensing unit suppliers. In addition, all pipework should be suitably isolated from the building structure.

## 7.0 Conclusions

A background noise survey has been undertaken to determine the noise climate likely to exist in the vicinity of the roof of 24 Park Square East, Regents Park, London, where the location of mechanical plant is proposed.

Appropriate external criteria have been identified on the basis of Local Authority noise policy and predictions of the proposed mechanical plant noise emissions have been undertaken. Predictions indicate that the Local Authority derived noise limits will be maintained. On this basis, reservations are not expected from the planning authority on the grounds of noise.

# Appendix A: Site Drawings




24 Park Square East — Measuring position MP1

# Appendix B: Measurement Data

| 1st day | LAeq | LAF(max | L10 | L90 |
|---|---|---|---|---|
| 07:00 | | | | |
| 07:15 | | | | |
| 07:30 | | | | |
| 07:45 | | | | |
| 08:00 | | | | |
| 08:15 | | | | |
| 08:30 | | | | |
| 08:45 | | | | |
| 09:00 | | | | |
| 09:15 | | | | |
| 09:30 | | | | |
| 09:45 | | | | |
| 10:00 | | | | |
| 10:15 | | | | |
| 10:30 | | | | |
| 10:45 | | | | |
| 11:00 | | | | |
| 11:15 | | | | |
| 11:30 | | | | |
| 11:45 | | | | |
| 12:00 | | | | |
| 12:15 | | | | |
| 12:30 | | | | |
| 12:45 | | | | |
| 13:00 | | | | |
| 13:15 | | | | |
| 13:30 | | | | |
| 13:45 | | | | |
| (2010/10/12 13:56:56.00) | 57.90 | 76.30 | 58.30 | 54.50 |
| (2010/10/12 14:11:57.00) | 56.70 | 68.00 | 58.40 | 54.10 |
| (2010/10/12 14:26:59.00) | 59.00 | 74.20 | 59.50 | 54.80 |
| (2010/10/12 14:42:00.00) | 58.40 | 74.50 | 60.00 | 55.00 |
| (2010/10/12 14:57:01.00) | 57.00 | 71.60 | 58.70 | 54.30 |
| (2010/10/12 15:12:03.00) | 59.40 | 73.90 | 61.80 | 54.40 |
| (2010/10/12 15:27:04.00) | 58.90 | 71.70 | 61.90 | 54.60 |
| (2010/10/12 15:42:05.00) | 59.10 | 82.20 | 60.50 | 54.70 |
| (2010/10/12 15:57:07.00) | 59.60 | 70.30 | 63.20 | 55.10 |
| (2010/10/12 16:12:08.00) | 58.00 | 72.50 | 59.60 | 54.50 |
| (2010/10/12 16:27:10.00) | 62.90 | 84.60 | 64.90 | 55.20 |
| (2010/10/12 16:42:11.00) | 58.00 | 72.90 | 59.10 | 54.60 |
| (2010/10/12 16:57:12.00) | 62.90 | 78.60 | 61.60 | 54.60 |
| (2010/10/12 17:12:14.00) | 57.00 | 66.70 | 58.70 | 54.30 |
| (2010/10/12 17:27:15.00) | 56.50 | 66.10 | 58.20 | 54.10 |
| (2010/10/12 17:42:17.00) | 56.30 | 67.50 | 57.70 | 54.30 |
| (2010/10/12 17:57:18.00) | 57.00 | 73.50 | 58.30 | 54.40 |
| (2010/10/12 18:12:19.00) | 57.50 | 76.30 | 58.20 | 54.20 |
| (2010/10/12 18:27:21.00) | 62.00 | 79.40 | 63.90 | 54.40 |
| (2010/10/12 18:42:22.00) | 57.60 | 71.00 | 58.70 | 54.10 |
| (2010/10/12 18:57:24.00) | 56.40 | 67.20 | 57.90 | 53.90 |
| (2010/10/12 19:12:25.00) | 56.90 | 66.30 | 58.60 | 54.30 |
| (2010/10/12 19:27:27.00) | 58.80 | 77.00 | 59.40 | 54.40 |
