

58 Southampton Row
London
WC1B 4AR

Plant Noise Impact Assessment

On behalf of



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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise impact assessment for new plant serving a restaurant kitchen at 58 Southampton Row in Camden.
- 1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.
- 1.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed following London Borough of Camden's usual requirements.
- 1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in [Appendix A](#). An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. A new external recirculating air handling unit (AHU) is to be installed within the service yard at the rear of 58 Southampton Row in Camden, serving the kitchen of a new restaurant.
- 2.2. The proposed plant location is shown in the drawing in [Appendix F](#). Plant noise data is shown in [Appendix D](#).
- 2.3. It is assumed that the plant may operate at any time.

3.0 Nearest noise sensitive receptors

- 3.1. The site is within a predominantly commercial area and is in the service yard at the rear of NYX Hotel London Holborn. The nearest windows of the hotel (Receptor R1) are considered to be the nearest noise-sensitive receptors.
- 3.2. All other potential receptors are at a significantly greater distance and are screened from the plant by the buildings around the service yard.
- 3.3. Photographs identifying the proposed plant location, the nearest hotel windows and the noise monitoring location used in this assessment are presented in [Appendix B](#).

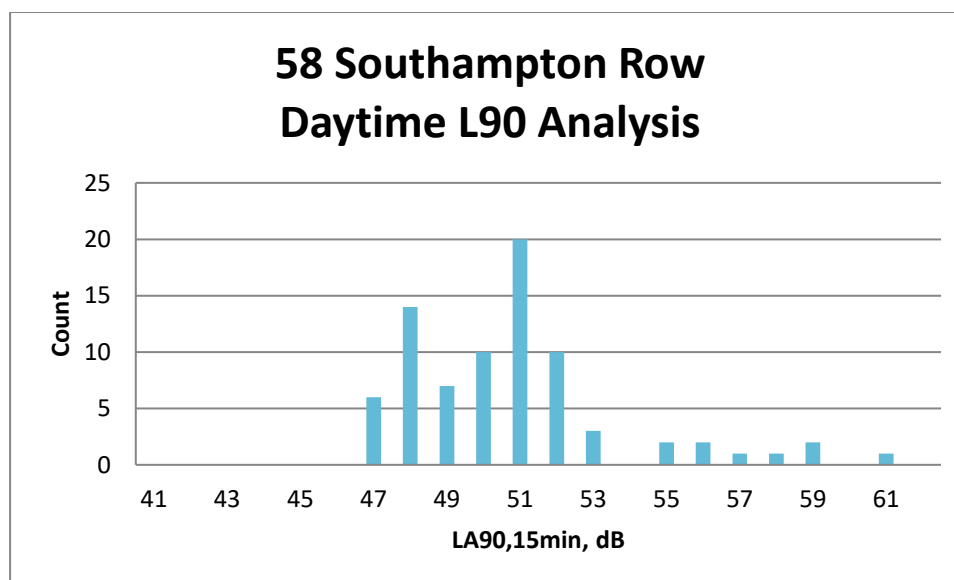
4.0 Existing noise climate

- 4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area, during the quietest times at which the plant will operate.
- 4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in [Appendix C](#).

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	L _{Aeq} (15mins)	L _{AFmax} (15mins)	L _{A10} (15mins)	L _{A90} (15mins)
Daytime (07.00 – 23.00 hours)	52-71	67-101	53-70	47-61
Night-time (23.00 – 07.00 hours)	46-55	58-87	48-55	42-47

Figure 1 Histogram of L_{A90} background sound pressure levels during the daytime



