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Nationwide Building Society

225/226 Tottenham Court Road, London W1T 7PZ

Mechanical Equipment Noise Report

28 July 2015

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aulos ACOUSTICS

28 July 2015
15P802 JT R1882-392

225/226 Tottenham Court Road, London W1T 7PZ

Mechanical Equipment Noise Report

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NB: Primary reference for report conclusions is Appendix D

document control

Document Reference	Revision	Title & Revision Comment	Checked	Approved	Date
15P802 JT R1882-392		Mechanical Equipment Noise Report	JT	JT	28/07/15

Copyright statement

225/226 Tottenham Court Road, London W1T 7PZ

Mechanical Equipment Noise Report

Introduction

Aulos Acoustics has been appointed by Barnwood Shopfitting Ltd on behalf of the Applicant to undertake an investigation of environmental noise emissions of 225/226 Tottenham Court Road, London W1T 7PZ.

The project is the refurbishment of a commercial unit to form a branch for Nationwide Building Society.

The refurbishment includes the provision of building services equipment, including air-conditioning, heat recovery and ventilation systems, to replace existing systems.

The unit previously included building services equipment and roof level and ground floor level. The existing equipment noise emissions could not be measured due to high ambient noise levels and unstable sound conditions at street level.

At roof level there is extensive building services equipment, much of which generates high noise levels. All equipment serves other premises and demises. The noise generated by the equipment is to be used as the “existing” plant noise level.

The application site represents a noise-generating use requiring an investigation of the effect of noise impact on amenity of nearby or adjacent residential property. The principal noise sources of concern are:

- Heating, Ventilation, Air Conditioning & Energy Equipment

The principal noise-sensitive receivers are those located at:-

- Alfred Place – to the rear of the application site
- Tottenham Court Road – to the front of the application site

These are the positively identified residential properties. No residential property was identified on Store Street adjacent.

An investigation and assessment has been completed in accordance with BS4142:2014 (1) to determine the environmental noise climate and establish any building services noise emissions important to the assessment.

The report of these investigations is included at Appendix D and shall be considered as the primary reference.

The following report summarises the outcome and conclusions of the investigation and assessment.

Reference shall be made to the datasheets, site plans and architectural drawings included in the application.

Planning Framework

The proposed installation is assessed against the requirements of the Local Planning Authority planning control policies and the national planning policy as defined in the following documents:-

- National Planning Policy Framework (NPPF) (2)
- Noise Policy Statement for England (NPSE) and Explanatory Note (3)
- Planning Practice Guidance – Noise (4)

The LPA is London Borough of Camden and requires mechanical equipment noise levels to not increase current ambient noise levels due to the high density of such equipment in the area.

The reference measurement and assessment method for such investigations is described in BS4142:2014 (1).

Local Planning Policy

LB Camden defines protection of amenity requirements in Policy DP26 and noise and vibration control in Policy DP28 of the Camden Development Policies 2010-2025.

These include definition of the target thresholds or limits for noise from mechanical equipment in Table E of the DP28 section.

Appendix C reports these requirements and Table E.

The noise thresholds may be summarised as follows:-

- Equipment noise without distinctiveness 5dB(A) below the Background Sound Level
- Equipment noise with distinctiveness 10dB(A) below the Background Sound Level

The Background Sound Level is the LA90,T. The stated period in Table E is 24-hours, but based on past experience, Camden did not intend this implication. The periods of assessment will be those of BS4142:2014, as the current best practice means of assessment.

Prevailing Noise Climate

Based on direct observations and listening, the ambient noise climate at the application site is determined by nearby road traffic on nearby roads and by building services equipment.

Away from the main roads, the noise climate remains determined by it in general with similar contributions from building services, particularly at upper floors.

Construction noise was noted, but was not the most significant source and was intermittent.

A continuous survey was completed to establish the noise emissions of existing equipment and, if possible, the underlying background noise. The details and results are reported in in Appendix D.

The meter and microphone were installed close to the proposed new, rooftop equipment position. This is at the quieter side of the roof and as far from major items and sources as was feasible.

Following inspection of the area, the likelihood of significant impact from the proposed equipment was considered low. There are more substantial building services installations at high level and no residential receivers within 20m of the equipment position.

The noise climate appears to be highly consistent over the time observed as would be expected of the equipment. Erratic equipment noise and vehicles at ground level as well as the irregular nature of road traffic on Tottenham Court Road precluded reliable measurement there. The latter seems to be affected significantly by construction work constraints further south.

To establish the components and magnitude of the noise climate, a noise survey was required. The type of survey and methodology has been determined with reference to Local Planning Authority guidance and/or relevant British Standards and guidance.

Environmental Noise Survey

The results and details of the survey are reported in Appendix D in general accordance with the requirements of the following documents:-

BS7445 (5) (6) (7) BS4142:2014 (1) BS8233:2014 (8)

Results

The results of the survey were analysed and are reported in Appendix D.

These confirm that the measurements of the rooftop equipment are within expectations with noise emissions of LAeq,T 59-63dB(A) depending on the range of active equipment.

Background sound level remains moderately high and was measured as:-

- LA90,15mins 54dB 07.00-19.00h
- LA90,15mins 61dB 08.00-18.00h
- LA90,15mins 52dB 01.00-07.00h or when restaurant equipment stops operating

Inspection of the area and knowledge of the prevailing and typical noise climate, would indicate a background noise level of approximately LA90,T 45dB(A) to be typical of any residential premises which are more sheltered than the nearest premises.

Positive identification of residential premises has been possible at buildings on or near Alfred Place and Tottenham Court Road. No such property was identified on Store Street.

BS4142:2014 Assessment

The calculations and details of the BS4142 assessment are contained in Appendix D

These include the schedules of equipment and the calculations of noise emissions.

