clarke saunders | acoustics
specialist consultants

REPORT AS8692.160128.NIA

147 KENTISH TOWN ROAD, LONDON

NOISE IMPACT ASSESSMENT

Prepared: 28 January 2016

Roman Pardon Architects
The Studio
8 Dalmeny Road
London
N7 0HH

Head Office -
Westgate House
39-41 Romsey Road
Winchester
SO22 5BE
mail@clarkesaunders.com

London Office -
16 Lower Marsh
London
SE1 7RJ
london@clarkesaunders.com

Exeter Office -
Sowton Business Centre
Capital Court
Bittern Road
Sowton
Exeter
EX2 7FW
exeter@clarkesaunders.com

Tel: +44 (0) 1962 872130
mail@clarkesaunders.com

www.clarkesaunders.com

CONTENTS

List of Attachments

1.0 INTRODUCTION

Planning approval is being sought for the installation of new plant at 147 Kentish Town Road, London.

Clarke Saunders Associates has been commissioned by Roman Pardon Architects to undertake an environmental noise survey in order to measure the prevailing background noise climate at the site. The background noise levels measured will be used to determine daytime and night-time noise emission limits and, subsequently, to assess the noise impact of the proposed building services plant in accordance with the planning requirements of Camden Council.

2.0 SURVEY PROCEDURE & EQUIPMENT

A survey of the existing background noise levels was undertaken at second floor level of the existing building at the location shown in site plan AS8692/SP1. Measurements of consecutive 5-minute L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were taken between 13:55 hours on Tuesday 26th January and 13:40 hours on Wednesday 27th January 2016.

These measurements will allow suitable noise criteria to be set for the new building services plant, dependent on hours of operation.

The following equipment was used during the course of the survey:

- Rion data logging sound level meter type NA28;
- Rion sound level calibrator type NC-74.

The calibration of the sound level meter was verified before and after use. No significant calibration drift was detected.

The weather during the survey was dry with light winds, which made the conditions suitable for the measurement of environmental noise.

Measurements were made generally in accordance with ISO 1996-2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels*.

Please refer to Appendix A for details of the acoustic terminology used throughout this report.

3.0 RESULTS

Figures AS8692/TH1-TH2 show the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels as time histories at the measurement position.

4.0 DISCUSSION

The background noise climate at the property is determined by road traffic noise in the surrounding streets.

Measured minimum background noise levels are shown in Table 4.1 below.

Monitoring period	Minimum $L_{A90,5mins}$
07:00 - 23:00 hours	53 dB 21:35-21:40, 26/01/2016
23:00 - 07:00 hours	51 dB 03:50-03:55, 27/01/2016
24 hours	51 dB

Table 4.1 - Minimum measured background noise levels **[dB ref. 20µPa]**

5.0 DESIGN CRITERIA

5.1 Local Authority Requirements

Camden Council currently requires new plant to be 5dB below the background level. In addition, the background level must not be exceeded by more than 1dB in any octave band between 63Hz and 8kHz.

Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (L_{A90}), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted 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), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the L_{A90}, expressed in dB(A).

It is not expected that tonal noise will be generated by any of the proposed plant items. Therefore, the plant noise emissions criteria that should not be exceeded at the nearest noise sensitive receiver should be set to the proposed levels detailed in Table 5.1 and Table 5.2.

Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	24 hours
L_{Aeq} 48 dB	L_{Aeq} 46 dB	L_{Aeq} 46 dB

Table 5.1 - Proposed design noise criteria **[dB ref. 20µPa]**

Freq (Hz)	63	125	250	500	1k	2k	4k	8k
Criterion	58	51	47	46	44	42	46	44

Table 5.2 - Spectral design criterion **[dB ref. 20µPa]**

6.0 PREDICTED NOISE IMPACT

6.1 Proposed plant

The selected heating/cooling plant items have been confirmed as:

- 2 no. Daikin Air Source Heat Pump Units Type EMRQ16A
- 1 no. Daikin Condensing Unit Type REYQ12T
- 1 no. Daikin Condensing Unit Type REYQ14T

The approximate location of the plant to be installed is shown in site plan AS8692/SP1.