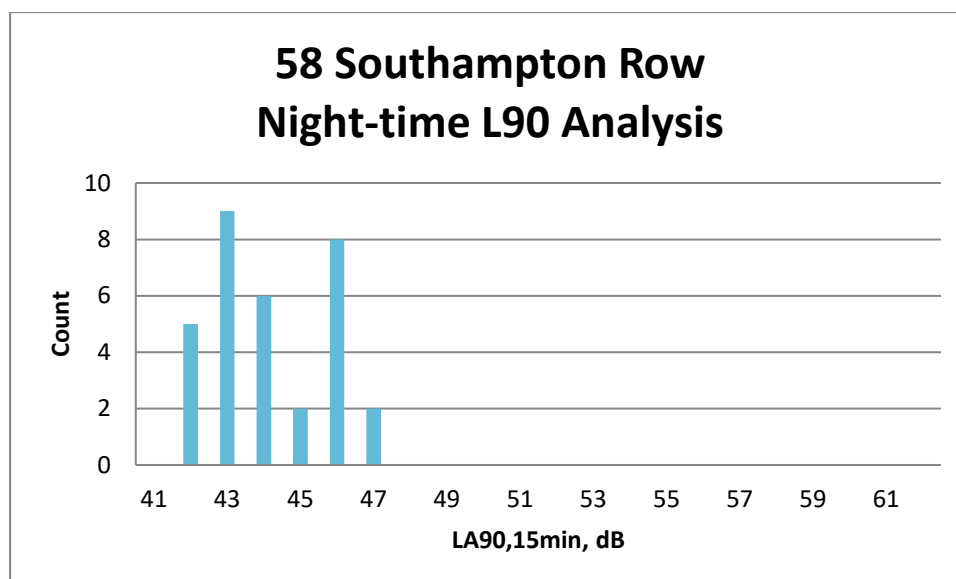
- 4.3. Further statistical analysis has been carried out on the data, and the mean, modal and median values are shown in Table 2 below.

Table 2 Statistical analysis of L_{A90,15min} levels during the daytime

dB, L _{A90} daytime period	
mean	51
modal	51
median	51

- 4.4. From reviewing the above histogram, 47dB has been selected to be representative of the background sound level in this area, during proposed trading hours.

Figure 2 Histogram of L_{A90} background sound pressure levels at night



- 4.5. Further statistical analysis has been carried out on the data, and the mean, modal and median values are shown in Table 3 below.

Table 3 Statistical analysis of $L_{A90,15min}$ levels at night

dB, L_{A90} daytime period	
mean	44
modal	43
median	44

- 4.6. From reviewing the above histogram, 42dB has been selected to be representative of the background sound level in this area, outside proposed trading hours.

5.0 Plant noise design criteria

London Borough of Camden

- 5.1. Section 6 of the Camden Planning Guidance Amenity, published January 2021, gives guidance on noise and vibration.
- 5.2. Clause 6.8 refers to noise thresholds within Appendix 3 of the Local Plan and to the principles of No observed effect level (NOEL), Lowest observable adverse effect level (LOAEL) and Significant observed adverse effect level (SOAEL) and defines their meanings. Specifically, in the context of this report, LOAEL is defined as:

The level above which changes in behaviour (e.g. closing windows for periods of the day) and adverse effects on health (e.g. sleep disturbance) and quality of life can be detected.

5.3. SOEAL is defined as:

The level above which adverse effects on health and quality of life occur. This could include psychological stress, regular sleep deprivation and loss of appetite.

5.4. Clause 6.27 states that:

Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the council accompanying any acoustic report. "BS4142 Method for rating Industrial and Commercial Sound" contains guidance and standards which should also be considered within the acoustic report.

5.5. Appendix 3 within the Camden Local Plan published 2017 states:

"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."

5.6. Table C of the appendix – reproduced here as Table 4 - states the criteria at which development related noise levels will be acceptable:

Table 4 Table C: Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL _{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL _{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL _{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 5.7. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes "sound from fixed plant installations which comprise mechanical and electrical plant and equipment".
- 5.8. The procedure contained in BS 4142:2014 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.
- 5.9. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.
- 5.10. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: "Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."

- 5.11. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: "Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."
- 5.12. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:
- *Typically, the greater this difference, the greater the magnitude of the impact.*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
 - *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
 - *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- 5.13. The standard does state that "adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."
- 5.14. The standard goes on to note that: "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."
- 5.15. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:
- "An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*
- 5.16. BS 4142:2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Criteria

- 5.17. From experience of similar situations it is likely that London Borough of Camden would classify the hotel bedrooms as “dwellings”. The rating level at the hotel windows must therefore be at least 10dBA below the existing representative background sound levels and should therefore not exceed the limits shown in Table 5.

