aulos
ACOUSTICS

12 Charlotte Mews, London W1T 4EQ

Environmental Noise Survey Report

P1656 *15 February 2018*

James Tomalin

12 Charlotte Mews, London W1T 4EQ

Environmental Noise Survey Report

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Document Reference	Rev	Title & Revision Comment	Check	Issue	Date
P1656 R2759-602		Environmental Noise Survey Report	JT	JT	20.12.2017
	a	Equipment selected	JT	JT	18.01.2018
	c	Relocated scheme	JT	JT	14.02.2018
	d	Duct & calculation modification	JT	JT	15.02.2018

12 Charlotte Mews, London W1T 4EQ

Environmental Noise Survey Report

1.0 Introduction

1.1 Aulos Acoustics has been appointed by Pizza Express Restaurants Ltd to investigate environmental noise emissions at the proposed new food innovation centre at 12 Charlotte Mews, London W1T 4EQ.

1.2 The food innovation centre is a commercial business use and not a restaurant, but will include the provision of ventilation mechanical equipment to kitchen and other areas, including kitchen extract and supply fans.

1.3 The current office use includes some heating, ventilation and air conditioning equipment installation (i.e. existing condensers). The proposed installation includes kitchen extract and supply fan equipment. Existing air conditioning units serving the premises are to be refurbished to serve new indoor units. Other existing air conditioning units serving other parts of the property will remain operational.

1.4 Allowance is made for modern refrigeration, including catering refrigeration. It is proposed that all refrigeration and freezing will be provided within the kitchen.

1.5 The planning application is, therefore, described as “Change of use of the ground floor unit from offices (B1) to food innovation office (Sui Generis), including the installation of new kitchen extract duct and plant.

1.6 Such facilities represent noise-generating uses 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

1.7 The report considers the typical noise emissions of the standard equipment and noise-vibration control scheme.

2.0 Mechanical Equipment

2.1 The proposed HVAC installation includes a typical range of equipment for modern restaurants. The schedule of equipment is reported in Appendix A.2. The schedule of equipment allowed for in the report includes: -

- Air conditioning condensers (operating hours) – two off. Existing condensers
- SF01 Supply Fan (operating hours+pre-start) – one off.
- EF01 General Extract Fan (operating hours+pre-start) – one off.

2.2 The schedule is the primary selection at this stage and is expected to be the final selection. The equipment is equivalent to that expected to serve a relatively large restaurant and commercial kitchen.

2.3 There is no major equipment to be removed.

2.4 There are no external compressors proposed and all equipment incorporates at least basic noise and/or vibration control, including primary ventilation silencers and anti-vibration mountings.

2.5 Further details are available in the services drawings and planning application forms, which are the primary reference for the equipment. The current application provides a detailed submission

and future information will include final equipment selection proposals and building services drawings.

2.6 The kitchen extract fan selection is based on a discharge at upper level. The fan considered has an airflow resistance for a mid-level discharge. The drawings refer.

2.7 The supply fan has a similar airflow duty.

2.8 The air conditioning units are existing, standard outdoor units serving re-located indoor DX room cassette units.

2.9 There are no external catering condenser units and, therefore, no night-time mechanical equipment operation.

2.10 The standard approach is to ensure fans are not adjacent to residential premises and no fan or evaporator is located directly below residential premises. This is maintained here.

2.11 The condenser fans are located externally. There are other existing condenser units at roof level operating at similar times of day.

2.12 Reference shall be made to the building services drawings for the final selections of equipment and locations applied for.

2.13 All locations are for new and existing equipment are the roof.

3.0 Operating Times

3.1 The mechanical equipment operating times are related to the operating times of the food innovation centre (09.00-23.00h full range). Allowance is made for pre-start operation of all equipment as follows:-

- 08.00-23.00 hours Monday to Saturday
- 08.00-23.00 hours Sundays and Bank Holidays

3.2 Such an assessment is considered to be highly pessimistic as not all equipment will operate on first occupation of the building or during preparation and not all equipment will operate simultaneously.