| (2010/10/12 19:42:28.00) | 59.60 | 79.60 | 58.40 | 53.90 |
| (2010/10/12 19:57:29.00) | 57.30 | 70.00 | 58.80 | 53.90 |
| (2010/10/12 20:12:30.00) | 56.70 | 70.60 | 58.40 | 53.40 |
| (2010/10/12 20:27:32.00) | 56.40 | 67.00 | 58.30 | 53.10 |
| (2010/10/12 20:42:33.00) | 56.80 | 75.50 | 58.50 | 52.70 |
| (2010/10/12 20:57:35.00) | 62.90 | 84.00 | 59.10 | 52.60 |
| (2010/10/12 21:12:36.00) | 58.20 | 74.40 | 59.60 | 52.50 |
| (2010/10/12 21:27:38.00) | 56.20 | 70.80 | 58.00 | 52.10 |
| (2010/10/12 21:42:39.00) | 61.10 | 79.20 | 62.20 | 52.80 |
| (2010/10/12 21:57:40.00) | 58.10 | 75.50 | 58.40 | 52.90 |
| (2010/10/12 22:12:42.00) | 56.30 | 71.70 | 58.00 | 52.70 |
| (2010/10/12 22:27:43.00) | 55.70 | 67.00 | 57.60 | 52.10 |
| (2010/10/12 22:42:45.00) | 56.00 | 62.60 | 58.20 | 52.00 |
| (2010/10/12 22:57:46.00) | 56.40 | 66.50 | 58.60 | 53.10 |
| (2010/10/12 23:12:47.00) | 58.00 | 75.20 | 59.00 | 52.60 |
| (2010/10/12 23:27:49.00) | 56.50 | 66.20 | 57.80 | 52.30 |
| (2010/10/12 23:42:50.00) | 55.90 | 67.70 | 57.90 | 51.40 |
| (2010/10/12 23:57:52.00) | 55.50 | 61.60 | 57.40 | 51.70 |
| (2010/10/13 00:12:53.00) | 58.00 | 80.50 | 58.00 | 51.70 |
| (2010/10/13 00:27:55.00) | 56.00 | 74.90 | 57.70 | 51.00 |
| (2010/10/13 00:42:57.00) | 55.20 | 70.00 | 57.30 | 50.80 |
| (2010/10/13 00:57:58.00) | 54.40 | 60.60 | 56.90 | 50.20 |
| (2010/10/13 01:13:00.00) | 55.00 | 69.80 | 57.40 | 50.10 |
| (2010/10/13 01:28:01.00) | 53.70 | 59.10 | 55.80 | 49.40 |
| (2010/10/13 01:43:02.00) | 54.60 | 72.60 | 56.20 | 49.10 |
| (2010/10/13 01:58:04.00) | 55.70 | 71.90 | 56.80 | 49.20 |
| (2010/10/13 02:13:05.00) | 56.50 | 70.00 | 57.20 | 49.00 |
| (2010/10/13 02:28:07.00) | 60.30 | 75.40 | 66.60 | 49.40 |
| (2010/10/13 02:43:08.00) | 59.90 | 76.50 | 66.20 | 49.90 |
| (2010/10/13 02:58:10.00) | 58.10 | 76.00 | 59.00 | 49.40 |
| (2010/10/13 03:13:12.00) | 53.10 | 60.50 | 55.80 | 48.70 |
| (2010/10/13 03:28:13.00) | 53.30 | 62.80 | 55.50 | 48.80 |
| (2010/10/13 03:43:14.00) | 53.50 | 64.90 | 56.00 | 48.70 |
| (2010/10/13 03:58:16.00) | 53.10 | 61.00 | 55.40 | 48.90 |
| (2010/10/13 04:13:17.00) | 53.50 | 61.50 | 56.00 | 49.30 |
| (2010/10/13 04:28:19.00) | 54.00 | 61.30 | 56.80 | 49.30 |
| (2010/10/13 04:43:20.00) | 54.60 | 63.80 | 57.30 | 49.40 |
| (2010/10/13 04:58:22.00) | 54.30 | 60.40 | 56.90 | 49.60 |
| (2010/10/13 05:13:23.00) | 54.70 | 61.40 | 57.30 | 49.90 |
| (2010/10/13 05:28:24.00) | 57.80 | 76.40 | 58.30 | 50.50 |
| (2010/10/13 05:43:26.00) | 55.70 | 67.30 | 58.20 | 50.30 |
| (2010/10/13 05:58:27.00) | 56.60 | 65.10 | 58.90 | 51.20 |
| (2010/10/13 06:13:29.00) | 56.90 | 66.50 | 59.00 | 52.20 |
| (2010/10/13 06:28:30.00) | 57.20 | 66.10 | 59.20 | 52.40 |
| (2010/10/13 06:43:32.00) | 59.00 | 76.30 | 60.10 | 54.00 |

