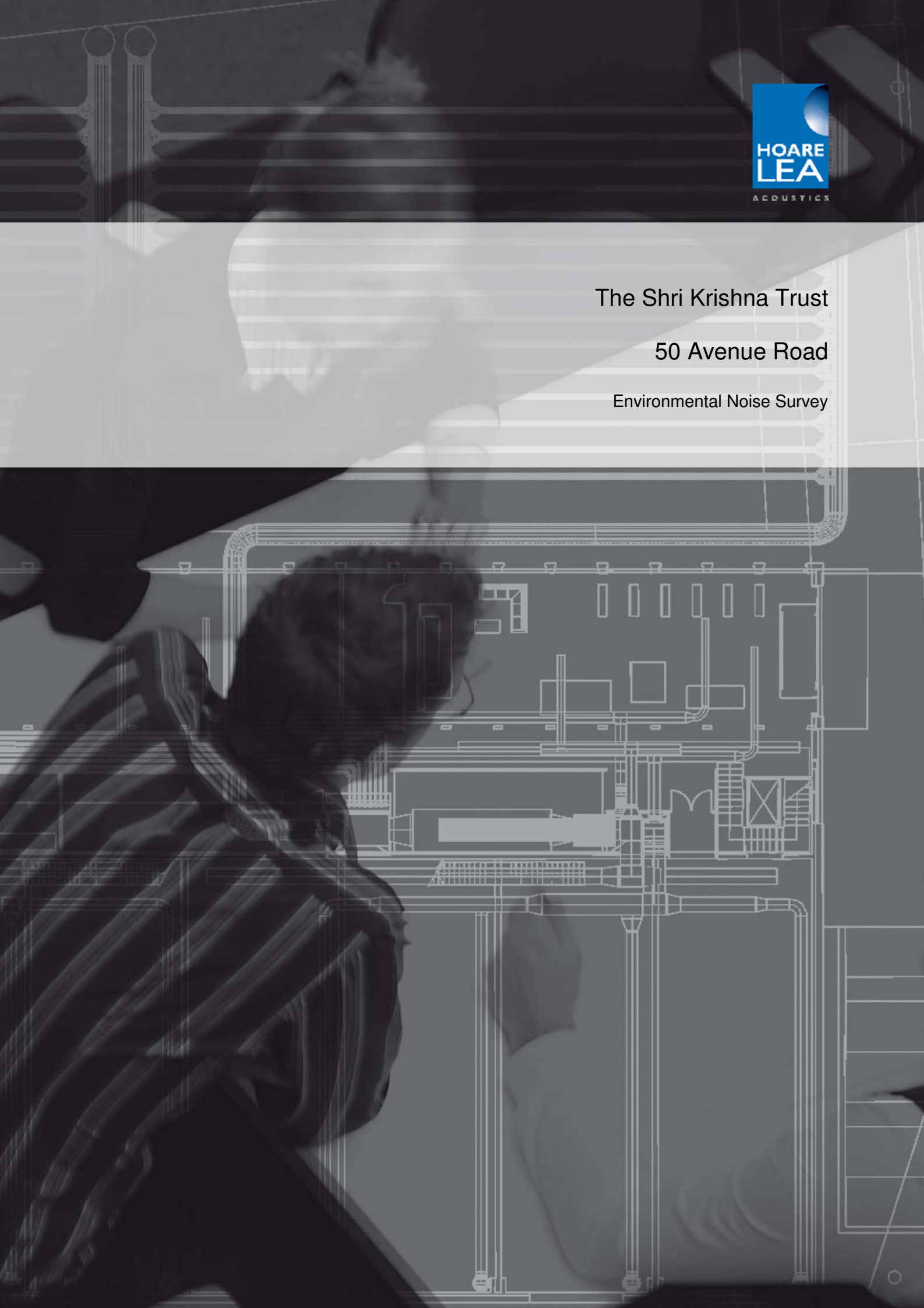

The Shri Krishna Trust

50 Avenue Road

Environmental Noise Survey

EXECUTIVE SUMMARY

- There are plans for a new residential development to be situated at 50 Avenue Road, London. The proposals will comprise the redevelopment of the existing building to provide a single detached property which will include the installation of new mechanical services plant.

- A background noise survey has been carried out in order to establish the existing noise environment around the site to enable an assessment of the impact of new habitable areas and to establish the design constraints on noise emissions from the operation of plant. The assessment is intended to support the planning application and identify acoustic design issues that will need to be addressed throughout the design.

