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Consultants in Acoustics, Noise & Vibration

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3 Belsize Place

Plant noise assessment report

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Version	Date	Comments	Author	Reviewer
A	20 Jan 17		Robert Burrell	Richard Muir

Summary

Sandy Brown has been commissioned by EAD Development Limited to provide acoustic advice in relation to noise from plant installed as part of the proposed development at 3 Belsize Place.

An environmental noise survey has been carried out to determine the existing background sound levels in the area and to set appropriate plant noise limits in line with the requirements of Camden Council.

The noise survey was performed between Friday 7 October 2011 and Wednesday 12 October 2011.

The representative background sound levels measured during the survey were $L_{A90,5mins}$ 44 dB during the daytime and $L_{A90,5mins}$ 38 dB at night.

Based on the planning condition plant noise criteria and on the results of the noise survey, noise from the plant must not exceed L_{Aeq} 34 dB during the daytime, and L_{Aeq} 28 dB during the night at 1 m from the worst affected windows of the nearby noise sensitive premises. These limits are cumulative, and apply with all plant operation under normal conditions.

An assessment of the proposed plant items associated with the development has been carried out. The noise level at the worst affected noise sensitive receptor is L_{Aeq} 28 dB which is in line with the plant noise criteria.

As long as the recommended mitigation measures are incorporated as proposed, the proposed plant item is expected to comply with the relevant noise limits.

Contents

1 Introduction

Sandy Brown has been commissioned by EAD Development Limited to provide acoustic advice in relation to noise from plant installed as part of the proposed development at 3 Belsize Place.

As part of the ongoing brief an environmental noise survey was undertaken, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

This report presents the survey method, results of the environmental noise survey, a discussion of acceptable limits for noise emission from building services plant and an assessment of the proposed plant items.

2 Site description

2.1 The site and its surrounding

3 Belsize place is a change of use development consisting of a four storey building with a two storey extension, creating a single family dwelling. The new development includes a basement swimming pool and gym. The location of the site in relation to the surrounding area is shown in Figure 1.