Noise levels generated by the plant to be installed have been confirmed by the manufacturer as follows:

Freq (Hz)	63	125	250	500	1000	2000	4000	8000	dB(A)
Daikin EMRQ16A Lp @ 1m (dB)	67	63	63	60	59	54	46	43	63
Daikin REYQ12T Lp @ 1m (dB)	59	65	60	62	54	50	44	37	61
Daikin REYQ14T Lp @ 1m (dB)	65	68	64	59	54	50	48	39	61

Table 6.1 - Source noise data for the plant items **[dB ref. 20µPa]**

6.2 Predicted noise levels

Following an inspection of the site, the nearest noise sensitive receptor is a 2nd floor side window of the residential flats at 3 Castle Road, as shown on the indicative site plan AS8692/SP1. The nearest window is at least 13 metres away from the nearest proposed plant location.

Screening losses afforded by the intermediate building edges have been included in the prediction of the cumulative plant noise level at the nearest receiver.

The cumulative noise level prediction at the nearest noise sensitive receptor is shown in the following table, together with the corresponding design criterion.

Freq (Hz)	63	125	250	500	1k	2k	4k	8k	dB(A)
Criterion	58	51	47	46	44	42	46	44	46
Predicted level at 1m from receiver	42	42	38	35	30	23	14	7	36

Table 6.2 - Predicted noise level and criteria at nearest noise sensitive receptor **[dB ref. 20 µPa]**

The predicted levels do not exceed the overall dB(A) criterion, or the octave band spectral criteria.

A summary of the calculations are shown in Appendix B.

All other air handling and extract plant will be fitted with acoustically specified splitter silencers in order that the cumulative noise level does not exceed the 24-hour design noise criterion.

7.0 CONCLUSION

An environmental noise survey has been undertaken at 147 Kentish Town Road, London by Clarke Saunders Associates between Tuesday 26th January and 13:40 hours on Wednesday 27th January 2016.

Measurements have been made to establish the existing background noise climate. This has enabled a 24-hour design criterion to be set for the control of plant noise emissions to noise sensitive properties, in accordance with Camden Council's requirements.

Data for the new plant items has been used to predict the noise impact of the new plant on the most affected noise sensitive receptor.

Compliance with the noise emission design criterion has been demonstrated. No further mitigation measures are required for external noise emissions.

Jamie Duncan
Jamie Duncan (Jan 28, 2016)