Table 5 Proposed plant noise emissions level limits at nearest receptors

Period	Residential
	Plant rating level, dB $L_{Ar,Tr}$
Plant operates only between 07.00 and 23.00 hours	37
Plant may operate between 23.00 – 07.00 hours	32

6.0 Plant noise impact assessment

- 6.1. The cumulative plant noise levels at the nearest noise sensitive receptors have been predicted. The assessment has considered distance attenuation between the AHU and the nearest hotel windows and acoustic reflections from the adjacent wall. The predictions assume that the AHU may operate at any time.
- 6.2. The predictions include a partial acoustic enclosure around the plant, providing at least 15dBA attenuation to the windows of the hotel. The enclosure is shown indicatively in [Appendix G](#).
- 6.3. The proposed plant is not anticipated to exhibit any tonal or impulsive characteristics provided it is well maintained. Since the local authority’s criterion is for plant noise to be at least 10dB below the existing background sound level, no other BS 4142 feature corrections are considered appropriate.
- 6.4. Table 6 summarises the results of the assessment at the nearest windows within the hotel. The full set of calculations can be found in [Appendix E](#).

Table 6 Assessment of predicted noise levels at the nearest noise sensitive receptors

Receptor	Period	Predicted rating level at receptor, dB $L_{Ar, Tr}$	Criterion dB $L_{Ar,Tr}$	Difference, dBA
R1	07.00 – 23.00 hours	32	37	-5
	23.00 – 07.00 hours	32	32	+0

- 6.5. The noise level predictions show that, when attenuated as described, noise levels will meet London Borough of Camden's usual requirements and should therefore be acceptable.

Context and uncertainties

- 6.6. Where possible uncertainty in the above assessments has been minimised by taking the following steps:
- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
 - Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
 - Care was taken to ensure that the measurement position was representative of the noise climate outside the nearby noise sensitive receptors and not in a position where higher noise levels were present.
- 6.7. As BS 4142:2014 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:
- The assessment is undertaken at the nearest residential windows. The impact on all other nearby windows will be lower due to screening and distance attenuation.
 - It should be noted that the above assessment is based on all plant operating at maximum duty. Given that the plant will not operate at maximum design duty all of the time the above assessment is considered to be representative of the worst case.