- Results from the noise survey indicate that the surrounding neighbours, particularly to the rear of the site, are subjected to low levels of noise. Consideration will need to be given to noise emissions from any new mechanical or electrical plant to minimise the risk of noise nuisance to the neighbours.

- Noise emission limits for any new plant associated with the development have been proposed relative to the measured prevailing background noise levels at neighbouring properties so as to avoid noise nuisance. The approach taken is in accordance with the London Borough of Camden's policy on noise.

- Based on observed measurements at the existing building façade and the background noise survey, calculations have been undertaken to determine the required sound reduction performance of the building façade. Recommendations have been made in regards to the glazed and non-glazed specifications to achieve required internal noise levels.

- The assessment indicates that noise can be controlled with suitable noise control measures, in our opinion.

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Audit Sheet

Revision	Description	Date	Issued by	Reviewed by
Draft	For Comment	21/08/2013	GW	TH
1	For Issue	05/09/2013	TH	TH

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CONTENTS

APPENDICES

1.0 INTRODUCTION

Hoare Lea Acoustics has been appointed by The Shri Krishna Trust to conduct an environmental noise survey in order to support the planning application for a residential development at 50 Avenue Road, within the London Borough of Camden.

The proposed development comprises the redevelopment of the existing site to provide a single five storey detached residential property at 50 Avenue Road. As part of the proposals, the development will include the installation of new mechanical services plant.

A background noise survey is required to determine the existing noise environment around the proposed development site in order to establish the design constraints on noise emissions from the operation of plant. The noise survey will also provide information required to establish the acoustic performance of the building façade and ventilation strategy to ensure that the internal living accommodation meets the Local Authority requirements.

This report provides a description of the results from the noise survey undertaken and an assessment to determine the external noise limits for building services plant required to meet the Local Authority's general noise emission limits and advice regarding the building envelope and ventilation strategy.

A glossary of acoustic terms used in this report is provided in Appendix A attached.

2.0 DESCRIPTION OF SITE AND SURROUNDINGS

The site is within a mainly residential area in the London Borough of Camden. There are existing noise sensitive receptors immediately adjacent to the north, south-east and east of the building. To the west of the proposed development site is Avenue Road. An aerial view of the site showing nearby noise sensitive facades, as well as the measurement positions used in the noise survey is shown in Figure 1.