3.3 There is no new equipment operating overnight.

3.4 Actual operating periods are not expected to be continuous, for full days or on all days of the week, which will provide further mitigation of the installation.

3.5 The worst-case, evening period is assessed for the planning application relative to the noise climate assuming continuous operation within the reference period.

4.0 Prevailing Noise Climate

4.1 The prevailing noise climate at each branch is a key environmental variable.

4.2 Fitzrovia is a relatively active area throughout the day and night, but Charlotte Mews is sheltered from direct exposure to the local area. There is some people, distant road traffic and mechanical equipment noise. Due to the proximity to other commercial premises both mechanical equipment noise and commercial noise affect the noise climate.

4.3 In this case, new equipment is being introduced, but there is active, substantial and audible mechanical equipment noise affecting the current noise climate.

4.4 The reference background noise levels are those for residential areas affected by traffic, based on a combination of local, regional and national reference noise studies.

4.5 Typically, the following background noise levels are used to provide a standard impact assessment:-

Period	Times	Reference Time	Minimum LAb	
Day	07.00-19.00h	1h	55	dB
Evening	19.00-23.00h	1h	50	dB
Night	23.00-07.00h	15mins	43	dB
Restaurant Operation	12.00-00.00h	1h [15mins]	47 [45]	dB

Table 1 – Typical Background Sound Levels

4.6 Where local environments are more sheltered than general urban areas, a quieter noise climate will prevail. Lightwells and enclosed yards in urban edge or suburban environments are likely to be the quietest areas.

4.7 Where there is greater exposure to transport or industry, or where the area is subjected to significant HVAC sources, then higher values are likely.

4.8 Recent surveys are generally within 5dB of the above reference levels.

4.9 Ambient sound levels tend to be significantly greater than background as these describe the effect of all sources, not just the quietest. For standard assessment, it is assumed that daytime and evening ambient sound levels are 7-10dB higher than background and night-time ambient sound levels are 3-6dB higher than background.

5.0 Environmental Noise Survey

5.1 The application site was reviewed prior to survey and assessment to determine if either were required.

5.2 Where local noise surveys have been completed near the application site and the risk of impact is considered low then these data may be used or referred to.

5.3 Where a noise survey is deemed necessary or the Local Planning Authority have a mandatory requirement for assessment then this will be completed over a period representative of the minimum noise climate.

5.4 Typically, this is a period between 22.00 and 03.00 hours and is measured by continuous monitoring at a fixed location.

5.5 Environmental noise surveys are undertaken in general accordance with B4142:2014 (1) and other Standards including:-

- BS 7445 (2) (3) (4)
- BS8233:2014 (5)

5.6 Measurements of the following sound pressure level (Lp) parameters have been completed:-

- Continuous equivalent sound pressure level LAeq,T
- Statistical Lp indices LA10, LA50, LA90
- Maximum Lp LAmax

5.7 All frequency weightings are “A” and all time weightings are FAST. Octave band frequency spectra are measured and some measurements have equivalent SLOW time-weighted results. The spectra and SLOW results are for use in design. A sample measurement is made and recorded every 30 seconds and the results reported for each 15-minute period – the measurement duration T. Results are reported in Appendix A.1.

6.0 Environmental Noise Assessment

6.1 The basis of environmental impact assessments is determined by the Local Planning Authority for the application site.

6.2 Whilst the measurement method is defined by BS4142:2014, the application of criteria is inconsistent across the country and even within small regions.

6.3 The over-riding principle is to "avoid significant effects" as defined by the NPPF (6) and Noise Policy Statement England (7).

6.4 *National Planning Practice Guidance – Noise* considers how to determine an impact and states:-

"*Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:*

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*"

6.5 Whilst there is sufficient guidance available within the NPSE and related British Standards there is significant variation between LPAs even within critically similar areas. The PPG – Noise defines a semantic scale of effects – or "noise exposure hierarchy" - as follows:-

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
	Lowest Observed Adverse Effect Level		
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect Level		
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 2 – Noise Exposure Hierarchy PPG - Noise

6.6 The range of target criteria which are implemented by LPAs is probably the greatest single cause of variation in noise impact assessment. The means of assessment cause a similarly wide variation in target noise level.