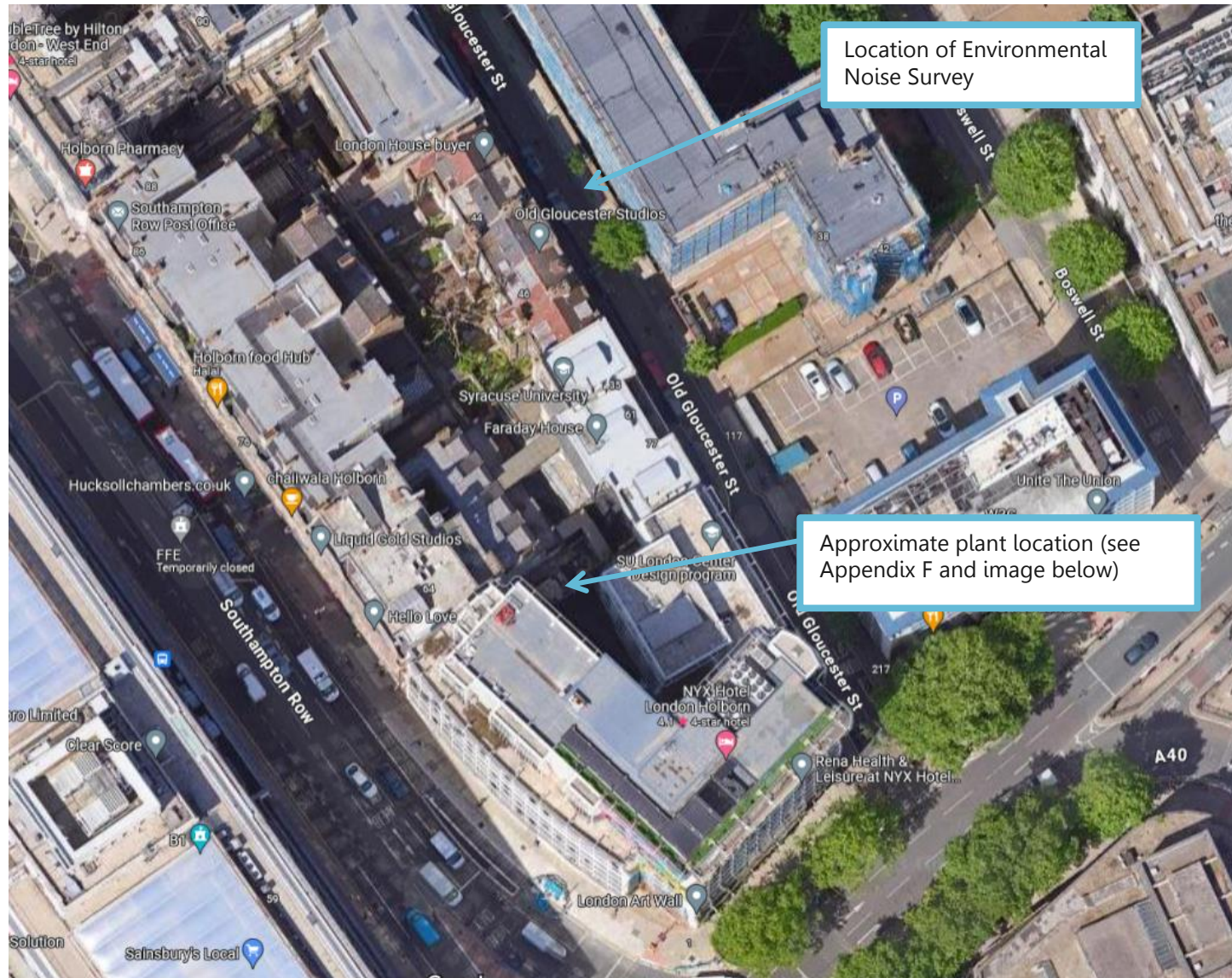
7.0 Summary

- 7.1. Noise Solutions Ltd has been commissioned to undertake a noise impact assessment for a new air handling unit serving the restaurant kitchen at 58 Southampton Row in Camden.
- 7.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at locations representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area.
- 7.3. The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor. When attenuated as described in this report, with a partial acoustic enclosure providing at least 15dBA attenuation, noise levels would comply with London Borough of Camden's usual requirements and should therefore be acceptable to them.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example

Appendix B Photographs of site showing areas of interest



View within service area



Appendix C Environmental sound survey

Details of sound survey

- C.1 Measurements of the existing environmental sound levels were undertaken between 12.45 hours on Monday 13th November and 16.30 hours on Tuesday 14th November 2023.
- C.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

- C.3 The measurement equipment was located on a lamp-post on Old Gloucester Street, to the east of the site (indicated on the site plan in [Appendix B](#)). The location was chosen to avoid noise from temporary plant within the service area.
- C.4 In accordance with BS 7445-2:1991 '*Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use*', the measurements were undertaken under free-field conditions.

Equipment

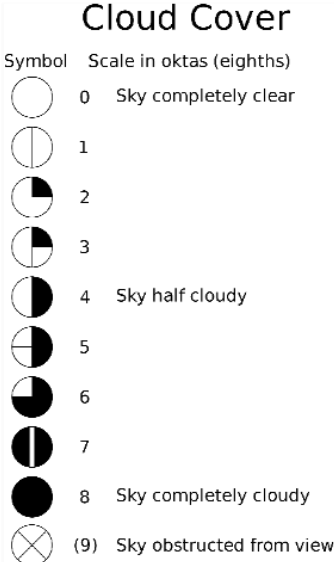
- C.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 971A / 124660	01/06/2023	1505421-1
Condenser microphone	ACO Pacific 7052E / 81197		
Preamplifier	Svantek SV18A / 130661		
Calibrator	Svantek SV33B / 125546	02/06/2023	1505532-1

