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NM&S

Environmental impact assessment.

Address:

48 Red Lion St, Holborn, WC1R 4PF

Client:

JKInterior

22 July, 2011

Engineer: Simone Longo AMIOA

Summary

1.0 Survey address.

1.1 At the 1st floor level, rear flat roof of 48 Red Lion St, Holborn, WC1R 4PF, London.

2.0 Location of the nearest noise sensitive window.

2.1.1 The main air extraction system flue outlet will be at approximately 4 metres from the nearest receptor window locate one floor above the flat roof, two more heat exchanger (compressor) units will be located at approximately 6.5 m distance from the same receptor window.

3.0 Proposed operating hours.

3.1 The plants will operate daily between 08.00 to 23.00.

4.0 Plant type and estimated noise emission levels.

4.1 Kitchen extractor unit.

4.1.1

Maker and model N.	Noise emission level published by the manufacture.
Ventaxia: Eco Mixed Flow Fan EMF40014	35 dBA @ 3m

4.1.2 Recommended in line attenuator

Maker and model N.	Average attenuation.
Lindab silencers: SLCU 50	10dBA

4.2 Heat exchanger (compressor) units.

4.2.1 Two heat exchanger units (compressor) manufactured by Sanyo will be installed at the roof top.

4.2.2 Relative noise emission level as declared by the manufacture is given below in tabular form.

Sanyo Unit model N.	Manufacture declared SPL assumed @ 1m hemispherical (worst case considered)
SPW-C366VH	52 dBA
SPW-C256VH	56 dBA

4.2.3 Since the two condenser units will be installed in close proximity to each other the cumulative noise emission of both units operating together will be taken into account.

4.2.4 52 + 56 = 57.4 dBA

4.3 Background environmental noise lowest LA90,15min within the period of interest.

4.2.1 Measured within the period if interest 08.00 to 23.00
43.4 dB LA,90,15min

5.0 Weather condition:

5.1 No remarks.

6.0 Instrumentation

6.1 Table showing instrumentation data.

Instrument type:	Norsonic Sound Analyser Nor-140	Serial no:	1403371
Preamflifier type:	Norsonic Type Nor-1209	Serial no:	12247
Microphone type:	Norsonic Type Nor-1225	Serial no:	24301
Traceable periodic laboratory verification by:	Gracey & Associate		
Date of last verification:	07.07.2010		

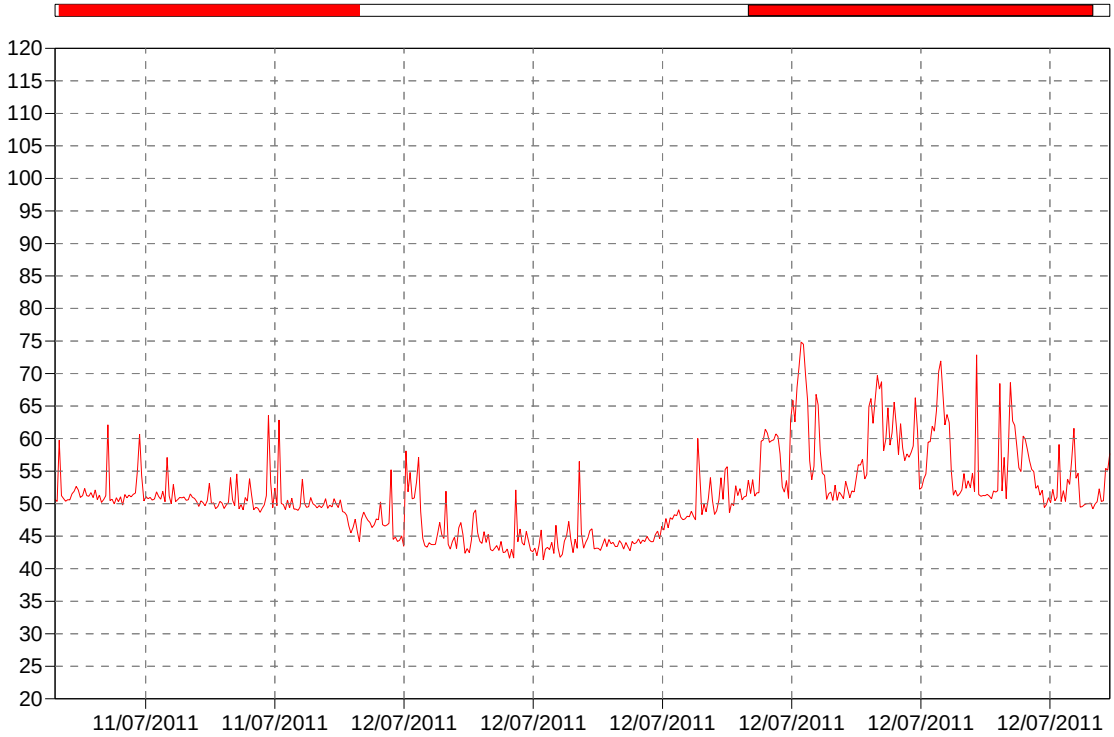
Calibrator type:	Norsonic Type 1251	Serial no:	31943
Traceable periodic laboratory verification by:	Gracey & Associates		
Date of last verification:	14.12.2009		