6.7 In combination, sustainability design standards have tended to ensure a minimum basic standard of noise control. The RICS-sponsored means of environmental rating for similar commercial development [*SKA rating*] recommends a rating level 5dB above background sound level, for example, which provides some protection. The standard is inconsistent with the prevailing approach to noise impact and residential amenity.

6.8 The range of approaches is illustrated in the table below:-

Approach	Description	LPA using as general view	Equivalent compared to background	Expected Perception
Less than "Marginal Significance"	Based on rating method of BS4142:1997 Accepted by a small number of LPAs and several tribunals as representative of a "reasonable" level of disturbance	Few	OdB to +5dB	Noticeable From not intrusive to slightly intrusive
Minor Increase in Noise Level	Limiting the total sound level with introduced noise to a maximum 2-3dB increase	Some	-2dB to 0dB	Noticeable if of character or different to existing Not intrusive
Minimal Increase in Noise Level	Limiting the total sound level with introduced noise to a maximum 1-2dB increase	Several	-5dB to -2dB	Not noticeable in most cases Not intrusive
No Increase in Noise Level	Limiting the total sound level with introduced noise to a maximum 0dB increase	Many	-10dB	Not noticeable
Rating Level Difference -5dB	BS4142 rating assessment including character corrections to attain a low risk of impact	Many	-5dB to -10dB	Not noticeable
Rating Level Difference -10dB	BS4142 rating assessment including character corrections to attain an extremely low or negligible risk of impact	Some	-10dB to -15dB	Not noticeable
Inaudible	Subjective standard inapplicable in planning	Few	-15dB to -20dB for true inaudibility	Not noticeable

Table 3 - Range of LPA Policy & Guidance Noise Criteria for HVAC Equipment

6.9 In the broadest terms, there exists a 20dB margin in noise criteria addressed by the author over recent years. In practice, the majority of LPAs apply criteria within the range 0dB to -15dB compared to background depending on the penalties applied.

6.10 In one LPA an introduced noise may need to be less than half to quarter as loud as in another.

6.11 There is no technical justification for such wide variation either in the equivalent noise targets or the application of the assessment method.

6.12 Aulos Acoustics considers the following approach to be reasonable and sustainable ensuring the protection of residential amenity by avoiding significant effects and reducing adverse effects to a minimum.

- A low risk of adverse impact would apply
- A perception of not noticeable and not intrusive would apply
- BS4142:2014 rating assessment at the nearest and most exposed residential properties
- Application of tonal penalties where applicable

- Application of distinctiveness penalties where appropriate
- Consideration of context positively and negatively
- Introduced noise no lower than 5dB below background sound level
  - *Equivalent Rating Level difference with typical character corrections = 0dB*
  - *Equivalent Rating Level difference with no character corrections = -5dB*

6.13 Based on the normal noise exposure hierarchy, no further specific measures would be required if the above criteria were met.

6.14 Each restaurant, or similar facility, will be assessed relative to the above and to LPA criteria. Deviations from the above will be identified.

7.0 Objective Criteria

General Approach

7.1 Based on the typical background sound levels of Table 1 above and the approach defined in 6.12, the following criteria would apply at different periods generally:-

Period	Times	Reference Time	Minimum LAb	Introduced Noise Level, LAeq,T			
Day	07.00-19.00h	1h	55	55	|	**50**	dB
Evening	19.00-23.00h	1h	50	50	|	**45**	dB
Night	23.00-07.00h	15mins	43	43	|	**38**	dB
Operating Time	11.00-23.00h	1h	47	47	|	**42**	dB
Operating Time	23.00-00.00h	15mins	45	45	|	**40**	dB
				No features		With features	

Table 4 – Standard Assessment Criteria

7.2 As most single or isolated HVAC installations are distinctive in some respect the lower noise targets are used in review of significant catering installations.