The comparison of new and existing equipment is contained therein also.

It must be noted all of the proposed equipment is contained within either the rooftop plant area for the air-conditioning condenser unit or inside the building at ground floor, using ducted ventilation openings at high level.

Comparison of New and Existing

The new equipment is expected to have a much lower noise level than current mechanical equipment noise emissions measured.

No change in current ambient noise levels is expected.

The new equipment will comply with the LB Camden criteria and provides substantial margin for variation.

Under BS4142, there is a “low” risk of adverse impact, which within the context of current noise levels means a negligible risk.

The new equipment attains the planning requirements of LB Camden Development Policy DP28 Table E and will not increase ambient noise levels.

Impact Assessment

New equipment is assessed to be of “low” risk of adverse noise impact as stated above.

The Rating Sound Level, Lr, will be 15dB or more below the Background Sound Level, including corrections for distinctive, acoustic features.

The existing equipment is calculated to be operating at 3-7dB above the Background Sound Level.

Within the context of identified residential premises, the proposed equipment is expected to have negligible impact on residents or residential amenity.

Similarly, the new equipment will not exacerbate the current situation of potential adverse impact.

Planning Assessment

The proposed building services equipment is expected to operate within the scope of LB Camden noise control requirements.

No change in overall ambient noise level of existing equipment would occur, based on the calculated performance.

No change in impact assessment or risk of adverse impact on residents would occur.

The risk of adverse impact is assessed to be negligible for the proposed equipment.

Equipment Noise Data

It should be noted equipment noise data is detailed in Appendix D.

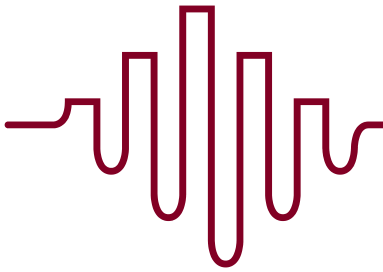
A datasheets package has been produced for inspection if required.

Noise Mitigation Recommendations

There is no requirement for additional attenuation or mitigation.

Vibration Isolation

All mechanical equipment will incorporate vibration isolation equipment to ensure transmitted vibration and structure-borne noise is commensurate with a commercial building.



Conclusions

Aulos Acoustics has completed an investigation of the environmental noise exposure expected of the application site at 225/226 Tottenham Court Road, London W1T 7PZ.

An environmental noise survey has been completed.

The proposed, replacement equipment will meet the requirements of the London Borough of Camden by avoiding an adverse impact on residential amenity, by generating noise levels well within Camden Noise Thresholds and by not exacerbating the current noise climate.

A negligible impact is predicted, for the context and normal circumstances of assessment, based on the methods of BS4142:2014. There is no change in the predicted noise level before or after installation.

The proposed building services equipment in this location meets the requirements of the National Planning Policy Framework, Planning Practice Guidance - Noise and Noise Policy Statement for England. Significant adverse effects are avoided and the resultant noise level will be below “No Effect Levels”.

The proposed development is expected to meet the requirements of the London Borough of Camden and is not expected to impact adversely on the local residents.

James Tomalin MIOA

Appendix A- Glossary

Term	Description	
Sound	Physical oscillation of air or other material which is normally detected by the ear as a complex, time-varying and detailed description of the environment around the listener. Interpretation and subjective filtering of sound by the brain results in comprehension, emotional response and physical reactions to sound. Sound can also be detected by touch when transmitted in a solid medium and be perceived as motion at very low frequencies (i.e. vibration).	
Noise	Generally defined as unwanted sound, which as a highly subjective description is subject to wide interpretation. Some describe noise as harsh or dissonant conditions, but such descriptions tend to be value-based and will vary from person to person.	
Ambient Noise	The noise climate heard over a period of time due to all normal sources, in the absence of extraneous or atypical sounds. Used to describe noise in the absence of the introduced sound, generally.	
Ambient Noise Level	Describes the average noise level of the ambient noise over a stated period of time, e.g. hourly noise	
	Parameter: A-weighted Continuous Equivalent Sound Pressure Level determined over the period T. Expressed in decibels / A-weighted decibels	$L_{eq,T}$ or $L_{Aeq,T}$ dB(A) or dB
Note:	Used in the reports generically to represent both current noise climate and noise level of vehicle noise to encourage direct comparison	
Leq,T	the notionally-steady sound level having the same acoustic energy as the time varying sound pressure level over the same period	
Background Noise	The underlying noise climate in the absence of an introduced or extraneous noise. Describes the quieter periods in the noise climate.	
Background Noise Level	Describes the “average minimum” level of the background noise climate over a stated period of time	
	Parameter: A-weighted Statistical Index 90% Sound Pressure. The quietest decile of the sound pressure levels or level exceeded for 90% of the time period, T Expressed in decibels / A-weighted decibels	$L_{90,T}$ or $L_{A90,T}$ dB(A) or dB
Acoustic screening	Physical barrier to sound formed by fence, wall, building or other structure, which has the effect of reducing the sound transmitted.	
Individual Event Noise	The noise of a distinctive event with the varying noise climate, usually a transient activity, such as a vehicle pass-by, aircraft flyover or similar, rather than an isolated impulsive noise.	
Event Noise Level	Highest noise level during the event as measured under particular conditions of time-weighting	
	Parameter: A-weighted Maximum Sound Pressure Level with FAST or SLOW time weighting Expressed in decibels / A-weighted decibels	$L_{Amax,FAST}$ or $L_{Amax,F}$ $L_{Amax,SLOW}$ or $L_{Amax,S}$ dB(A) or dB
Event Frequency	The number of times an individual event of a similar type occurs in the time period under consideration. Important descriptor as the impact of Individual Event Noise is dependent on changes in both level and event frequency.	
Time Weighting	The sampling rate at which a sound level meter measures the time-varying sound pressure level: originally described how fast the needle moved on analogue meters. Ensures the measurements respond to the type of noise source accurately and are representative. FAST = 125ms sampling rate = 480 samples / minute SLOW = 1s sampling rate = 60 samples / minute	

Appendix B - References

1. **BSI.** *BS4142:2014 'Methods for rating and assessing industrial and commercial sound".* EH/1, BSI. London : BSI, 2014. p. 80, Standard. ISBN 978 0 580 80051 1.