7.0 Survey data, personnel and calibration.

Microphone position:	At 1 m from the building façade.			Operator:	Simone Longo
Measurement title:	24 hours assessment			Date:	11-12/07/2011
Measurement duration:	24 hours	Period length:	15 min.	Filter bandwidth:	(A) and 1/1 Oct
Initial calibration level:	113.9 dB	Sampling frequency:	50ms	End calibration level:	113.8 dB

8.0 Noise survey data in graphical form.

8.1 Time Vs. Level Plot (24 Hrs)



Markers: RED= Period of interest.

9.0 Prediction of noise level emission at the noise sensitive window.

9.1 Kitchen extractor flue outlet.

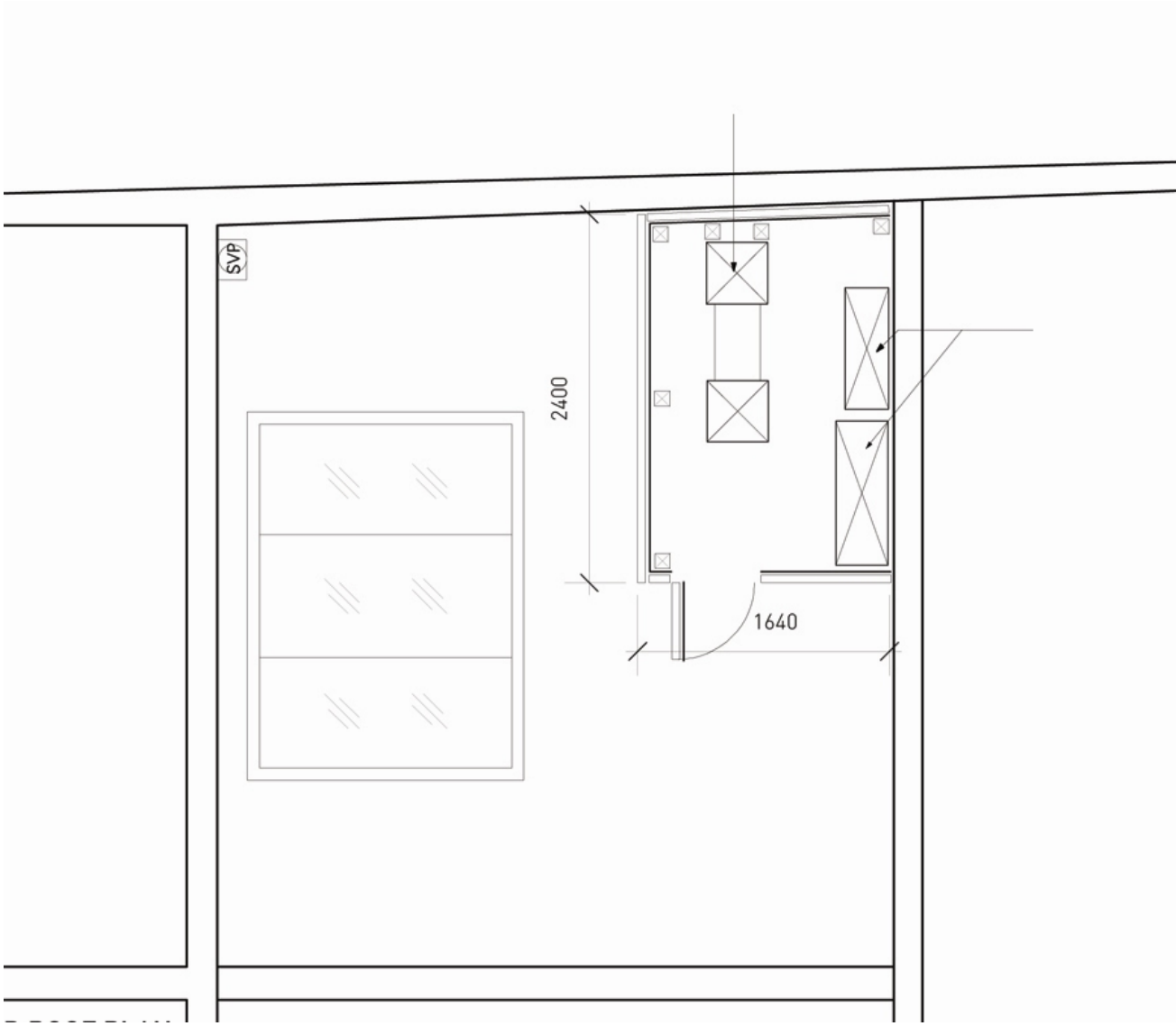
Kitchen extractor duct: Prediction of noise arriving at the nearest receptor.	
Noise emission @ 3m from the flue outlet.	35 dBA
Noise attenuation due to insert loss of the recommended silencer – 10dBA	25dBA
Noise at 3 m from the outlet is also at 1 m from the nearest receptor, no correction for distance is necessary. -0	25dBA @ 1 m from the building façade
+3dBA Correction for façade reflection.	28dBA
- Lowest measured background noise LA9015min during the operating hours 43.4 dBA	-15.4
Excess noise to comply with current regulation (10 dBA below background noise)	0 (The plant comply with current regulations)