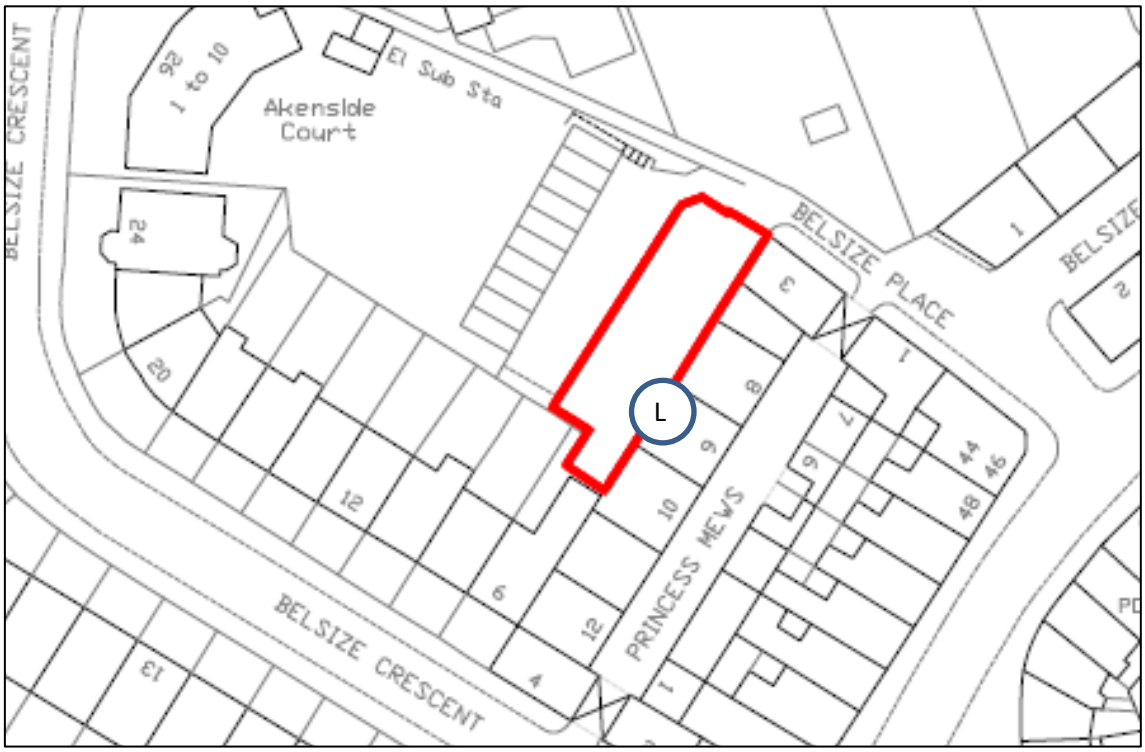


Figure 1 Plan showing the site location ion relation to the surrounding receptors

2.2 Adjacent premises

The site is surrounded by mainly residential premises. The nearest of which are the dwellings located along Princess Mews. Other nearby dwellings are located along Belsize Crescent.

3 Noise survey

Details of the equipment used, the noise indices and the weather conditions during the survey are provided in Appendix A. Further information on the specific survey method is provided in this section.

3.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 6 days to determine the existing background sound levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 5 minute periods between 12:02 on Friday 07 October 2011 and 15:47 on Wednesday 12 October 2011.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided Figure 2. This location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises.

Figure 2 Photograph of the logging microphone

3.2 Observations

The noise climate at the site was generally quiet. The dominant noise sources at the monitoring location were distant road traffic and rustling induced by wind passing through local foliage. Occasional air traffic was audible over the background noise.

Nearby plant items located on the flat roofs of 3 Belsize place were switched off for the duration of the noise survey.

3.3 Unattended measurement results

The results of the unattended noise measurements are summarised in the following tables. A graph showing the results of the unattended measurements is provided in Appendix B.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Friday 7 October 2011	-	42
Saturday 8 October 2011	48	44
Sunday 9 October 2011	49	49
Monday 10 October 2011	58*	48
Tuesday 11 October 2011	51	44
Average	50	46

* Measurement data for this daytime period has been affected by a short term event of around L_{Aeq} 70 dB occurring for approximately 30 mins. This event can be seen on the time history graph included in Appendix B. The data for this day has been excluded from the average

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels, day and night time typical levels have been quantified using statistical analysis from the continuous logging measurements.

Daytime and night time statistical analysis of representative values for the site are given in Figure 3 and Figure 4.