2. **HM Government.** *National Planning Policy Framework.* DCLG, HM Government. London : HM Government, 2012. p. 65, Policy. ISBN 9781409834137.

3. —. *Noise Policy Statement for England (NPSE).* London : DeFRA, 2010. p. 10, Policy. NPSE2010.

4. —. *Planning Practice Guidance – Noise ID30.* DCLG. London : HM Government, 2014. Guidance. Active guidance.

5. **BSI.** *BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures.* London : BSI, 2003. Standard. BS 7445-1:2003.

6. —. *BS 7445-2:1991, ISO 1996-2:1987 Description and measurement of environmental noise. Guide to the acquisition of data pertinent to land use.* London : BSI, 1991. Standard. Current UK standard. EN ISO standard is updated. BS 7445-2:1991.

7. —. *BS 7445-3:1991, ISO 1996-3:1987 Description and measurement of environmental noise. Guide to application to noise limits.* London : BSI, 2003. Standard. ISO edition already updated.

8. —. *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.* London : BSI, 2014. Standard.

9. —. *BS 4142:1997 Method for Rating Industrial Noise in Mixed Residential and industrial Areas.* EH/1/3, BSI. London : HMSO, 1997. p. 20, Standard. ISBN 0 580 28300 3.

Appendix C Local Planning

DP26 – Managing the impact of development on occupiers and neighbours

The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. The factors we will consider include:

...

d) noise and vibration levels;

...

g) the inclusion of appropriate attenuation measures.

We will also require developments to provide: ...

DP28 – Noise and vibration

The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:

a) development likely to generate noise pollution; or

b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted.

The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds.

The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.

Table E: 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	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dB$L_{Aeq'}$

Appendix D BS4142:2014 Investigations & Assessments

Calculation Reference	Revision	Title & Revision Comment			Checked	Approved	Date
15P802 JT C1882-391		Mechanical Assessment	Equipment	BS4142	JT	JT	28/07/15

aulos ACOUSTICS

Fixed equipment noise

Author

Consultant	James Tomalin	Director	**Date**	28/07/2015
Qualifications	MIOA			
Experience	Building acoustics; building services acoustics; environmental acoustics			
Length	26 years			
Profile	LinkedIn profile			

Location

225/226 Tottenham Court Road, London W1T 7PZ

Equipment

	Norsonic 140 Set 1	Calibration and details available on request
		Conforms to BS4142:2014 requirements

Tests

Standard(s)	BS4142:2014	with reference to BS7445 as appropriate
Source Type(s)	Mechanical equipment	
	Environmental noise	
Measurement	Short Automated	

Sources

	HVAC Noise	Dominant in most positions; cyclical
	Construction noise	Moderate but intermittent
	Road traffic	Distant / screened