9.2 External heat exchanger unit.

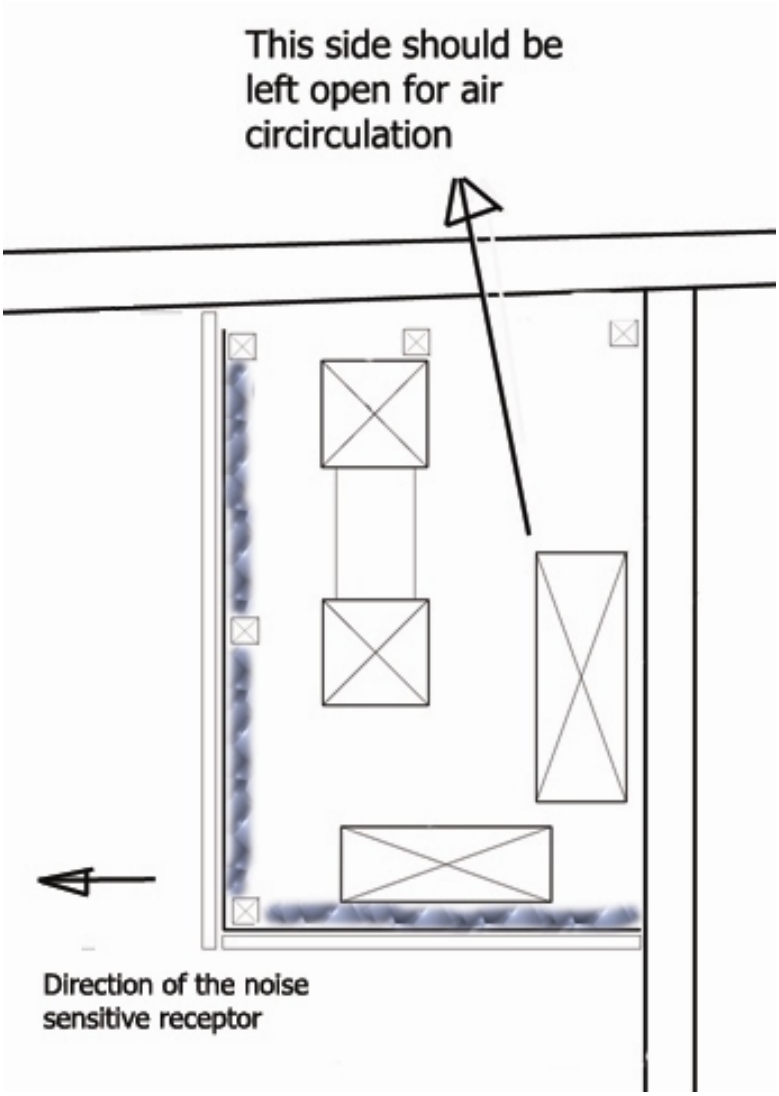
Heat exchanger unit: Prediction of noise arriving at the nearest receptor.	
Cumulative noise emission	57.4 (hemispherical at 1 m)
Correction for one additional reflective surface. +3	60.4dBA
The noise mitigation will be specified to provide no less that 20 dBA noise attenuation in the direction of the nearest receptor window. – 20dBA	40.4dBA
Correction for noise arriving at 4.5 m distance (6.5 m – 1 m from the unit – 1 m from the building façade)	27.3dBA
Correction for façade reflection +3	30.3dBA
- Lowest measured background noise LA9015min during the operating hours 43.4 dBA	-13.1
Excess noise to comply with current regulation (10 dBA below background noise)	0 (The plant comply with current regulations)