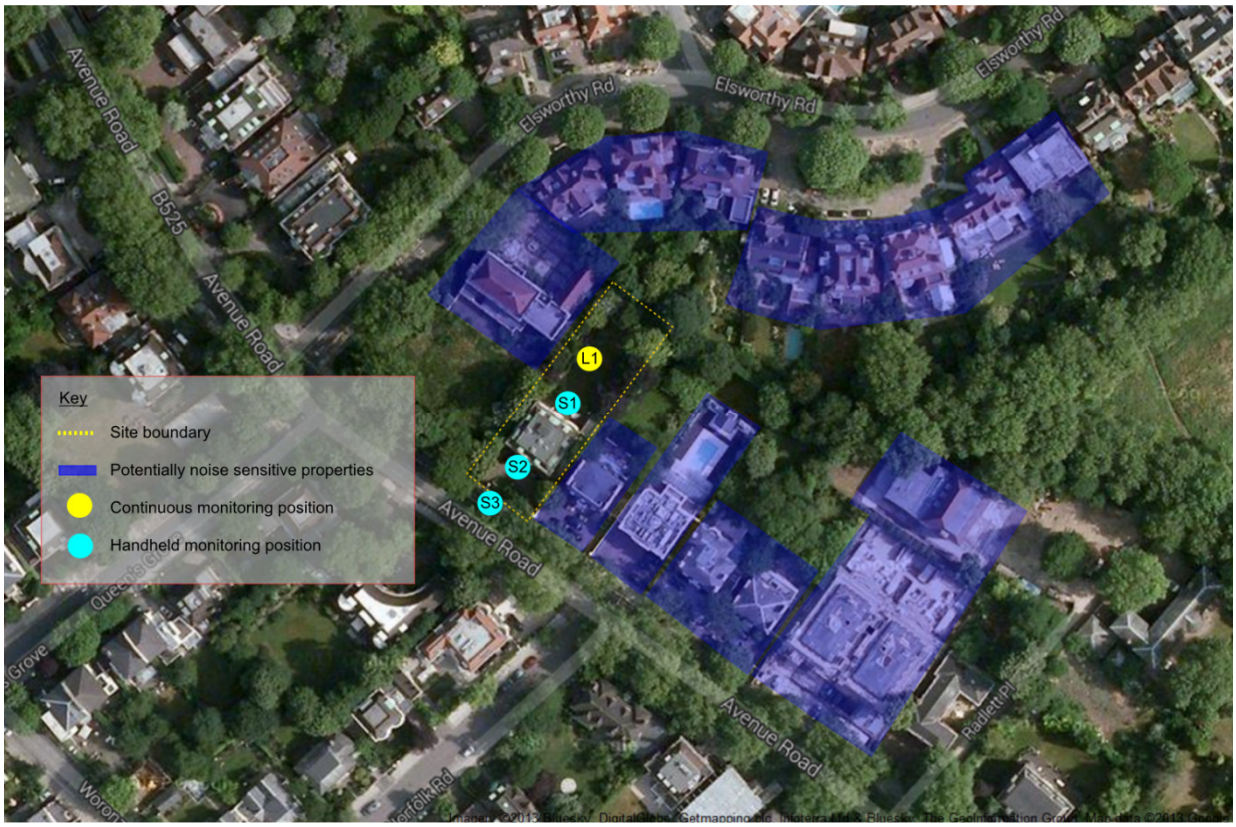

Figure 1: Aerial View of Site.

2.1 Local Noise Environment

The local noise environment comprises road traffic noise from Avenue Road (including occasional heavy goods vehicles), as well as underlying road traffic noise from roads further afield including A41 to the north west. Occasional aircraft noise was also audible during the observed part of the survey.

3.0 BASIS OF ASSESSMENT

3.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) [(1)] sets out the Government's current planning policies for England and how these are expected to be applied.

With regards to local noise planning policies, Section 11 paragraph 123 of the NPPF states:

'Planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put upon them because of changes in nearby land uses since they were established;
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'

Reference is made to the DEFRA Noise Policy Statement for England 2010 (NPSfE). This latter document is intended to apply to all forms of noise other than that which occurs in the workplace and includes environmental noise and neighbourhood noise in all forms.

The NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have 'a single objective noise-based measure…that is applicable to all sources of noise in all situations'. It further advises that the sound level at which an adverse effect occurs is 'likely to be different for different noise sources, for different receptors and at different times'.

In the absence of specific guidance for assessment of environmental noise within the NPPF and the NPSfE, it is considered appropriate to base assessment on current British Standards and national guidance. These are considered to be Local Authority guidance, BS 4142 [(2)], BS 8233 [(3)] and the World Health Organisations (WHO) [(4)] guidelines.

3.2 BS 4142

Current Government advice to Local Planning Authorities in both England and Wales makes reference to BS 4142 as being the appropriate guidance for assessing commercial operations and fixed building services plant noise. This British Standard provides an objective method for rating the likelihood of complaint from industrial and commercial operations. It also describes means of determining noise levels from fixed plant installations and determining the background noise levels that prevail on a site.

The complaints assessment method is based on the subtraction of the measured background noise level from the rating level determined. The rating level is the source noise level (either measured or predicted) corrected for tone or character (if necessary). The difference is compared to the following criteria to evaluate the likelihood of complaint.

- A difference of around +10 dB or more indicates that complaints are likely.
- A difference of around +5 dB indicates a marginal significance for complaint.
- A difference of -10 dB or less is a positive indication that complaints are unlikely.

The objective complaint rating method is only applicable for external noise levels.

3.3 BS 8233

BS 8233 offers guidance on suitable internal noise levels for dwellings to facilitate good and reasonable resting and sleeping conditions. The specified criteria are generally in line with guidance given by World Health Organisation (WHO). It is however noted that these criteria are based on satisfying the majority of the population accounting for noise from normally occurring external sources including road and rail traffic, but exclude sources such as emergency vehicle sirens and train horns.

The recommended levels are for unoccupied conditions are presented in Table 1.

Table 1: Recommended Noise Levels for Resting/Sleeping Conditions

Room	Design Range, $L_{Aeq,T}$, dB	
	Good	Reasonable
Living Rooms	30	40
Bedrooms	30	35

3.4 London Borough of Camden Requirements

The general principles of the London Borough of Camden's (LBC) planning policy on noise are set out in the 'Camden Development Policies 2010-2025' [5] document (CDP).

Acoustic requirements in the CDP can broadly be broken into two criteria; that noise sensitive development is sufficiently protected against external noise, and that noise generating development has a minimal impact on the local noise environment.