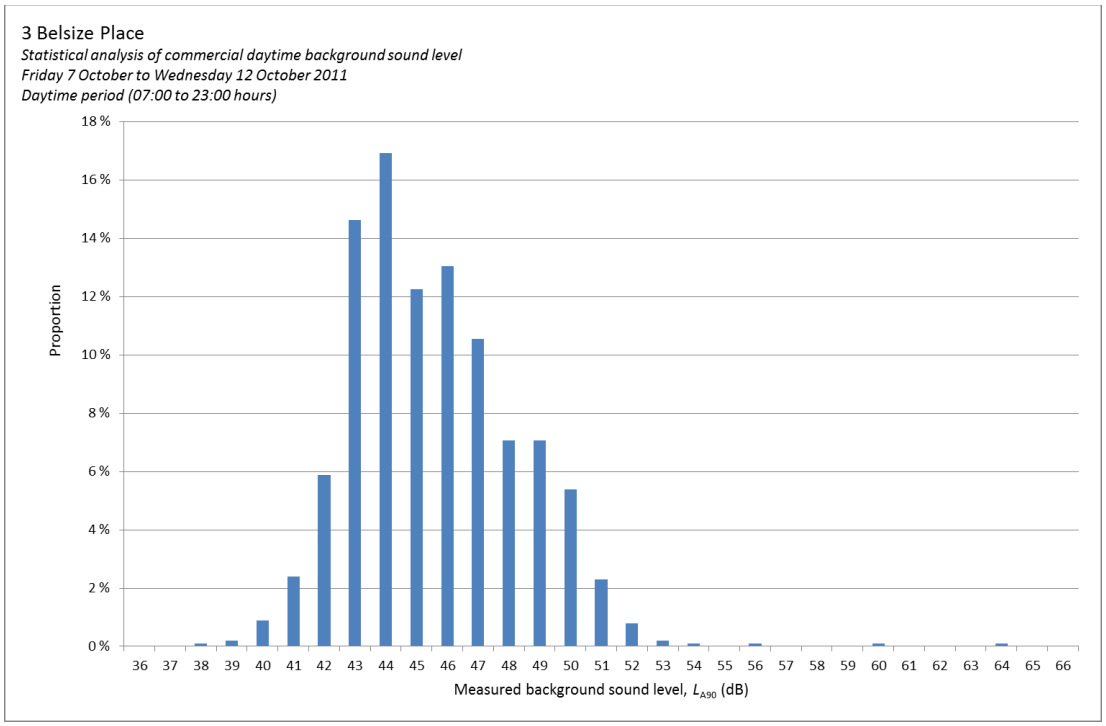


Figure 3 Graph showing the statistical analysis of background noise levels during the daytime period

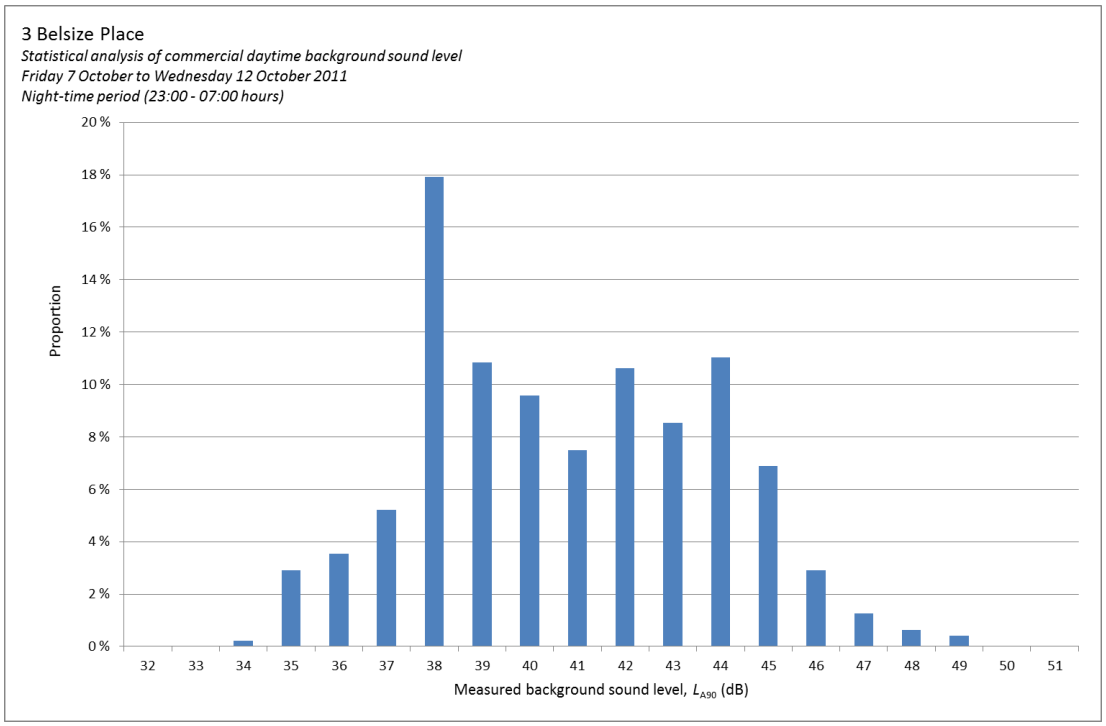


Figure 4 Graph showing the statistical analysis of background noise levels during the night time period

From this analysis, the representative background sound levels measured during the survey were $L_{A90,5min}$ 44 dB during the daytime and $L_{A90,5min}$ 38 dB at night.

4 Building services noise egress limits

4.1 Standard guidance

Guidance for noise emission from proposed new items of building services plant is given in BS 4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'.

BS 4142 provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.2 Planning Condition 3

Condition 3 of the planning approval for the development states:

"Noise levels at a point 1 metre external to sensitive facades shall be at least 10dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant equipment (or any part of it) is in operation.

Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policy CS5 of the London Borough of Camden Local Development Framework Core Strategy and policies DP26 and DP28 of London Borough of Camden Local Development Framework Development Policies."

4.3 Limits

4.3.1 Basic limits

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the worst affected windows of the nearest noise sensitive premises should not exceed the limits set out in Table 2.

Table 2 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises (L_{Aeq} dB)
Daytime (07:00-23:00)	34
Night-time (23:00-07:00)	28

As the plant may operate on a 24 hour basis the plant must not exceed the L_{Aeq} 28 dB limit.

A limit of L_{Aeq} 28 dB is considered to be very low. To provide context to the limit, the recommended internal noise level with in bedrooms at night L_{Aeq} 30 dB. With an external noise level of L_{Aeq} 28 dB, internal noise levels in the neighbour's properties will be approximately L_{Aeq} 18 dB, with windows open and L_{Aeq} 8 dB when the windows are closed.

5 Plant noise assessment

5.1 Plant items to be installed

It is proposed that a Daikin type EMRQ16A heat pump is to be located in a plant enclosure on the ground level. The plant enclosure is ventilated with fresh air via an acoustic louvre on the north façade of the plant space at lower ground level and air discharge through acoustic attenuators to the norther north façade of the plant space at ground level. Manufacturers' sound power level data for the unit is given in Table 3.

Table 3 Sound power level data

	Octave band sound power level (dB)						
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Daikin EMRQ16A	86	88	83	78	71	65	60

The nearest noise sensitive windows to the plant enclosure are directly adjacent to the roof and the side of the ground floor plant area at distances of 4 m from the intake louvre and discharge grille.

A plan of the ground floor of the plant area and the surroundings is shown in Figure 5. Sections the plant area showing the location of the heat pump, the nearest noise sensitive windows the acoustic attenuator and the acoustic louvre is shown in Figure 6 and Figure 7.

The ceiling and walls (not including the louvre or the internal lining) in the plant room must are to be imperforate.

To minimise reverberant noise build-up in the plant room, the internal walls and the ceiling in the room are to be acoustically lined.