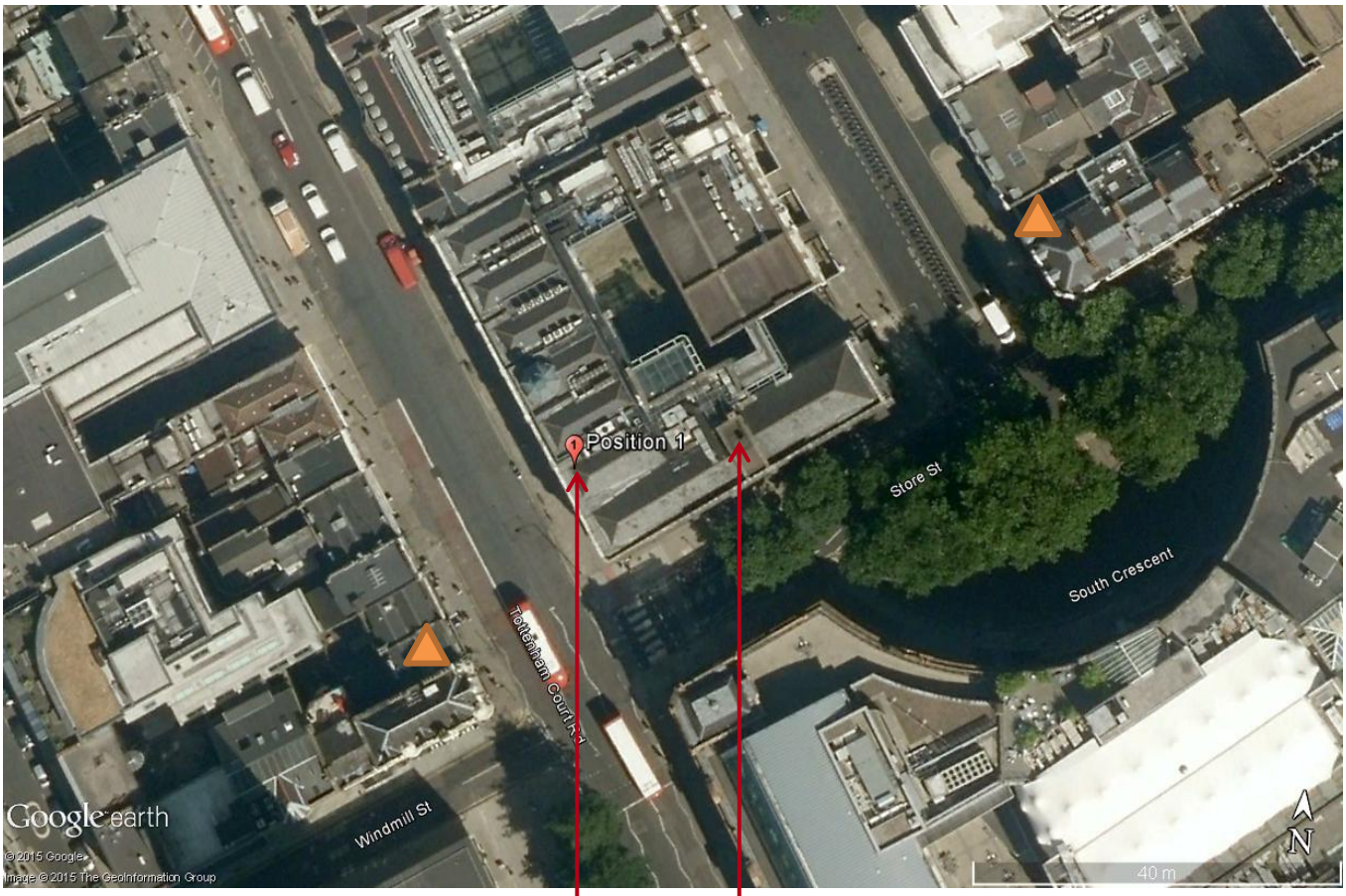
Weather

Temperature	22-25 C
Wind Speed	Negligible to 3m/s
Direction	Variable
Gusts	Occasional; low speed
RH%	Reported as 65%
Precipitation	Minor light rain overnight
Cloud cover	4-6/8 variable approx.

Survey

Start	16/07/2015 17:00
Finish	18/07/2015 17:00
Type	Short Automated
Comment	Measurement position is at least 1.5m from nearest small condenser unit and significantly further from oth
	Dominant kitchen exhaust and refrigeration equipment controls rooftop and local noise climate at high lev

Measurement Location



Restaurant kitchen exhaust

Residential or possible residential
Public building

Position 1

In gulley of pitched roof at 1.8m above roof level
Equipment noise controlling
Kitchen exhaust dominant
Significant refrigeration equipment