3.4.1 Internal Noise Levels – Residential Developments

It is understood that the London Borough of Camden require that any proposed development exposed to high levels of noise will required design features and sound insulation to enable residents to be protected from such external noise. These should be designed to enable the following WHO guidelines levels to be met in all residential developments.

a) For Living Rooms: 35 dB $L_{Aeq,16hour}$ between 0700 and 2300;

b) For Bedrooms: 30 dB $L_{Aeq,8hour}$ between 2300 and 0700; and

c) 45 dB L_{Amax} for any individual noise event (measured with F time weighting) between 2300 and 0700.

3.4.2 Building Services - Noise

Table 2 below is extracted from the CDP and shows the noise levels from building services plant at which planning permission will not be granted. The levels are relative to the minimum background noise level, L_{A90}.

Table 2: 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	00:00-24:00	5dB(A) < L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	10dB(A) < L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, evening and night	00:00-24:00	10dB(A) < L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90}>60dB	Day, evening and night	00:00-24:00	55dB L_{Aeq}

In practice, this means that in order to obtain planning permission, noise emissions from any building services plant associated with the development is required to be rated 5 dB below the minimum existing $L_{A90.}$ If the noise contains distinguishable tonal or impulsive components the required noise rating is 10 dB below the prevailing background noise level in accordance with the methodology stated within BS 4142.

4.0 BASELINE NOISE SURVEY

A noise survey has been carried out to establish the existing noise levels at both the development site and nearby noise sensitive properties. A fixed noise monitor was positioned on site to measure the variation in noise levels over an extended period. The local noise conditions at the chosen position are deemed to be representative of the noise environment at nearby noise-sensitive buildings.

The fixed monitor recorded five minute contiguous samples between Wednesday 31st July 2013 and Friday 2nd August 2013. The position of this monitor is shown as position L1 in Figure 1 above and was considered free-field. With the exception of a brief period of heavy rain showers on 2nd August, local conditions where dry with wind varying in both direction and strength.

Short-term attended measurements were carried out between 14:30 and 16:00 on 31st July 2013 to determine the external noise levels incident upon the façade. Continuous five minute samples were measured during periods of low wind and dry conditions at each monitoring position. The measurement positions used during this part of the survey are indicated in Figure 1 as positions S1, S2 and S3.

Full details of the equipment used to undertake the background noise survey is presented in Appendix B.

4.1 Continuous Noise Monitor Results

Table 3 below shows the average ambient noise and minimum background noise levels measured during the survey. A full graphical representation of the measurements is provided in Appendix C.

Table 3: Minimum Background Noise Levels

Date	Period	Average Ambient Noise Level, $L_{Aeq,T}$, dB	Minimum Background Noise Level, $L_{A90, 5min}$, dB	Maximum Noise Level, L_{Amax} dB
31/07/2013	**Day (15:00-23:00)**	48	37	75
	Night (23:00-07:00)	43	31	84
01/08/2013	**Day (07:00-23:00)**	64*	38	93
	Night (23:00-07:00)	40	32	57
02/08/2013	**Day (07:00-1400)**	59**	40	102

*Measured results indicate high level periods between 13:00 and 15:15 on 01st August 2013.
** Heavy rainfall was observed during this period.

It should be noted that regular high $L_{Aeq,5min}$ levels were observed during the period during the daytime on 1st August. These levels may be due to construction activities on nearby sites, or due to garden maintenance activities. The current occupant did not confirm any on site interference with the monitoring equipment when prompted. As a result, daily average ambient noise levels measured on the 1st August are at an increased level compared to those measured on other dates of similar periods (fixed monitor) and observed measurements.

The results indicate that the site and existing neighbouring buildings are subject to low levels of noise, particularly during night-time periods. Consideration will need to be given to noise emissions from any plant associated with the development to minimise the risk of noise nuisance to neighbours.

4.2 Plant Noise Emissions Limits

Noise emission limits due to building services serving the proposed development are proposed in Table 4 below one metre from the nearest noise sensitive area (expressed as “free-field”).

Table 4: Noise Emissions Limits at 1m from Nearest Noise Sensitive Façades

Period	Minimum Measured Background Noise Level, L_{A90}, dB	Proposed Noise Emissions Limit $L_{Ar,Tr}$ dB
Day (07:00-23:00)	37	32
Night (23:00-07:00)	31	26

It should be noted that these are the combined operational noise levels of proposed fixed plant at the nearest noise sensitive façade (expressed as “free-field). As such, the combined operational noise levels of all plant are required to achieve the noise limits defined in Table 4.