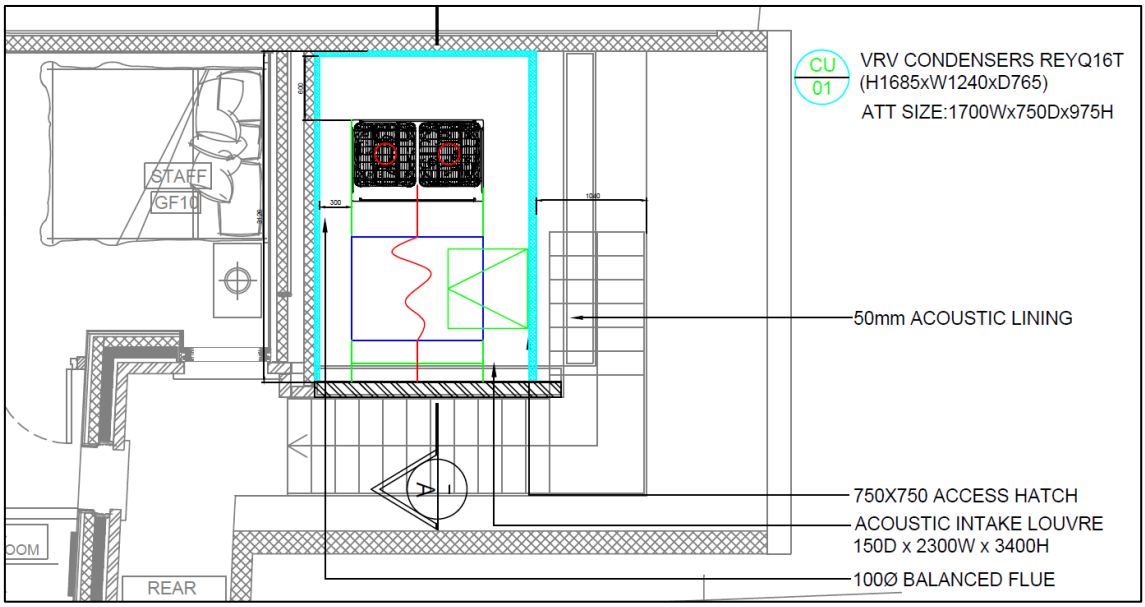


Figure 5 Plan at ground level showing the plant room

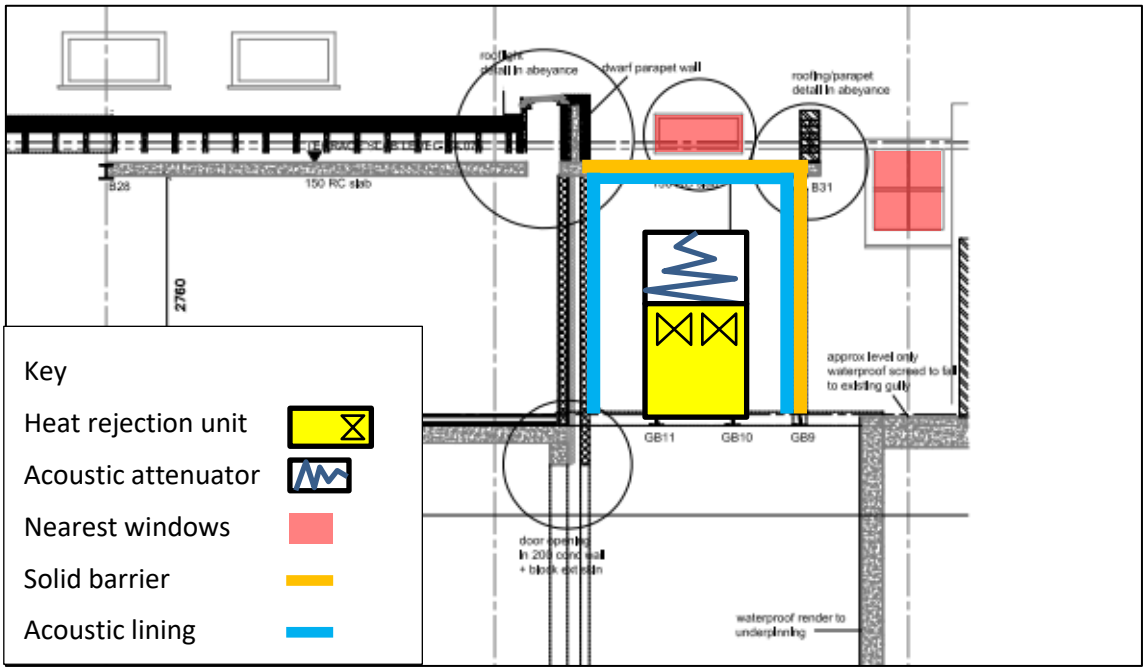


Figure 6 Section through the development indicating the nearest residential windows

As line of sight screening is necessary, reflections of the boundary wall must be minimised. Therefore, a 50 mm thick acoustic lining must be provided as indicated in Figure 7. This lining is likely to require a perforated metal facing if it is exposed.