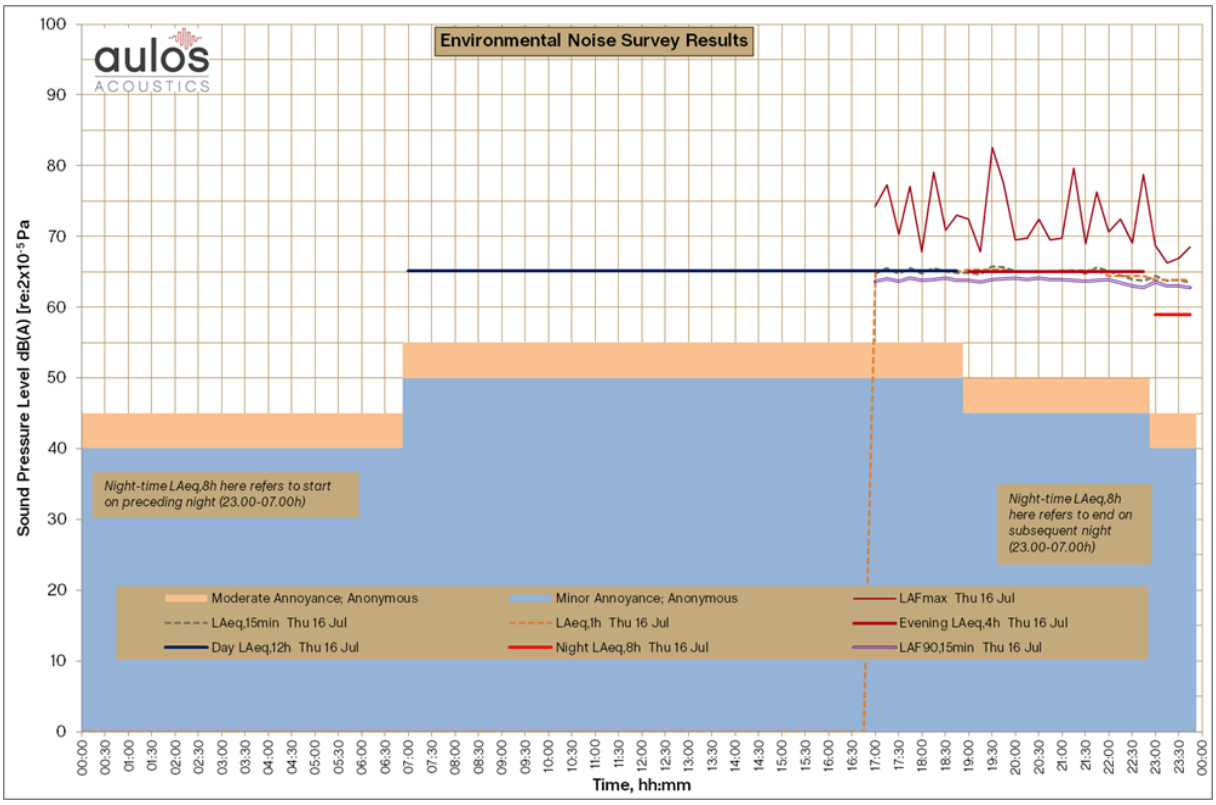
Sensitive Receivers

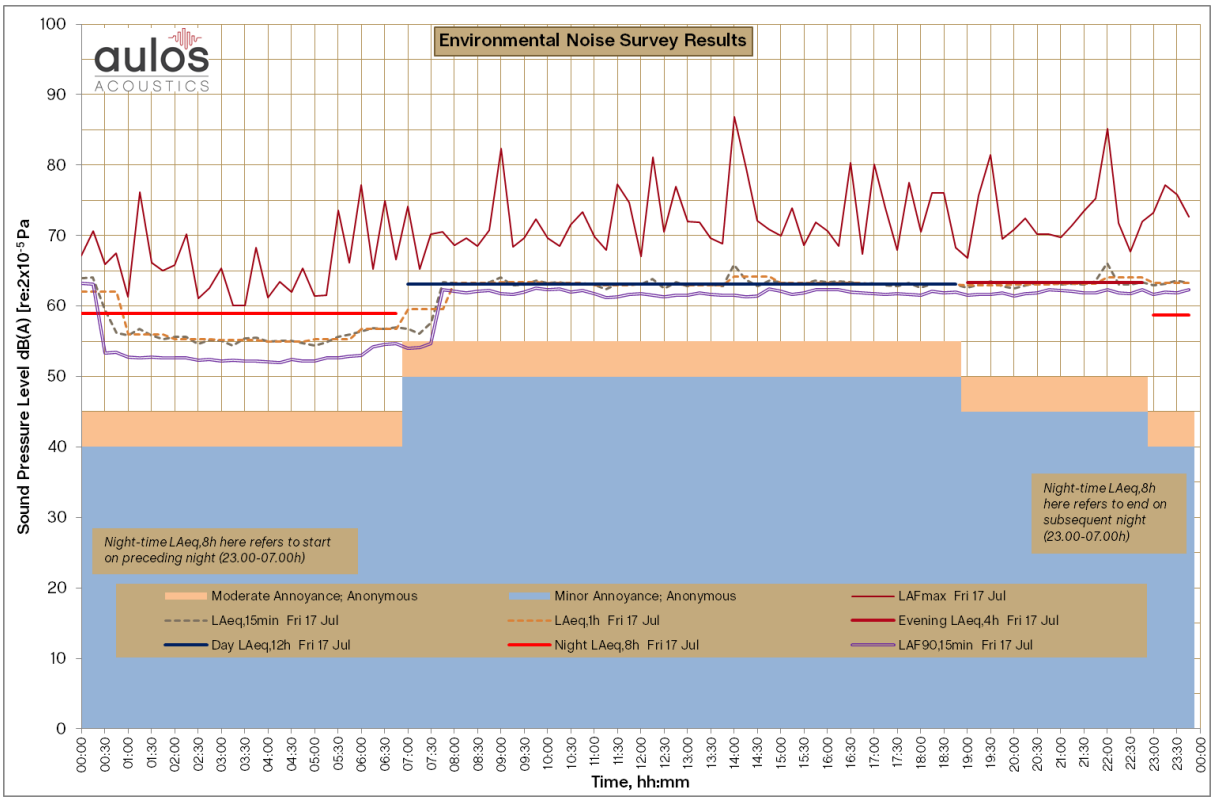
Residential property was visible from the roof as marked above on Tottenham Court Road and Alfred Place

Tottenham Court Road	35m from NBS equipment - no screen	48m from exhaust source - no screen
Alfred Place	55m from NBS equipment - screened	40m from exhaust source - no screen

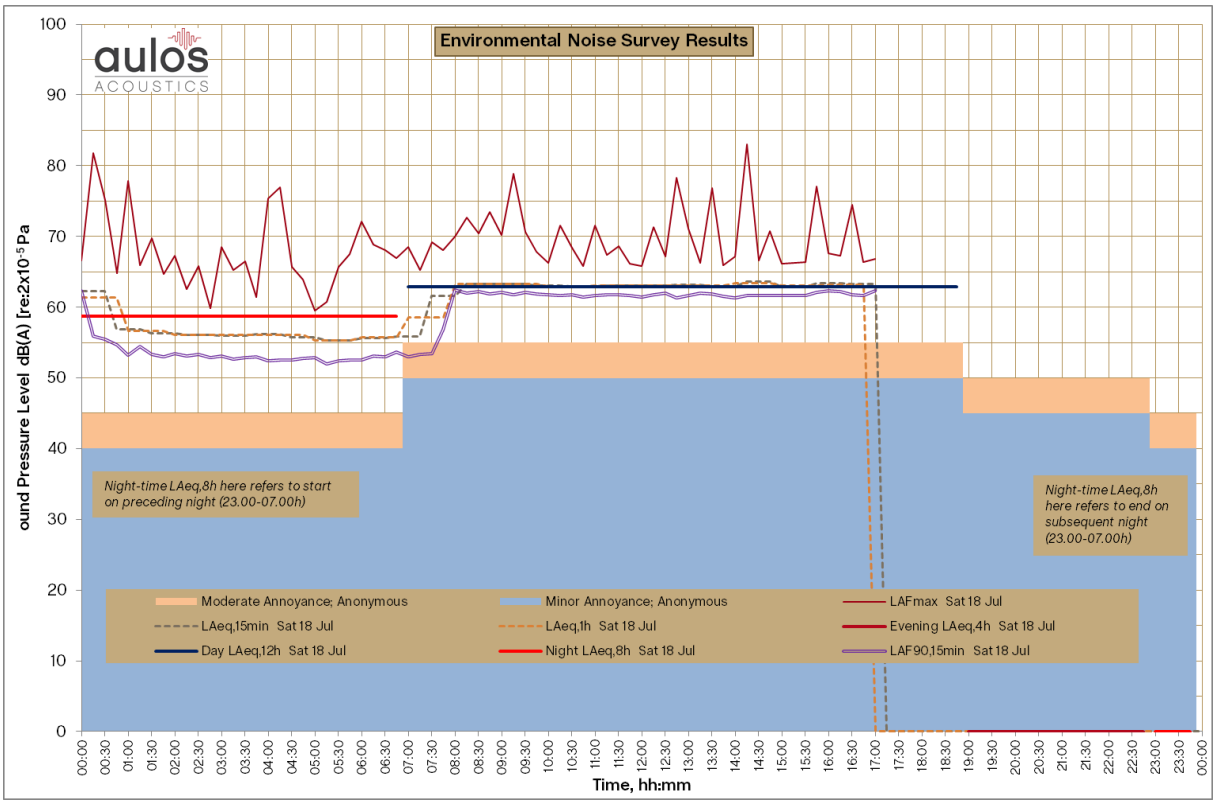
The measurement Position 1 is 16m from the exhaust source and unscreened.