For plant noise that contains distinguishable tonal or impulsive components the limit shall be lowered by an additional 5 dB. Therefore a worst case design basis would be to achieve the values of Table 4 minus 5 dB(A). It should be noted that the above noise emission limits are sufficient to satisfy the requirements of the London Borough of Camden.

4.3 Observed Noise Measurement Results

Results from the observed noise survey are presented below in Table 5. Full measurement details and site observations are shown in Table C1 in Appendix C attached.

Table 5: Results from Observed Noise Survey

Measurement	Location	Time hh:mm	$L_{Aeq,5min}$ dB	$L_{A90,5min}$ dB	$L_{Amax,f}$ dB
001	Rear of building, ground floor (1m from façade) - S1	14:15	49	44	60
002	Rear of building, ground floor (1m from façade) – S1	14:20	48	45	65
003	Front of building, ground floor (1m from façade) – S2	14:35	64	55	75
004	Front of building, ground floor (1m from façade) – S2	14:40	65	56	76
006	Avenue Road (1m from boundary wall) – S3	14:55	69	60	81
007	Avenue Road (1m from boundary wall) – S3	15:00	69	58	82

5.0 BUILDING ENVELOPE AND VENTILATION STRATEGY

The sound insulation properties of the building envelope depend upon the external noise levels present at the façade and the proposed design criteria for the internal noise levels of specific rooms, dependant on their use. Table 6 below assumes compliance with the Local Authority's internal noise criterion and shows the level differences for varying spaces within the proposed development. The examples shown represent the highest specification of sound insulation required for each façade.

A 5 dB reduction has been derived from daytime to night-time levels from the continuous monitor on the rear façade and has been applied to observed measurements at both the front and rear façade for indicative night-time external noise levels.

Table 6: Notional Sound Insulation Values of Proposed Façade Construction

Facade	Room Use	Noise Levels (dB)			
		Measured External $L_{Aeq,T}$	Proposed Internal (Maximum) $L_{Aeq,T}$	Minimum Level Difference D	Notional Selection Sound Insulation Value (Minimum) R_w
Rear Façade	Living Room	49	35	14	22
	Bedroom	44	30	14	22
Front Façade	Living Room	65	35	30	38
	Bedroom	60	30	30	38

Table 7 below shows the maximum noise levels ($L_{Amax,T}$) measured during the night-time at position L1. This table also displays the calculated ninetieth percentile maximum instantaneous noise levels during this period.

Table 7: Measured Maximum Instantaneous Noise Levels ($L_{Amax,T}$)

Measurement Position	Measurement Period	$L_{Amax,T}$ Range dB(A)	90th Percentile dB(A)
S1	31st July 2013 (23:00 - 07:00)	44 – 84	56
S1	1st August 2013 (23:00 - 07:00)	45 – 57	36

Table 8 below assumes compliance with the Local Authority's noise intrusion level criterion (L_{Amax}) and shows the level differences for all bedrooms within the proposed development based on the maximum calculated ninetieth percentile L_{Amax} shown in Table 7 above, except in the case of the front façade where the worst case maximum noise levels L_{Amax} during the observed measurements are used. It should be noted that the highest sound insulation value (R_w) shown in Table 6 and Table 8 takes precedence.

Table 8: Notional Sound Insulation Values of Proposed Façade Construction

Façade	Room Use	Noise Levels (dB)			
		Measured External $L_{Amax,T}$	Proposed Internal (Maximum) $L_{Amax,T}$	Minimum Level Difference D	Notional Selection Sound Insulation Value (Minimum) R_w
Rear façade	Bedroom	56	45	11	19
Front façade	Bedroom	76	45	31	39

Simple natural ventilation through the use of opening windows will provide a level difference (D) in the order of 10 dB. It can be seen from Table 6 and Table 8 above that all internal spaces require considerably greater levels of sound insulation based on the measured external noise levels.

Passive acoustically attenuated ventilation can generally be designed to provide a level difference (D) in the order of 20 dB to 25 dB. It can be seen that internal spaces to the rear of the property, including living rooms and bedrooms could be considered for passive ventilation providing suitable acoustic trickle ventilators are provided.

Internal spaces to the front of the property are therefore advised to be considered for mechanical ventilation, or bespoke mixed mode ventilation systems as the level differences required are greater than those achievable by simple means of natural ventilation.