Weather Conditions

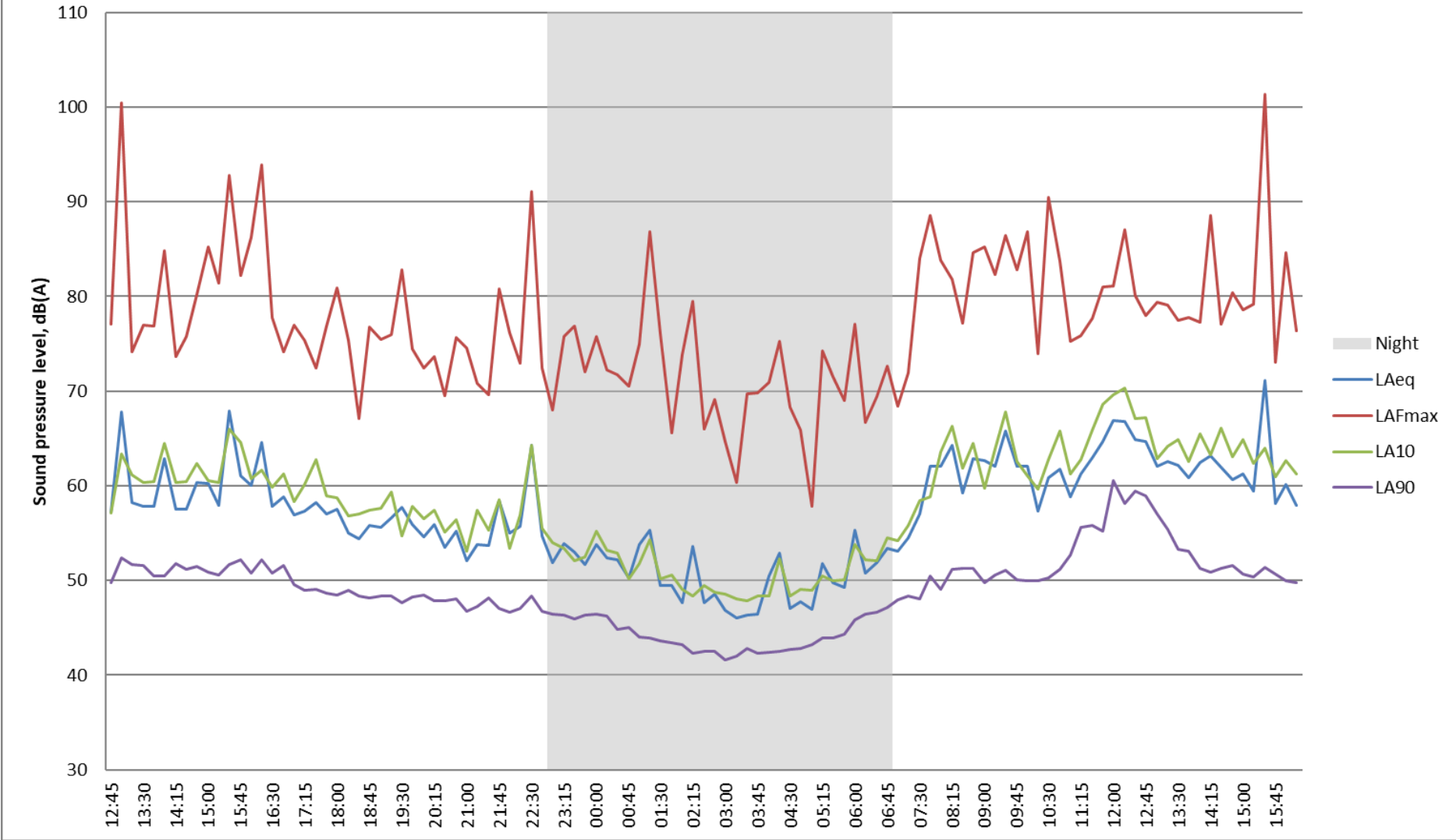
- C.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Time/Date	Description	Beginning of Survey	End of Survey
As indicated on Appendix C	12.45 13 Nov - 16.30 14 Nov 2023	Temperature (°C)	21	18
Cloud Cover  <p>Symbol Scale in oktas (eighths)</p> <p>0 Sky completely clear</p> <p>1</p> <p>2</p> <p>3</p> <p>4 Sky half cloudy</p> <p>5</p> <p>6</p> <p>7</p> <p>8 Sky completely cloudy</p> <p>(9) Sky obstructed from view</p>		Precipitation:	No	No
		Cloud cover (oktas - see guide)	2	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	Yes	Yes
		Wind Speed (m/s)	4	<1
		Wind Direction	SW	NW
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- C.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by distant and local traffic. The results of the survey are presented in a time history graph overleaf.