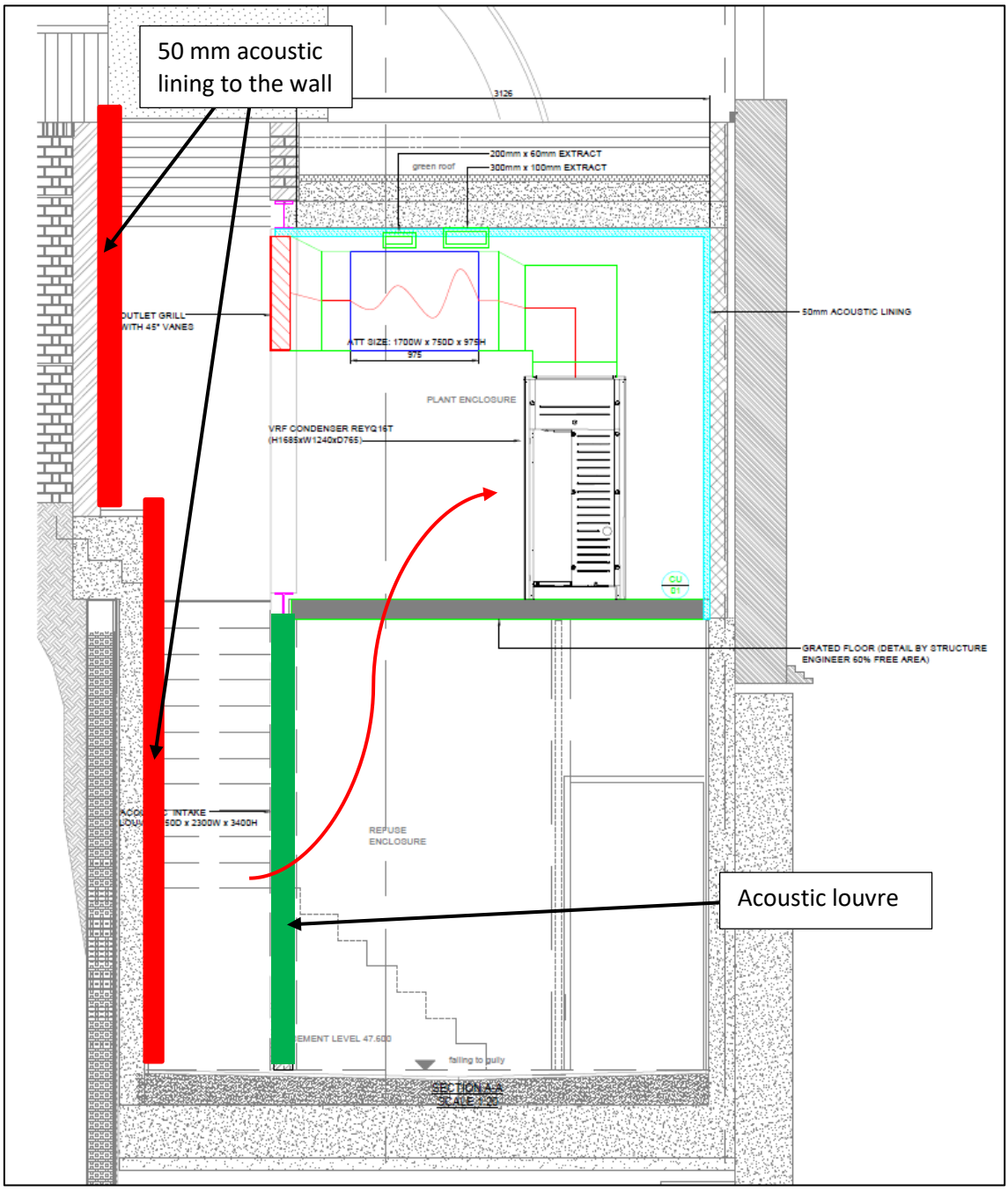


Figure 7 Section through the plant room indicating the air inlet, the acoustic louvre and air discharge route

Table 4 Octave band insertion loss values

	Octave band insertion loss (dB)						
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Caice SG01V/2c/L/S attenuator	8	15	26	25	18	14	11
Caice SH150 Acoustic louvre	5	7	9	13	13	13	12

5.2 Assessment

The sound pressure level of the heat pump as calculated at the nearest window has been undertaken. The calculation takes into account the following:

- Attenuation from the discharge attenuator / acoustic louvre
- Reverberant build up in the plant room
- Distance attenuation from the inlet louvre/discharge grill to the window
- Screening correction
- Directivity of the inlet louvre/discharge grille

The total sound pressure level at the nearest window is calculated to be L_{Aeq} 28 dB. This is in line with the plant noise limits.

The full calculations are given in Appendix C.

6 Conclusion

A noise survey has been carried out to determine the existing background sound levels in the vicinity of the site and surrounding noise sensitive premises. The representative background sound levels were $L_{A90,5min}$ 44 dB during the day, and $L_{A90,5min}$ 38 dB during the night.

On the basis of the requirements of the Planning Condition, the relevant plant noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 34 dB during the day, and L_{Aeq} 28 dB during the night. These limits are cumulative, and apply with all plant operating under normal conditions.