Measured Time History Position 1





Measured Time History Position 1 (cont..d)



Analysis of Measurement Results

The survey period shows two clearly different periods of noise emissions over day and night.

Rooftop services equipment in the vicinity of the measurement positions has a daytime noise level of:-

Time	07.00-23.00	08.00-18.00		
LAeq,T	63	63	where T is 15-minutes	**Source Noise Level**
LA90,T	54	61	where T is 15-minutes	

Rooftop services equipment in the vicinity of the measurement positions has a night-time noise level of:-

LAeq,T	59 dB	where T is 15-minutes
LA90,T	52 dB	where T is 15-minutes

The reported time history graphs on the preceding pages clearly show the marked change in noise exposure.

The minimum overall background noise level is considered to be representative of the nearby residential property. These premises are closer to other building services installations and / or road traffic noise sources.

Such conditions would be in line with expectations for the area.

The ambient noise climate and existing source noise levels will be determined by daytime ambient noise level above.

Background Sound Level

The background sound level at any residential premises in the area is unlikely to be as high as the quieter noise levels measured.

Typically, we would not expect background to be as high as the daytime levels as residential premises seen are not close to such extensive building services rooftop plant areas.

For the purposes of assessment the minimum background noise levels are assumed to be:-

LA90,T	52 dB	
LA90,T	45 dB	minimum where any sheltered areas are identified

Source Noise - Existing

Existing Equipment at Branch (other demises)

The existing equipment sound level is as measured and reported as **Source Noise Level** above.

The equipment is that of other operators not the Applicant.

The minor installation of existing Applicant equipment is insufficient to cause a change in the noise climate when operating in conjunction with the extensive rooftop equipment used by others.

Assuming the kitchen exhaust is the dominant source the corrected noise level at each residential properties is:-

Tottenham Court Road	63	-20 log (48/16)	-9.5	No screen	53.5 dB(A)
Alfred Place	63	-20 log (40/16)	-8.0	No screen	55.0 dB(A)

NB: the above will be taken as the Specific Sound Level of Existing Equipment, Ls,existing

As the underlying noise level in the absence of dominant and continuous fan noise is markedly less, the above is considered to be representative of the noise levels at the residential premises due to existing equipment.

The objective shall be either to not increase the above level significantly or to attain 5dB(A) below the background noise level not increase the above significantly or attain 5dB(A) below the background noise level

New Equipment Schedule

Ref	Location	Description	Main Time From	To	Control On	Type
F1	Side	ATM Room Fan	08:00	18:00	WEMS	100% Vent-axACM250
F2	Side	Comms Room	08:00	18:00	WEMS	100% Airflow Icon 60
HRU01	Side	Heat Recovery Unit	08:00	18:00	WEMS	100% Toshiba VN-M800HE (240V/50Hz/Hi)
HRU02	SIde	Heat Recovery Unit	08:00	18:00	WEMS	100% Toshiba VN-M1000HE(240V/50Hz/Hi)
CU01	Roof	Condensing Unit	08:00	18:00	WEMS	70% Toshiba MMY-MAP1814FT8-E

Location Is the location of noise emission for intake, discharge or outdooor unit location

Main Time Are the primary operating times. Units are either remotely switched off by a management system or occupancy controlled. Outdoor condenser units maintain protective operation after hours

New Equipment Noise Schedule

			Level [dB re 2x10-6 Pa] @Octave Band Mid Frequency [Hz]									
Ref			dB(A)	63	125	250	500	1k	2k	4k	8k	dB
EF01	Duct	Duct Lw*	75.3	80.1	77.1	74.1	74.1	70.1	65.1	59.1	53.1	
EF01	Duct	Duct Lw**	68.3	73.2	70.2	67.2	67.2	63.2	58.2	52.2	46.2	
HRU01	Intake	Open Lp @ 1.5m	46.7	48	51	46	44	41	39	33	25	
	Discharge	Open Lp @ 1.5m	46.7	48	51	46	44	41	39	33	25	
HRU02	Intake	Open Lp @ 1.5m	49.2	50	53	47	46	44	42	37	29	
	Discharge		49.2	50	53	47	46	44	42	37	29	
CU01 Heat	Unit	Unit Lp @ 1 m	61.5	60	63	62	61	56	47	42	35	
CU01 Cool	Unit	Unit Lp @ 1 m	59.5	60	61	60	58	54	47	38	34	

* calculated to achieve known high ductborne noise level (Beranek re manufacturer stated Lp@3m+5 dB(A)

** calculated to achieve manufacturer stated Lp@3m+5 dB(A)

NB: manufacturer data for fan noise is not accurate and requires critical, pessimistic approach.