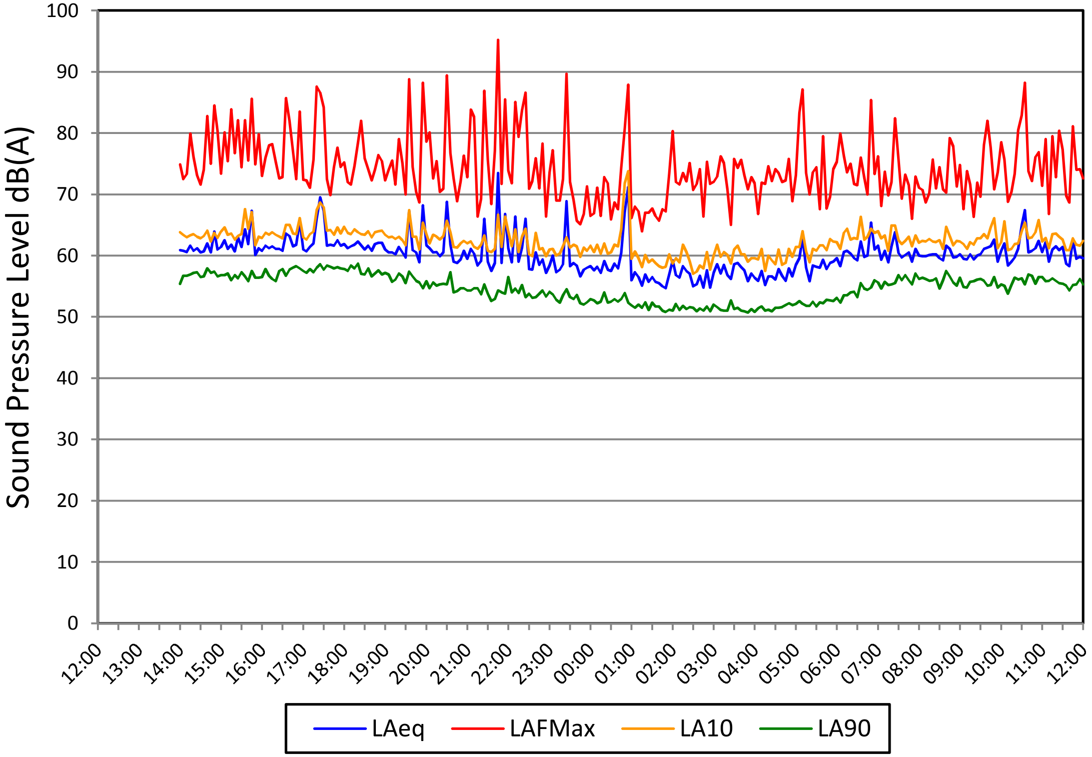
Jamie Duncan MIOA

CLARKE SAUNDERS ASSOCIATES

Figure AS8692/SP1

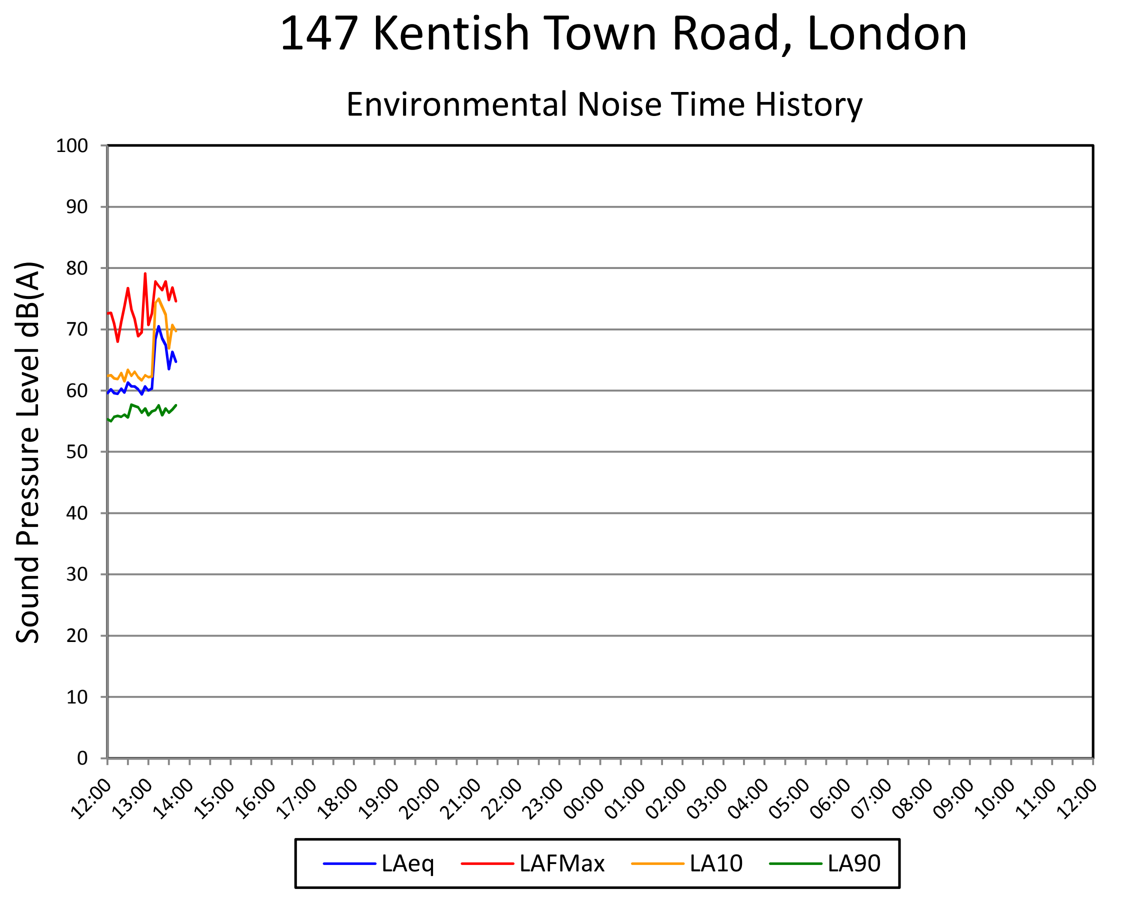
147 Kentish Town Road, London

Environmental Noise Time History



Tuesday 26 January to Wednesday 27 January 2016

Figure AS8692/TH1



Wednesday 27 January to Thursday 28 January 2016

Figure AS8692/TH2

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

1.0 ACOUSTIC TERMINOLOGY

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

dB (A): The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level.

L_{10} & L_{90} : If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the `average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.

It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.

L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).

The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward.