An assessment of the proposed plant items associated with the development has been carried out. As long as the recommended mitigation measures are incorporated as proposed, the proposed plant item is expected to comply with the relevant noise limits.

Appendix A

Survey details

Equipment

A Svantek 949 sound level meter was used to undertake the unattended measurements. The calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	949 / 8573	Svantek	12/09/2013	0909393
Preamplifier	SV12L / 10141	Svantek	12/09/2013	0909393
Microphone	SV22 / 4012078	Svantek	12/09/2013	0909393
Calibrator	SVB30A / 5309	Svantek	16/09/2013	0909385

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meter used in this survey are available upon request.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators. No significant deviation in calibration occurred.

Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

The L_{A90} is considered most representative of the background sound level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

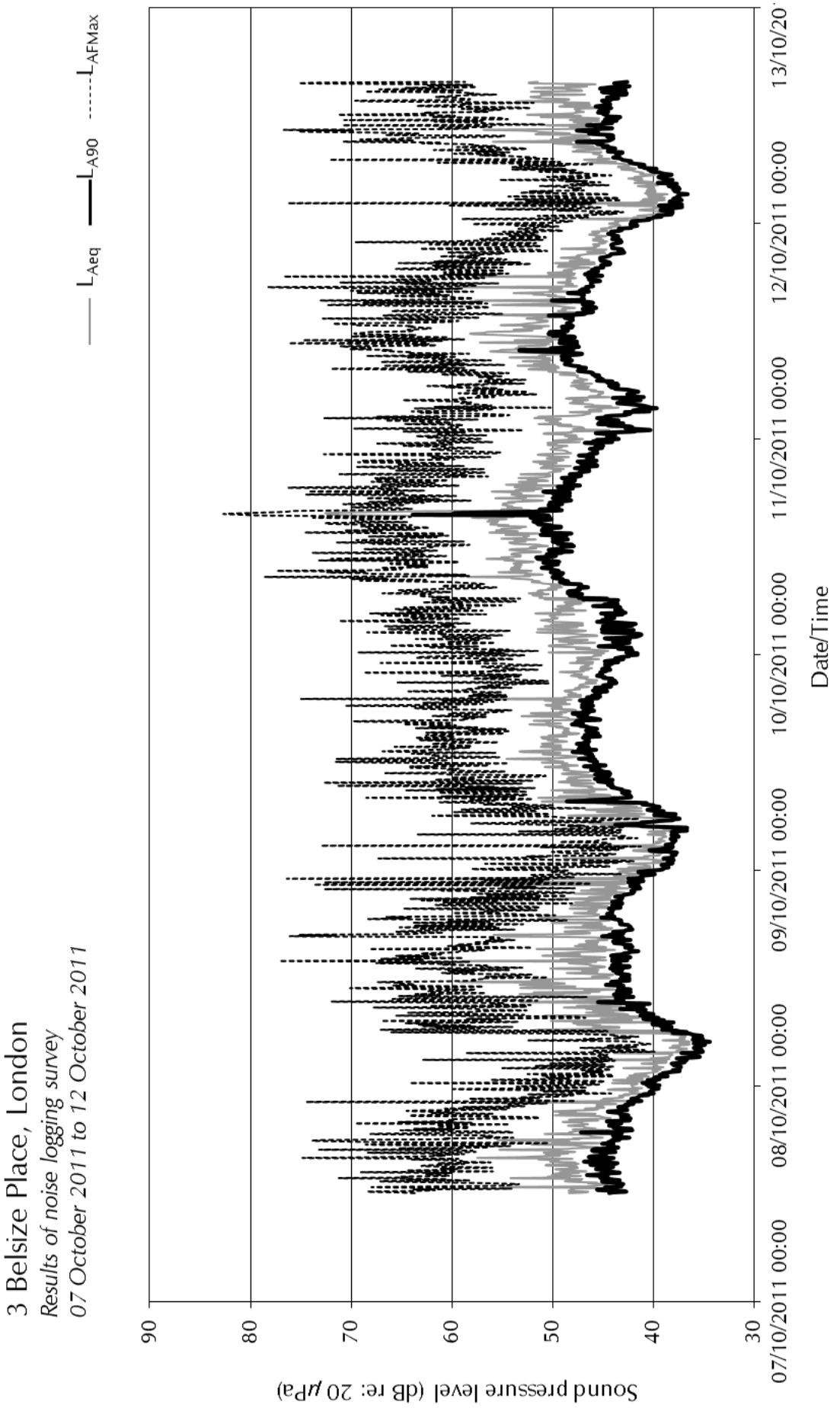
Weather conditions

During the unattended noise measurements between Friday 7 October 2011 and Wednesday 12 October 2011, weather reports for the area indicated that temperatures varied between 9°C at night and 20°C during the day, and the wind speed was typically less than 5 m/s. The weather conditions were generally dry with some occasional periods of light rain.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements


3 Belsize Place, London
Results of noise logging survey
07 October 2011 to 12 October 2011
LAeq
LA90
LAFMax
Sound pressure level (dB re: 20 μPa)
90
80
70
60
50
40
30
07/10/2011 00:00
08/10/2011 00:00
09/10/2011 00:00
10/10/2011 00:00
11/10/2011 00:00
12/10/2011 00:00
13/10/20
Date/Time

Appendix C

Assessment calculations

	Octave band centre frequency (Hz)							
	125	250	500	1k	2k	4k	8k	(A)