Detailed calculations have been undertaken to determine the sound insulation requirements of the building envelope across all floors to achieve the Local Authority's internal noise criteria.

The calculations indicate that the external wall on all facades should be capable of achieving a sound reduction of 45 dB R_w. An example of an external wall capable of achieving this requirement is a cavity brickwork wall with a 50mm cavity.

The calculations indicate that glazed elements to all bedrooms and living rooms on the rear facade are required to achieve a minimum of 29 dB R_w as a whole unit (seals, frame etc.). This sound insulation requirement is readily achievable with a standard thermal double glazing unit.

Similarly, the calculations indicate that glazed elements to all bedrooms and living rooms on the front facade are required to achieve a minimum of 38 dB R_w as whole unit (seals, frames etc.). An example of a glazing configuration that can achieve the front façade requirement would comprise 6mm of glass, 16mm air gap and 6.8mm of acoustic glass.

Table 9 below provides examples of primary glazing configurations capable of achieving the minimum required R_w and gives the sound insulation values per octave band frequency.

Table 9: Sound Insulation Values Required to comply with the Local Authority's Internal Noise Criterion

Façade	Internal Room	Product Description	Sound Insulation Values per Octave Band Frequency (Hz) dB						R_w dB
			125	250	500	1000	2000	4000	
All	All	Solid façade element	34	34	40	56	65	65	45
Rear	Living Room & Bedroom	Standard Double Glazing	21	17	25	35	37	31	29
Front	Living Room & Bedroom	Pilkington Optiphon 6mm / 16mm / 6.8mm*	23	24	34	42	43	54	38

Note *: Acoustic Glass

The above guidance has been based on the scheme being fully mechanically ventilation however as previously stated; ventilation to living rooms and bedrooms on the rear of the property could be provided via acoustically rated trickle vents.

In order to maintain internal noise levels in compliance with the Local Authority's requirements, trickle vents are required to have the following minimum acoustic requirements as detailed in Table 10. It should be noted that the performance ratings are referenced to the equivalent areas as detailed below.

Table 10: Trickle Ventilation Minimum Requirements for Rear Façade to comply with the Local Authority's Internal Noise Criterion

Façade	Internal Room	Equivalent area required (mm^2)	Product	Sound Insulation Values per Octave Band Frequency (Hz) dB						$D_{ne,w}$ dB
				125	250	500	1000	2000	4000	
Rear	Living Room	20120	Through wall ventilator	36	28	26	28	30	28	29
	Bedroom	9725	Through wall ventilator	36	28	26	28	30	28	29

The guidance provided within this section is sufficient to satisfy the requirements of the London Borough of Camden's general noise policy with full mechanical ventilation or passive acoustically attenuated ventilation to the rear façade only.

6.0 CONCLUSION

Hoare Lea Acoustics has conducted an environmental noise survey for the proposed redevelopment of the existing property at 50 Avenue Road, within the London Borough of Camden. Unattended noise monitoring throughout a typical two day period and sample octave band measurements were conducted.

Background noise levels typical of the daytime and night-time have been measured and used to define building services plant noise emission limits. During the daytime the combined building services noise emission limit is 32 dB and during the night-time the plant noise emission limit is 26 dB, one metre from the nearest noise sensitive receptor. The limit shall apply to any building services plant associated with the development and has been derived relative to the measured background noise levels, in accordance with London Borough of Camden's requirements.

An assessment of the building envelope acoustic performance is provided with a level difference (D) and notional acoustic sound reduction index (R_w). The ventilation strategy should allow for full mechanical ventilation of all internal spaces located on the front façade as the level difference required is above those achievable by simple means of natural ventilation. To the rear of the property internal ambient noise levels can be achieved through the use of passive acoustically attenuated ventilation.

Detailed noise intrusion calculations have also been undertaken to determine the sound insulation performance requirements of the building envelope in accordance with the Local Authority's internal noise criterion. The calculation indicates that the non-glazed element of all facades shall achieve a minimum of R_w 45 dB.

The calculations also indicate that glazed elements to all bedrooms and living rooms to the rear façade are required to achieve a minimum of 29 dB Rw and glazed elements to all bedrooms and living rooms on the front façade are required to achieve a minimum of 38 dB R_w. Indicative primary glazing configurations capable of achieving the required sound insulation values have also been provided.