Because L_{eq} is effectively a summation of a number of noise events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute noise limit.

L_{max} : L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

D The sound insulation performance of a construction is a function of the difference in noise level either side of the construction in the presence of a loud noise source in one of the pair of rooms under test. *D*, is therefore simply the *level difference* in decibels between the two rooms in different frequency bands.

D_w D_w is the *Weighted Level Difference* The level difference is determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1.

$D_{nT,w}$ $D_{nT,w}$ is the *Weighted Standardised Level Difference* as defined in BS EN ISO 717-1 and represents the *weighted level difference*, as described above, corrected for room reverberant characteristics.

C_{tr} C_{tr} is a spectrum adaptation term to be added to a single number quantity such as $D_{nT,w}$, to take account of characteristics of a particular sound.

$L'_{nT,w}$ $L'_{nT,w}$ is the *Weighted Standardised Impact Sound Pressure Level* as defined in BS EN ISO 717-2 and represents the level of sound pressure when measured within room where the floor above is under excitation from a calibrated tapping machine, corrected for the receive room reverberant characteristics.

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

2.0 OCTAVE BAND FREQUENCIES

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation have agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, eg. 250 Hz octave band runs from 176 Hz to 353 Hz. The most commonly used bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

3.0 HUMAN PERCEPTION OF BROADBAND NOISE

Because of the logarithmic nature of the decibel scale, it should be borne in mind that noise levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) is not twice as loud as 50 dB(A) sound level. It has been found experimentally that changes in the average level of fluctuating sound, such as traffic noise, need to be of the order of 3 dB(A) before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10 dB(A) is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in traffic noise level can be given.

INTERPRETATION

Change in Sound Level dB(A)	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

4.0 EARTH BUNDS AND BARRIERS - EFFECTIVE SCREEN HEIGHT

When considering the reduction in noise level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a 3 metre high barrier exists between a noise source and a listener, with the barrier close to the listener, the listener will perceive the noise source is louder, if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the noise source would seem quieter than it was if he were standing. This may be explained by the fact that the "effective screen height" is changing with the three cases above, the greater the effective screen height, in general, the greater the reduction in noise level.

Where the noise sources are various roads, the attenuation provided by a fixed barrier at a specific property will be greater for roads close to the barrier than for roads further away.

APPENDIX B

EXTERNAL PLANT NOISE EMISSIONS CALCULATIONS

Calculation 1: Plant noise emissions to 3 Castle Road

				63	125	250	500	1000	2000	4000	8000	dB(A)
Daikin EMRQ16A	Lp @	1	m	67	63	63	60	59	54	46	43	63
Distance Loss		16	m	-24	-24	-24	-24	-24	-24	-24	-24	
Screening				-5	-6	-7	-8	-10	-12	-14	-17	
Level At Receiver				*38*	*33*	*32*	*28*	*25*	*18*	*8*	*2*	*30*

				63	125	250	500	1000	2000	4000	8000	dB(A)
Daikin EMRQ16A	Lp @	1	m	67	63	63	60	59	54	46	43	63
Distance Loss		17	m	-25	-25	-25	-25	-25	-25	-25	-25	
Screening				-5	-5	-6	-7	-9	-11	-13	-16	
Level At Receiver				*37*	*33*	*32*	*28*	*26*	*19*	*8*	*3*	*30*

				63	125	250	500	1000	2000	4000	8000	dB(A)
Daikin REYQ12T	Lp @	1	m	59	65	60	62	54	50	44	37	61
Distance Loss		13	m	-22	-22	-22	-22	-22	-22	-22	-22	
Screening*				-6	-7	-8	-10	-12	-14	-17	-18	
Level At Receiver				*31*	*36*	*30*	*30*	*20*	*13*	*5*	*-3*	*29*

				63	125	250	500	1000	2000	4000	8000	dB(A)
Daikin REYQ14T	Lp @	1	m	65	68	64	59	54	50	48	39	61
Distance Loss		14	m	-23	-23	-23	-23	-23	-23	-23	-23	
Screening*				-5	-6	-7	-9	-11	-13	-16	-18	
Level At Receptor				*37*	*39*	*34*	*27*	*20*	*14*	*9*	*-2*	*30*
Cumulative plant noise level at receptor				42	42	38	35	30	23	14	7	36
Camden Council 24 hour criterion				58	51	47	46	44	42	46	44	46

* Screening Limited to 18dB