Discharge through the attenuator								
Total sound power level	**86**	**88**	**83**	**78**	**71**	**65**	**60**	**84**
Assume discharge is 3dB less for	-3	-3	-3	-3	-3	-3	-3	
Sound power of discharge	**83**	**85**	**80**	**75**	**68**	**62**	**57**	81
600mm Rec UL No TV Elbow	-1	-5	-8	-4	-3	-3	-3	
Caice SG01V/2c/L/S attenuator	-8	-15	-26	-25	-18	-14	-11	
Total SWL of discharges	**74**	**65**	**46**	**46**	**47**	**45**	**43**	**61**
Screening attenuation	10	12	15	18	21	24	24	
Directivity (180 degrees)	-1	-3	-8	-15	-20	-20	-20	
Distance attenuation (SWL to SPL)	-22	-22	-22	-22	-22	-22	-22	2.0
Sound pressure level	**41**	**28**	**1**	**-9**	**-16**	**-21**	**-23**	**26**
A-weighting curve	-16	-9	-3	0	1	1	-1	
A-weighted sound pressure level	25	19	-2	-9	-15	-20	-24	
Intake through the louvre								
Total sound power level	**86**	**88**	**83**	**78**	**71**	**65**	**60**	**84**
Assume discharge is 5dB less	-5	-5	-5	-5	-5	-5	-5	
Volume of plant room	*37*	*37*	*37*	*37*	*37*	*37*	*37*	*37*
Absorption coefficient of linings	*0.33*	*0.85*	*0.87*	*0.94*	*1.00*	*0.97*	*0.70*	*2.30*
Absorption for linings	*11.6*	*29.9*	*30.6*	*33.0*	*35.1*	*34.1*	*24.6*	*####*
SWL to SPL	-12	-16	-17	-17	-17	-17	-16	
SPL in plant room	69	67	61	56	49	43	39	**63**
Caice SH150 Acoustic louvre	5	7	9	13	13	13	12	
Sound power of area	**67**	**62**	**55**	**46**	**39**	**33**	**30**	**57.6**
Screening attenuation	10	12	15	18	21	24	24	
Distance attenuation (SWL to SPL)	-22	-22	-22	-22	-22	-22	-22	2.0
Sound pressure level	**35**	**28**	**18**	**6**	**-4**	**-13**	**-16**	**23**
A-weighting curve	-16	-9	-3	0	1	1	-1	
A-weighted sound pressure level	19	20	15	6	-3	-12	-17	
Cumulative sound pressure level								
Discharge through the attenuator	41	28	1	-9	-16	-21	-23	26
Intake through the louvre	35	28	18	6	-4	-13	-16	23
Total sound pressure level	**42**	**31**	**18**	**6**	**-4**	**-12**	**-15**	**28**