7.0 REFERENCES

1. *National Planning Policy Framework, Department for Communities and Local Government*, March 2012.
2. *British Standard 4142: 1997, 'Method for rating industrial noise affecting mixed residential and industrial areas'.*
3. *British Standard 8233: 1999, 'Sound Insulation and Noise Reduction for Buildings – Code of Practice'*.
4. *World Health Organisation (WHO) – Guidelines for Community Noise*, 1999.
5. *London Borough of Camden, 'Camden Development Policies 2010-2025', 2010*
6. *ISO 9613-2: 1996, 'Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2'*

APPENDIX A – GLOSSARY OF ACOUSTICS TERMS

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Octave and Third Octave Bands

The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB (A).

Equivalent Continuous Sound Level L_{eq},

The L_{eq}, is a parameter defined as the equivalent continuous sound pressure level. Over a defined time period 'T', it is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. The $L_{eq,T}$ can be seen to be an "average" sound pressure level over a given time period (although it is not an arithmetic average). Typically the $L_{eq,T}$ will be an 'A' weighted noise level in dB(A). It is commonly used to describe all types of environmental noise sources.

Background Noise Level L_{90}

The $L_{90,\ T}$ is a parameter defined as the sound pressure level exceeded for 90% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined to other acoustic parameters. It is generally used to describe the prevailing background noise level or underlying noise level.

Rating Level

The specific noise level of the source plus any adjustment for characteristic features of the noise.

APPENDIX B – LIST OF MEASUREMENT EQUIPMENT

Fixed noise monitor

Equipment	Make and Model	Serial No.	Calibration Cert.	Date of calibration expiration
Sound Level Meter	Rion NL-32	01161938	07165	29/05/2014
Microphone	Rion UC-59	311039	07165	29/05/2014
Calibrator	B&K 4231	34172704	07160	22/05/2014

Spot measurements

Equipment	Make and Model	Serial No.	Calibration Cert.	Date of calibration expiration
Sound Level Meter	B&K 2260	2447600	06659	02/08/2014
Microphone	B&K 4189	2799360	06659	02/08/2014
Calibrator	B&K 4231	2445715	06948	28/01/2014

Instruments were calibrated both before and after the survey and found to be within acceptable tolerances.

Results

A graph plotting the results over the survey period is presented on the next page.