10.0 Proposed mitigation measure:

10.1 Original architect drawings to show a fence to be built around the units to conceal the units visually.


SVP
2400
1640

10.2 The proposed noise mitigation consists in rearranging the units inside the fenced space, additionally the fence should be modified to include a roof surface cover, and one side of the fence should be left open as per the modified sketched rappresentation below.



10.3 The inner sides of the fence including the roof surface should be lined with 3 mm acoustiblok membrane to create a partial acoustic enclosure, external appearance can remain unchanged.

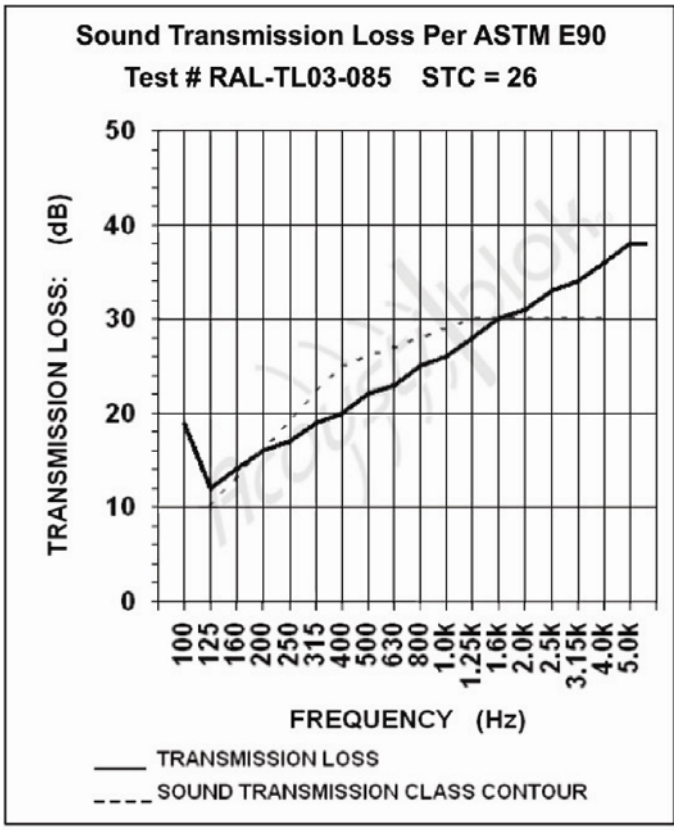
10.4 Inside the enclosure 50mm fibrous acoustic absorber should be lined over the acoustiblok membrane to prevent the build up of sound energy.

10.5 One side of the partial enclosure facing away from the noise sensitive windows should be left open to allow the necessary air airflow circulation.

10.6 The kitchen extractor ducts can conveniently pass through the roof cover by an appropriate cut out hole,

10.7 It is paramount that, no gaps are left open in between sheets of acustiblok membrane and all joints should be sealed with the appropriate tape provided by acoustiblok, including gaps between acoustiblok and the floor surface, and at the roof were the flue outlet passes through.