| 2nd day | LAeq | AF(max | L10 | L90 |
|---|---|---|---|---|
| (2010/10/13 06:58:33.00) | 58.30 | 68.00 | 60.20 | 55.10 |
| (2010/10/13 07:13:34.00) | 58.70 | 74.90 | 59.70 | 55.00 |
| (2010/10/13 07:28:35.00) | 58.10 | 71.00 | 59.70 | 55.30 |
| (2010/10/13 07:43:37.00) | 58.60 | 67.50 | 60.80 | 55.60 |
| (2010/10/13 07:58:38.00) | 58.50 | 70.10 | 60.00 | 56.00 |
| (2010/10/13 08:13:39.00) | 58.30 | 68.20 | 59.80 | 56.10 |
| (2010/10/13 08:28:41.00) | 58.30 | 66.50 | 60.10 | 55.90 |
| (2010/10/13 08:43:42.00) | 61.80 | 80.10 | 61.30 | 56.40 |
| (2010/10/13 08:58:44.00) | 58.50 | 70.20 | 59.80 | 55.80 |
| (2010/10/13 09:13:45.00) | 59.10 | 72.10 | 60.40 | 56.30 |
| (2010/10/13 09:28:47.00) | 58.50 | 70.00 | 59.70 | 56.20 |
| (2010/10/13 09:43:48.00) | 58.20 | 67.90 | 60.10 | 55.60 |
| (2010/10/13 09:58:49.00) | 59.10 | 74.30 | 60.90 | 56.00 |
| (2010/10/13 10:13:51.00) | 59.90 | 74.00 | 61.50 | 55.40 |
| (2010/10/13 10:28:53.00) | 61.70 | 77.70 | 66.00 | 56.00 |
| (2010/10/13 10:43:54.00) | 65.20 | 82.50 | 67.20 | 56.70 |
| (2010/10/13 10:58:55.00) | 58.70 | 72.20 | 60.20 | 55.90 |
| (2010/10/13 11:13:57.00) | 58.90 | 78.20 | 59.40 | 55.60 |
| (2010/10/13 11:28:58.00) | 58.10 | 72.40 | 59.50 | 55.70 |
| (2010/10/13 11:44:00.00) | 60.40 | 76.30 | 62.00 | 55.80 |
| (2010/10/13 11:59:01.00) | 58.10 | 71.30 | 59.50 | 55.80 |
| (2010/10/13 12:14:02.00) | 58.70 | 73.10 | 59.80 | 55.60 |
| (2010/10/13 12:29:04.00) | 58.00 | 71.10 | 59.40 | 55.30 |
| (2010/10/13 12:44:05.00) | 57.50 | 65.40 | 59.00 | 55.50 |
| (2010/10/13 12:59:07.00) | 62.60 | 79.00 | 66.80 | 55.70 |
| (2010/10/13 13:14:09.00) | 59.20 | 75.60 | 60.10 | 55.40 |
| (2010/10/13 13:29:10.00) | 62.30 | 76.90 | 64.30 | 57.00 |
| (2010/10/13 13:44:11.00) | 58.70 | 74.40 | 59.50 | 54.30 |
| (2010/10/13 13:59:12.00) | 63.60 | 86.90 | 65.50 | 55.30 |
| 14:15 | | | | |
| 14:30 | | | | |
| 14:45 | | | | |
| 15:00 | | | | |
| 15:15 | | | | |
| 15:30 | | | | |
| 15:45 | | | | |
| 16:00 | | | | |
| 16:15 | | | | |
| 16:30 | | | | |
| 16:45 | | | | |
| 17:00 | | | | |
| 17:15 | | | | |
| 17:30 | | | | |
| 17:45 | | | | |
| 18:00 | | | | |
| 18:15 | | | | |
| 18:30 | | | | |
| 18:45 | | | | |
| 19:00 | | | | |
| 19:15 | | | | |
| 19:30 | | | | |
| 19:45 | | | | |
| 20:00 | | | | |
| 20:15 | | | | |
| 20:30 | | | | |
| 20:45 | | | | |
| 21:00 | | | | |
| 21:15 | | | | |
| 21:30 | | | | |
| 21:45 | | | | |
| 22:00 | | | | |
| 22:15 | | | | |
| 22:30 | | | | |
| 22:45 | | | | |
| 23:00 | | | | |
| 23:15 | | | | |
| 23:30 | | | | |
| 23:45 | | | | |
| 00:00 | | | | |
| 00:15 | | | | |
| 00:30 | | | | |
| 00:45 | | | | |
| 01:00 | | | | |
| 01:15 | | | | |
| 01:30 | | | | |
| 01:45 | | | | |
| 02:00 | | | | |
| 02:15 | | | | |
| 02:30 | | | | |
| 02:45 | | | | |
| 03:00 | | | | |
| 03:15 | | | | |
| 03:30 | | | | |
| 03:45 | | | | |
| 04:00 | | | | |
| 04:15 | | | | |
| 04:30 | | | | |
| 04:45 | | | | |
| 05:00 | | | | |
| 05:15 | | | | |
| 05:30 | | | | |
| 05:45 | | | | |
| 06:00 | | | | |
| 06:15 | | | | |
| 06:30 | | | | |
| 06:45 | | | | |