APPENDIX C – NOISE SURVEY RESULTS

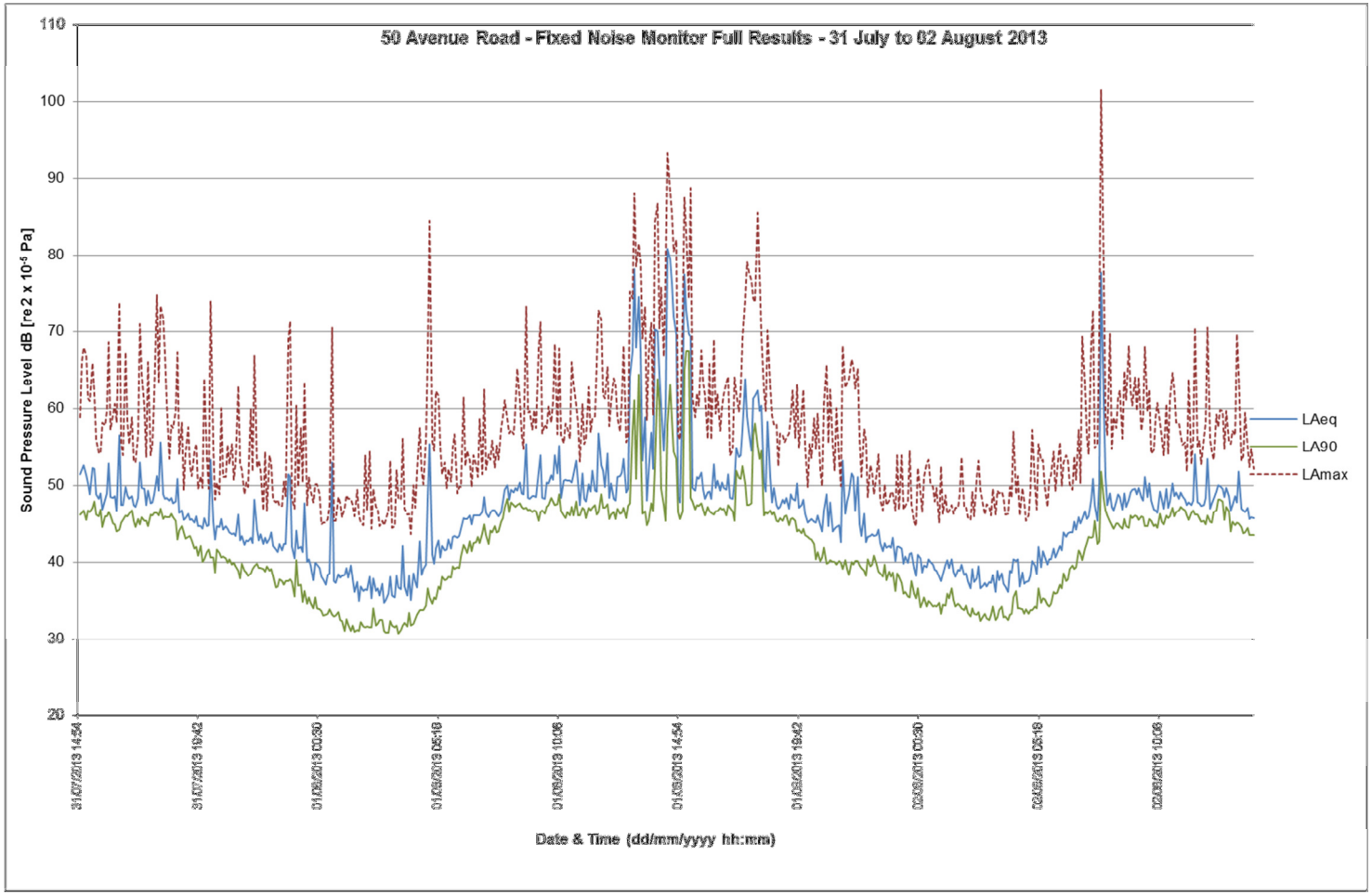

Figure 2: Noise Survey Results from Fixed Noise Monitor at 50 Avenue Road.

APPENDIX C – NOISE SURVEY RESULTS

File Number	Location	Start Time	Duration	LAeq	LAmax	LA90	Leq per Octave Band Frequency (Hz)								Comments
							63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz	
001	Rear Centre (1m from façade)	14:14:59	00:05:00	49	60	44	60	50	47	48	44	39	34	---	Road traffic noise - constant hum Aircraft movements - x 2 (1 x low flying) Construction noise - cutting (at intervals) Other - resident movements (light impacts)
002	Rear Centre (1m from façade)	14:19:59	00:05:00	48	65	45	59	46	43	43	43	43	37	31	Road traffic noise - constant hum (1 x beep of horn) Aircraft movements - x 2 (1 x low flying) Construction noise - cutting (frequent intervals) Other - resident movements (light impacts)
003	Front Centre (1m from façade)	14:35:01	00:05:00	64	75	55	71	61	62	59	61	56	50	48	Road traffic noise - dominant (mainly domestic cars, including HGV and motorbike frequent passes)
004	Front Centre (1m from façade)	14:40:01	00:05:00	65	76	56	73	62	63	61	62	57	51	44	Road traffic noise - dominant (mainly domestic cars, including HGV and motorbike frequent passes) Construction noise - scaffolding impacts (46-48 Av. Rd.)
005	Avenue Rd Centre (1m from boundary wall)	14:50:01	00:05:00	70	89	59	80	70	69	65	66	63	60	54	Road traffic noise - dominant (mainly domestic cars, including HGV and motorbike frequent passes) Construction noise - cutting Music in car audible 1 x beep of horn **1 x overload due to high level HGV impact (omit measurement)**
006	Avenue Rd Centre (1m from boundary wall)	14:55:01	00:05:00	69	81	59	77	68	66	64	65	61	57	53	Road traffic noise - dominant (mainly domestic cars, including HGV and motorbike frequent passes) HGV engine left idle - 30m from measurement pos. Pedestrians passbys
007	Avenue Rd Centre (1m from boundary wall)	15:00:33	00:05:00	69	82	58	76	67	66	64	65	61	57	51	Road traffic noise - dominant (mainly domestic cars, including HGV and motorbike frequent passes) Construction noise - loading impacts, reverse alarm sounding (distant)
008	Avenue Rd Centre (1m from boundary wall)	15:05:33	00:05:00	71	81	61	76	69	67	66	66	63	60	53	**Construction noise - dominant - high frequency screeching - loading skip/crushing material (omit measurement)** Road traffic noise - (mainly domestic cars, including HGV and motorbike frequent passes)

Table C1: Observed Measurement Results