10.7.1 Acoustiblok specification sheet provided by the manufacture.



10.7.2 Information to obtain the material can be found at the acoustiblok website www.acoustiblok.com

11.0 Conclusions.

11.1 Predictive calculation shows the plants comply with regulation guidelines of 10dBA below background noise (Lowest LA 90,15min) provided the recommended noise mitigation measure described in this report are implemented.

Approved for Issue on behalf of
Noise Measurements & Solutions

Simone Longo
Acoustic Engineer

AMIOA – AIA

Appendix A

Measurement results in tabular form.

Calculation interval (absolute time) 11/07/2011 15:53:46.000 - 12/07/2011 16:26:02.350	Effective duration	L 90.0%: LAF(spl) (dB)
11/07/2011 16:08:46.000 - 11/07/2011 16:23:45.999	0 00:15:00.000 (1)	49.0 dB
11/07/2011 16:23:46.000 - 11/07/2011 16:38:45.999	0 00:15:00.000 (1)	49.6 dB
11/07/2011 16:38:46.000 - 11/07/2011 16:53:45.999	0 00:15:00.000 (1)	49.6 dB
11/07/2011 16:53:46.000 - 11/07/2011 17:08:45.999	0 00:15:00.000 (1)	49.5 dB
11/07/2011 17:08:46.000 - 11/07/2011 17:23:45.999	0 00:15:00.000 (1)	49.1 dB
11/07/2011 17:23:46.000 - 11/07/2011 17:38:45.999	0 00:15:00.000 (1)	49.1 dB
11/07/2011 17:38:46.000 - 11/07/2011 17:53:45.999	0 00:15:00.000 (1)	49.5 dB
11/07/2011 17:53:46.000 - 11/07/2011 18:08:45.999	0 00:15:00.000 (1)	49.2 dB
11/07/2011 18:08:46.000 - 11/07/2011 18:23:45.999	0 00:15:00.000 (1)	49.3 dB
11/07/2011 18:23:46.000 - 11/07/2011 18:38:45.999	0 00:15:00.000 (1)	49.1 dB
11/07/2011 18:38:46.000 - 11/07/2011 18:53:45.999	0 00:15:00.000 (1)	49.2 dB
11/07/2011 18:53:46.000 - 11/07/2011 19:08:45.999	0 00:15:00.000 (1)	49.2 dB
11/07/2011 19:08:46.000 - 11/07/2011 19:23:45.999	0 00:15:00.000 (1)	48.7 dB
11/07/2011 19:23:46.000 - 11/07/2011 19:38:45.999	0 00:15:00.000 (1)	48.7 dB
11/07/2011 19:38:46.000 - 11/07/2011 19:53:45.999	0 00:15:00.000 (1)	48.5 dB
11/07/2011 19:53:46.000 - 11/07/2011 20:08:45.999	0 00:15:00.000 (1)	48.5 dB
11/07/2011 20:08:46.000 - 11/07/2011 20:23:45.999	0 00:15:00.000 (1)	48.3 dB
11/07/2011 20:23:46.000 - 11/07/2011 20:38:45.999	0 00:15:00.000 (1)	48.3 dB
11/07/2011 20:38:46.000 - 11/07/2011 20:53:45.999	0 00:15:00.000 (1)	48.3 dB
11/07/2011 20:53:46.000 - 11/07/2011 21:08:45.999	0 00:15:00.000 (1)	48.2 dB
11/07/2011 21:08:46.000 - 11/07/2011 21:23:45.999	0 00:15:00.000 (1)	48.1 dB
11/07/2011 21:23:46.000 - 11/07/2011 21:38:45.999	0 00:15:00.000 (1)	48.1 dB
11/07/2011 21:38:46.000 - 11/07/2011 21:53:45.999	0 00:15:00.000 (1)	48.6 dB
11/07/2011 21:53:46.000 - 11/07/2011 22:08:45.999	0 00:15:00.000 (1)	48.5 dB
11/07/2011 22:08:46.000 - 11/07/2011 22:23:45.999	0 00:15:00.000 (1)	48.2 dB
11/07/2011 22:23:46.000 - 11/07/2011 22:38:45.999	0 00:15:00.000 (1)	48.0 dB
11/07/2011 22:38:46.000 - 11/07/2011 22:53:45.999	0 00:15:00.000 (1)	43.4 dB
12/07/2011 07:53:46.000 - 12/07/2011 08:08:45.999	0 00:08:46.000 (1)	49.0 dB