GFL Side Calculation to Outside

				Level [dB re 2x10-6 Pa] @Octave Band Mid Frequency [Hz]							
Ref			**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
F01	**Outlet**	Duct Lw	75.3	80.1	77.1	74.1	74.1	70.1	65.1	59.1	53.1
Losses	Attenuator;4 circ bends;End loss			12	9	10	11	17	18	16	16
Radiated Lw			62.7	68.1	68.1	64.1	63.1	53.1	47.1	43.1	37.1
F02	**Outlet**	Open Lw	68.3	73.2	70.2	67.2	67.2	63.2	58.2	52.2	46.2
Losses	1 bend; end	None		19	13	10	7	4	3	3	3
Radiated Lw			63	54.2	57.2	57.2	60.2	59.2	55.2	49.2	43.2
HRU01	**Intake**	Open Lp @ 1.5m	46.7	48	51	46	44	41	39	33	25
Losses	Correction to Lw; Q=2+50% split			8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Radiated Lw			55.2	56.5	59.5	54.5	52.5	49.5	47.5	41.5	33.5
HRU01	**Discharge**	Open Lp @ 1.5m	46.7	48	51	46	44	41	39	33	25
Losses	Correction to Lw; Q=2+50% split			8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Radiated Lw			55.2	56.5	59.5	54.5	52.5	49.5	47.5	41.5	33.5
HRU02	**Intake**	Open Lp @ 1.5m	49.2	50	53	47	46	44	42	37	29
Losses	Correction to Lw; Q=2+50% split			8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Radiated Lw			57.7	58.5	61.5	55.5	54.5	52.5	50.5	45.5	37.5
HRU02	**Discharge**	Open Lp @ 1.5m	49.2	50	53	47	46	44	42	37	29
Losses	Correction to Lw; Q=2+50% split			8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Radiated Lw			57.7	58.5	61.5	55.5	54.5	52.5	50.5	45.5	37.5
Combined Intake		Radiated Lw	60	61	64	58	57	54	52	47	39
Combined Discharge		Radiated Lw	66.8	69	69.7	65.8	65.5	61.2	57.4	51.9	45.3

GFL Side Calculation to Pavement

r	4 m									
-20 lg r		-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0
-11		-11	-11	-11	-11	-11	-11	-11	-11	-11
Q	2	3	3	3	3	3	3	3	3	3
Combined Intake	Lp	39.6	40.6	43.6	38.0	36.6	34.3	32.3	26.9	18.9
Combined Discharge	Lp	46.7	49.0	49.7	45.7	45.5	41.1	37.4	31.8	25.3
Cumulative Level	**Lp**	**47.5**	**49.6**	**50.6**	**46.4**	**46**	**41.9**	**38.6**	**33.1**	**26.2**

Only applies to pavement noise level not residential. Reasonable conditions for street side noise climate in close proximity to Tottenham Court Road. No adverse impact on other sensitive receivers expected due to these sound levels.

			Level [dB re 2x10-6 Pa] @Octave Band Mid Frequency [Hz]								
Ref			**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB**
Combined Intake			59.7	60.6	63.6	58.1	56.6	54.3	52.3	47	39	
Combined Discharge			66.8	69	69.7	65.8	65.5	61.2	57.4	51.9	45.3	
r	44 m											
-20 lg r			-32.9	-32.9	-32.9	-32.9	-32.9	-32.9	-32.9	-32.9	-32.9	
-11			-11	-11	-11	-11	-11	-11	-11	-11	-11	
Q	2		3	3	3	3	3	3	3	3	3	
Directivity	Minimum allowed at 90° horizontal		-3	-3	-3	-3	-3	-3	-3	-3	-3	
Screening	Sightline screening ignored		0	0	0	0	0	0	0	0	0	
On Time	100%		0	0	0	0	0	0	0	0	0	
Combined Intake			15.8	16.8	19.8	14.2	12.8	10.4	8.4	3.1	-4.9	
Combined Discharge			22.9	25.1	25.9	21.9	21.7	17.3	13.6	8.0	1.5	
Resultant Lp			24	26	27	23	22	18	15	9	2	
Equivalent to Specific Sound Level, Ls												

Roof Level to Alfred Place - Condenser Units

CU01 Heat	r, m	1	**61.5**	**60**	**63**	**62**	**61**	**56**	**47**	**42**	**35**
Distance	r, m	55	-34.8	-34.8	-34.8	-34.8	-34.8	-34.8	-34.8	-34.8	-34.8
Reflection	Q=2 vs. Q=	2	0	0	0	0	0	0	0	0	0
On Time		70%	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
Losses	Screen		-5	-5	-5	-5	-5	-5	-5	-5	-5
Lp	**Alfred place**		**20**	**19**	**22**	**21**	**20**	**15**	**6**	**1**	**-6**
Equivalent to Specific Sound Level, Ls											

Roof Level to Tottenham Ct Rd - Condenser Units

CU01 Heat	r, m	1	**61.5**	**60**	**63**	**62**	**61**	**56**	**47**	**42**	**35**
Distance	r, m	35	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9
Reflection	Q=2 vs. Q=	2	0	0	0	0	0	0	0	0	0
On Time		70%	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
Losses	None		0	0	0	0	0	0	0	0	0
Lp	**Tottenham Court Road**		**29**	**28**	**31**	**30**	**29**	**24**	**15**	**10**	**3**
Equivalent to Specific Sound Level, Ls											

aulos ACOUSTICS

Fixed equipment noise

BS4142:2014 Assessment - Existing (other demises)

Existing		dB		Page	Relevant clause	
Measured ambient sound level		-		5	*7.3.2*	
Residual sound level LAeq,1h		-		5	*7.3.3*	
Background sound level LA90,T			52	5	*8.3*	See estimated LA90min
Assessment made duringthe daytime, so thereference time intervalis1h					*7.2*	
Specific sound level		LAeq(T)	*see below*	5		