58 Southampton Row Monday 13 - Tuesday 14 Nov 2023



Appendix D Manufacturer's data sheet (extract)

RAH – Reco-Air by Halton – Recirculating kitchen extract unit (CE)



Overview

RAH units eliminate long ductwork to outside when they become too costly or when they simply are impossible to install. Technical constraints on buildings' structure, restrictions linked to listed activities or historic sites, co-ownerships opposed to the degradation of the facades aesthetic or to odor nuisance risk... all these challenges can easily be overcome with recirculation units.

In addition to providing opportunities to install kitchen operations in previously unfeasible locations, RAH units significantly reduce fire risk. They also simplify planning procedures.

Globally cost effective

- RAH units reduce CAPEX investment. They eliminate the costly fire-rated duct work to atmosphere thus reducing the construction and installation costs.
- They also reduce the utility usage and plant requirement with a compact design, an ease of assembly and flat pack options.
- RAH units enable establishing a restaurant wherever you chose i.e. where it is of most value, whatever the technical or environmental challenges.
- Traditional extract duct work requires regular specialist cleaning. RAH units significantly reduce maintenance regimes when accessing duct systems and plant is difficult and time consuming.
- When combined with Halton's Capture Jet™ hoods or ventilated ceiling, the installation and operating costs are even more reduced. They reach the lowest possible level when M.A.R.V.E.L. optimization airflow technology is also used.

- Max. ambient working temperature to suit specific application.
- Each fan shall be Inverter Controlled, so fan speed ramps up as the filter pressure increases to maintain a constant air volume flow rate at the cookline / hood.

Control platform & Interface Requirements

- The control platform shall be Halton Brand, Halton Connect. It shall include a unique LCD user interface, common to all technologies of the manufacturer. It shall also have advanced distant monitoring capabilities enabling future premium services, including a predictive maintenance of the systems.
- The control platform shall ensure the unit ceases to function if any of the following scenarios arise:
 - A unit filter access door is left open or slightly open.
 - Filters are removed or left out of the unit.
 - The Fire Alarm system is activated.
 - The registered filter pressure drop across any of the primary 3 sets of filters exceeds pre-set warning levels & reaches critical levels.
 - The unit Isolator is turned Off.
 - A system Timeclock – external controls – is not calling for system activation.
 - A remote Shut-off safety feature – external controls – has been activated.
- [Option] An electrical interlock system shall be incorporated, to disable all essential cooking equipment whenever a 'No Air Flow' status is present.
- See enclosed the full and specific descriptions of Halton Connect.

Air Commissioning / Testing

- The unit(s) shall be delivered pre-commissioned from factory.
- On completion of any RecoAir unit installation, the air volume flow rates to extract & return air ductwork must be verified by a suitably qualified commissioning engineer & a report produced as point of record.
- All test points are sealed with proprietary plugs on completion of this operation.

Measures for unit's Service & Maintenance

- When planning the installation of the recirculation unit –however configured – adequate clearance must be allowed to facilitate safe operative replacement of the filter media & fan(s).
- To comply with Specific Landlord / Authority approvals – a Service Contract is required. It is highly recommended to use a suppliers' accredited service partner.
- Evidence of same must be made available prior to formal approval being acknowledged.

RecoAir Unit Noise Breakout

- In normal 'Internal' instances, breakout noise from the unit shall not exceed 60 dB(A) when measured at 1 metre (free field).
- Where Specific Authorities enforce lower noise levels, the unit construction shall be modified accordingly.

Appendix E Noise level predictions

Receptor R1

Unit	Distance correction				Directivity, dB	Screening, dB	Attenuation, dBA	BS4142 feature correction, dB	Rating level at receptor, dB $L_{Ar,Tr}$
	L_{pA}	at / m	m	dB					
AHU breakout	60	1	6	-16	3	0	-15	0	32

Appendix F

Proposed plant layout



Appendix G Indicative acoustic enclosure arrangement