12/07/2011 08:08:46.000 - 12/07/2011 08:23:45.999	0 00:15:00.000 (1)	49.0 dB
12/07/2011 08:23:46.000 - 12/07/2011 08:38:45.999	0 00:15:00.000 (1)	53.6 dB
12/07/2011 08:38:46.000 - 12/07/2011 08:53:45.999	0 00:15:00.000 (1)	48.5 dB
12/07/2011 08:53:46.000 - 12/07/2011 09:08:45.999	0 00:15:00.000 (1)	49.4 dB
12/07/2011 09:08:46.000 - 12/07/2011 09:23:45.999	0 00:15:00.000 (1)	51.4 dB
12/07/2011 09:23:46.000 - 12/07/2011 09:38:45.999	0 00:15:00.000 (1)	48.7 dB
12/07/2011 09:38:46.000 - 12/07/2011 09:53:45.999	0 00:15:00.000 (1)	48.6 dB
12/07/2011 09:53:46.000 - 12/07/2011 10:08:45.999	0 00:15:00.000 (1)	48.6 dB
12/07/2011 10:08:46.000 - 12/07/2011 10:23:45.999	0 00:15:00.000 (1)	49.0 dB
12/07/2011 10:23:46.000 - 12/07/2011 10:38:45.999	0 00:15:00.000 (1)	49.2 dB
12/07/2011 10:38:46.000 - 12/07/2011 10:53:45.999	0 00:15:00.000 (1)	50.5 dB
12/07/2011 10:53:46.000 - 12/07/2011 11:08:45.999	0 00:15:00.000 (1)	50.8 dB
12/07/2011 11:08:46.000 - 12/07/2011 11:23:45.999	0 00:15:00.000 (1)	51.3 dB
12/07/2011 11:23:46.000 - 12/07/2011 11:38:45.999	0 00:15:00.000 (1)	50.8 dB
12/07/2011 11:38:46.000 - 12/07/2011 11:53:45.999	0 00:15:00.000 (1)	50.3 dB
12/07/2011 11:53:46.000 - 12/07/2011 12:08:45.999	0 00:15:00.000 (1)	49.8 dB
12/07/2011 12:08:46.000 - 12/07/2011 12:23:45.999	0 00:15:00.000 (1)	50.9 dB
12/07/2011 12:23:46.000 - 12/07/2011 12:38:45.999	0 00:15:00.000 (1)	56.1 dB
12/07/2011 12:38:46.000 - 12/07/2011 12:53:45.999	0 00:15:00.000 (1)	49.3 dB
12/07/2011 12:53:46.000 - 12/07/2011 13:08:45.999	0 00:15:00.000 (1)	49.5 dB
12/07/2011 13:08:46.000 - 12/07/2011 13:23:45.999	0 00:15:00.000 (1)	49.3 dB
12/07/2011 13:23:46.000 - 12/07/2011 13:38:45.999	0 00:15:00.000 (1)	49.6 dB
12/07/2011 13:38:46.000 - 12/07/2011 13:53:45.999	0 00:15:00.000 (1)	49.6 dB
12/07/2011 13:53:46.000 - 12/07/2011 14:08:45.999	0 00:15:00.000 (1)	49.7 dB
12/07/2011 14:08:46.000 - 12/07/2011 14:23:45.999	0 00:15:00.000 (1)	50.2 dB
12/07/2011 14:23:46.000 - 12/07/2011 14:38:45.999	0 00:15:00.000 (1)	49.8 dB
12/07/2011 14:38:46.000 - 12/07/2011 14:53:45.999	0 00:15:00.000 (1)	48.3 dB
12/07/2011 14:53:46.000 - 12/07/2011 15:08:45.999	0 00:15:00.000 (1)	48.1 dB
12/07/2011 15:08:46.000 - 12/07/2011 15:23:45.999	0 00:15:00.000 (1)	48.2 dB
12/07/2011 15:23:46.000 - 12/07/2011 15:38:45.999	0 00:15:00.000 (1)	48.6 dB
12/07/2011 15:38:46.000 - 12/07/2011 15:53:45.999	0 00:15:00.000 (1)	47.9 dB

Appendix B

SOURCE OF INFORMATION

Information used in this assessment has been obtained from the following sources:

- Planning Policy Guidance PPG24.
- BS8233: 1999 Sound Insulation and noise reduction for buildings – Code of Practice.
- BS4142: 1997 Method for rating industrial noise affecting mixed residential and industrial areas.
- BS7445: 1991: Description and measurement of environmental noise.
- C 46 to C50 – New Noise Planning Conditions – January 2007, revised May 2007.
- Engineering and noise control Third edition.