To	Position	TCR	AP		
				TCR =	Tottenham Ct Rd
				AP =	Alfred Place

Specific sound level corrected

To		Position		TCR	AP		
	Ls	dB		53.5	55	*7.3.5*	
Acoustic feature	Tonality	dB		2	4	*9.3*	Clearly perceptible
	Impulsivity	dB		0	0	*9.2*	None
	Other	dB		0	0	*9.2*	No distinctiveness
	Intermittency	dB		0	0	*9.2*	No distinctiveness
	Lr,full	dB		55.5	59.0		
Rating Level	**Lr**	dB		**55**	**59**	*9.3.1*	Rounded once
Background sound leve	LA90,T	dB		52	52		
Level Difference		dB		**3**	**7**	*11*	

7.3.3

Assessment of impact			*11*
	TCR	Adverse impact	*11*
	AP	Adverse impact	*11*
			11

NB: Assessment is against night-time background sound level.

Assessment indicates the residential receivers are currently subject to a moderate to significant risk of adverse impact

Uncertainty	*Overall- minor due to both positiive & negative values & large Level Difference*
Measurement	Low uncertainty due to continuous measurement and clear differentiation of sources at roof level
Calculation	Moderate - assumption needed for distance and dispersion to receivers
Rating	Minor as underlying, measured background is used and differences are significant and positive

Local Planning Outcome

The existing equipment does not meet the requirements of the LB of Camden planning policy for noise from mechanical as it exceeds the background sound level instead of being substantially below (5-10dB(A) below)

BS4142:2014 Assessment Roof - New

New Equipment		dB	Page	Relevant clause	
Measured ambient sound level		-	5	*7.3.2*	
Residual sound level LAeq,1h		-	5	*7.3.3*	
Background sound level LA90,T		52	5	*8.3*	See estimated LA90min
Assessment made duringthe daytime, so thereference time intervalis1h				*7.2*	
Specific sound level		LAeq(T) *see below*	8		

To	Position	TCR	AP		
				TCR =	Tottenham Ct Rd
				AP =	Alfred Place

Specific sound level corrected

To		Position		TCR	AP		
	Ls	dB		29	20	*7.3.6*	
Acoustic feature	Tonality	dB		0	0	*9.3*	Not in the context
	Impulsivity	dB		0	0	*9.2*	None
	Other	dB		0	0	*9.2*	No distinctiveness
	Intermittency	dB		0	0	*9.2*	No distinctiveness
	Lr,full	dB		29.1	20.1		
Rating Level	**Lr**	dB		**29**	**20**	*9.3.1*	Rounded once
Background sound leve	LA90,T	dB		52	52		
Level Difference		dB		**-23**	**-32**	*11*	

7.3.3

Assessment of impact			*11*
	TCR	Negligible impact	*11*
	AP	Negligible impact	*11*
			11

NB: Assessment is against night-time background sound level.

Assessment indicates the residential or potential residential receivers are subject to a negligible risk of adverse impact

The above takes into account the distances to known receivers and the underlying noise climate

Uncertainty	*Overall- minor due to both positiive & negative values & large Level Difference*
Measurement	Low uncertainty due to continuous measurement and clear differentiation of sources at roof level
Calculation	Minor - standard dispersion model and use of published, tested noise data
Rating	Minor as underlying, measured background is used and differences are large and negative

Local Planning Outcome

The new rooftop equipment meets the requirements of LB of Camden planning policy for noise from mechanical equipment and is well below the most onerous criterion of 10dB(A) below background (i.e. better than required).

New Equipment		dB		Page	Relevant clause	
Measured ambient sound level		-		5	*7.3.2*	
Residual sound level LAeq,1h		-		5	*7.3.3*	
Background sound level LA90,T			45	5	*8.3*	See estimated LA90min
Assessment made duringthe daytime, so thereference time intervalis1h					*7.2*	
Specific sound level		LAeq(T)	*see below*	8		

To	Position	TCR	AP		
Ground floor level to Alfred Place only.				TCR =	Tottenham Ct Rd
The receiver is in a quieter ambient noise climate away from the main road traffic noise. Notional low background sound level is used.				AP =	Alfred Place

Specific sound level corrected

To		Position					
	Ls	dB	0	24		*7.3.6*	
Acoustic feature	Tonality	dB	0	2		*9.3*	Slight tonal
	Impulsivity	dB	0	0		*9.2*	None
	Other	dB	0	3		*9.2*	Assumed distinctive
	Intermittency	dB	0	0		*9.2*	No distinctiveness
	Lr,full	dB	0	28.7			
Rating Level	**Lr**	dB	**0**	**29**		*9.3.1*	Rounded once
Background sound leve	LA90,T	dB	45	45			
Level Difference		dB	**-45**	**-16**		*11*	

7.3.3

Assessment of impact			*11*
	TCR	Not applicable	*11*
	AP	Negligible impact	*11*
			11

NB: Assessment is against night-time background sound level.

Assessment indicates the residential or potential residential receivers are subject to a negligible risk of adverse impact

The above takes into account the distances to known receivers and the minimum noise climate anticipated

Uncertainty	*Overall- minor due to both positiive & negative values & large Level Difference*
Measurement	Moderate - stable ambient noise levels could not be measured at low level & were plant-affected
Calculation	Minor - standard dispersion model and use of published, tested noise data
Rating	Minor - reduced background used; acoustic features pessimistic; no screening;large level difference

Local Planning Outcome

The new ground floor equipment meets the requirements of LB of Camden planning policy for noise from mechanical equipment and is well below the most onerous criterion of 10dB(A) below background (i.e. better than required).