# Appendix C: Calibration certificates

## Calibration Report

Certificate number 4796

Norsonic Type : 118 Serial no : 31990

| | |
|---|---|
| Customer: | Paragon Acoustic Consultants |
| Department: | Woodley House |
| Place: | 65-73 Crockhamwell Road |
| City: | Woodley, Reading RG5 3JP |
| Order No: | 1600/16 |
| Contact Person: | Phil Dutfield |
| Phone/Mail: | 0118 944 8444 |

| | | | | |
|---|---|---|---|---|
| Microphone : | Norsonic | Type : 1225 | Serial no : 47988 | Sens:-25.44dB |
| Pre amplifier | Norsonic | Type : 1206 | Serial no : 30366 | |
| Calibrator : | Norsonic | Type : 1251 | Serial no : 31651 | Level:114.16dB |

Measured with Pre Amplifier RS232 cable was included

This sound level meter has been calibrated as specified in BS 7580. PART 1 : 1997.
Measurement Results:

| | |
|---|---|
| Noise test - BS 7580 #5.5.2 | Passed |
| Level Linearity Test - BS 7580, #5.5.3 | Passed |
| Frequency weightings: A Network - BS 7580 #5.5.4 | Passed |
| Frequency weightings: C Network - BS 7580 #5.5.4 | Passed |
| Time weightings F and S - BS7580 #5.5.5 | Passed |
| Peak response - BS7580 #5.5.6 | Passed |
| RMS accuracy - BS7580 #5.5.7 | Passed |
| Time weighting I - BS7580 #5.5.8 | Passed |
| Integrating Test : Time averaging - BS7580 #5.5.9 | Passed |
| Integrating Test : Pulse range - BS7580 #5.5.10 | Passed |
| Integrating Test : Sound exposure level - BS7580 #5.5.11 | Passed |
| Overload SPL Test - BS 7580 #5.5.12 | Passed |
| Overload Leq Test - BS 7580 #5.5.12 | Passed |
| Acoustic tests - BS 7580 #5.4 and 5.6 | Passed |
| Summation of acoustic tests - BS 7580 #5.5.4 | Passed |

The overall frequency response of the sound level meter including case reflections, microphone response and wind screen has shown to confirm with the requirements in #6 of the BS EN 60651 and #5.5.4 in BS 7580 Part 1.

Comment :
Correct level with associated calibrator is 114.1dB(A)

Environmental conditions:

| Pressure : | Temperature : | Relative humidity : |
|---|---|---|
| 102.106 kPa | 23.9 °C | 40 %RH |

Date of calibration: 21/02/2009
Date of issue: 24/02/2009
Supervisor:
Engineer

Ian Campbell MSc MIOA

Campbell Associates
www.campbell-associates.co.uk