Appendix C

BASIC ACOUSTIC TERMINOLOGY

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air.
Sound Pressure Level is a measurement of the size of these pressure fluctuations. It is expressed in decibels (dB) on a logarithmic scale. Each 3 dB increase in sound pressure level represents a doubling of the sound energy. The threshold of hearing is approximately 0 dB. The rate at which the pressure fluctuations occur determines the pitch or frequency of the sound. The frequency is expressed in Hertz (Hz), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hz to 20,000 Hz. Although sound can be of one discrete frequency - a 'pure tone' - most noises are made up of many different frequencies. The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same 'subjective' way. This is the basis of the A-weighted sound level dB(A), normally used to assess the effect of noise on people. The dB(A) weighting emphasises or reduces the importance of certain frequencies within the audible range.

Noise Measurement
The measurement of sound pressure level is only really meaningful where the level of noise is constant. In the typical industrial environment noise levels can vary widely and sometimes short duration high levels of noise are interspersed with periods of relative quiet. The most widely used means of 'averaging' the noise over a period of time is the Equivalent Continuous Sound Level. Normally written as LAeq this value takes into account both the level of noise and the length of time over which it occurs.
There are many meters available which are capable of measuring LAeq by electronic integration over the measurement period. The LAeq or A-weighted equivalent continuous noise level is a measure of the total noise energy over a stated time period and includes all the varying noise levels and re-expresses as an 'average', allowing for the length of time for which each noise level was presented. The LAn parameters are defined as the noise levels which are exceeded for n% of the monitoring period, thus, for example, the LA90 parameter is the noise level exceeded for 90% of the 15 minute period, i.e. 13.5 minutes. The LA50 parameter is the noise level exceeded for 50% of the hourly period, i.e. 30 minutes, etc.

A-weighting: Normal hearing covers the frequency (pitch) range from about 20Hz to 20,000 Hz but sensitivity of the ear is greatest between about 500Hz and 5000Hz.
The "A-weighting" is an electrical circuit built into noise meters to mimic this characteristic of the human ear.

Ambient noise: The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Attenuation: Noise reduction

Background noise: The general quiet periods of ambient noise when the noise source under investigation is not there.

Decibel (dB): The unit of measurement for sound based on a logarithmic scale. 0dB is the threshold of normal hearing; 140dB is the threshold of pain. A change of 1dB is only detectable under controlled laboratory conditions.

dB(A) [decibel A weighted]: Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) serves to distinguish sounds of different frequency (or pitch) in a similar way to how the human ear responds. Measurements in dB(A) broadly agrees with an individual's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal everyday conditions, and a change of 10dB(A) corresponds roughly to doubling or halving the loudness of sound.

LAeq: This is a noise index used to describe the "average" level of a noise that varies with time (T). It allows for the different sensitivities of the human ear to different frequencies (pitch), and averages fluctuating noise levels in a manner, which correlates well with human perceptions of loudness.

LA10,T: This noise index gives an indication of the upper limit or peak levels of the fluctuating noise. It is the "A weighted" noise level exceeded for 10 per cent of the specified measurement period (T). e.g. If the measurement period was over 10 hours
and the LA10 reading was say 60dB, then this means that for 1 hour out of 10 the level went above 60dB.

LA90,T: This noise index gives an indication of the lower limit or levels of the fluctuating noise. It is the "A weighted" noise level exceeded for 90 per cent of the specified measurement period (T). e.g. If the measurement period was over 10 hours
and the LA90 reading was say 50dB, then this means that for 9 hours out of 10 the level went above 50dB.

Residual noise: The ambient noise remaining at a given position in a given situation when the noise source under investigation is not there.

Specific noise: The noise source under investigation for assessing the likelihood of complaints.