7.3 Importantly, the above criteria would ensure the internal noise levels within a bedroom at night were no greater than 25-28dB(A) for the introduced noise source, which is within the criterion of BS8233:2014. In conjunction with the existing noise climate an internal total noise level of less than 31-34dB(A) would apply, which remains within the "reasonable" conditions allowed by BS8233:2014.

7.4 The above objective criteria are applied in the review of each branch prior to full assessment.

Specific Approach

7.5 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.

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

7.7 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

7.8 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.

7.9 It is worth noting that noise-exposure of the premises is considered to be moderate in the context of similar environments. Noise exposure of existing noise sources is prevalent and significant factor in local consideration of the area.

7.10 Noise-generation is limited to the fixed mechanical equipment.

7.11 The policies remain broadly in line with the requirements of the NPPF and associated guidance.

7.12 The Environmental Noise Assessment attached confirms the specific criterion, which is 5dB more stringent than the general approach described at 6.12 above.

7.13 For most equipment, the minimum daytime and evening criterion shall apply as follows:-

- Minimum $L_{A90,1\ hour}$ 48dB 07.00-23.00h
- Assessment Criterion 38dB (i.e. introduced noise level $L_{Aeq,1\ hour}$)
- Equipment noise shall not exceed the above value where distinctive

7.14 The minimum background for the full day and evening period has been adopted, which is expected to lead to a worst-case assessment of the application site.

7.15 The minimum night-time criterion for equipment operating over 24-hours (if introduced later) is:-

- Minimum $L_{A90,15min}$ 44dB 23.00-07.00h
- Assessment Criterion 34dB (i.e. introduced noise level $L_{Aeq,15min}$)
- Equipment noise shall not exceed the above value where distinctive

7.16 It should be noted the minimum value applies in the more sheltered low level areas of the mews at or close to roof level of 12 Charlotte Mews. Noise exposure commonly elevates sound levels as height increases in built-up London streets.

7.17 The existing condenser units generate noise and comparison will be made to these items of equipment to determine if any significant change is expected. Control of existing equipment is not proposed.

8.0 Approach to Design

8.1 The standard equipment installation includes basic attenuation and noise-vibration control equipment to ensure a reasonable noise level at reasonable distance.

8.2 A general impact assessment has been completed. The equipment subject to the application is located:-

- Outside within open mews courtyard at roof level
- Exposed to quiet streets
- Less than 30m to nearest resident unscreened
- Approximately 20-25m to nearest resident with no screening

8.3 A Moderate risk of adverse impact on existing residents is estimated.

8.4 Moderate and low risk sites in most circumstances will only require a basic installation for noise-vibration control in normal circumstances – a low performance attenuation system.

8.5 It must be noted the assessment assumes that the building to the north-west of 12 Charlotte Mews is residential.

8.6 The appearance of the building indicates residential, but it was not possible to confirm this with occupants or local people.

8.7 Other buildings are commercial within the immediate vicinity of the application site.

9.0 Noise Exposure Assessment

9.1 A general noise exposure assessment is presented in Appendix B for the proposed installation. The appendix constitutes the report of calculations and details of the noise exposure assessment required under BS4142:2014 and includes the following:-

- Calculations of equipment noise emissions (Appendix B1)

9.2 Specific locations and selections are defined in building services drawings.

9.3 The typical distance allowed is 15m unscreened between application plant items and the residential property.

9.4 A BS4142:2014 assessment is included (Appendix C) for the new equipment.

9.5 As indicated in the assessment the system is capable of achieving reasonable noise levels at the residential premises nearby.

9.6 The resulting $L_{Aeq,1h}$ sound levels for each calculation in Appendix B.1 are as follows:-

All Existing Condenser Units	39.2	dB(A)
New Equipment Operating	35.6	dB(A)
Difference	-3.6	dB(A)
Combined Sound Level	40.8	dB(A)
Change in Sound Level	+1.6	dB(A)

9.7 The new equipment is calculated to have noticeably lower sound levels than the existing equipment. The resulting change in sound level, at worst, with all new equipment operating, would be 1.6dB, which is expected to be unnoticeable in an open environment.

9.8 The comparison of the new equipment with the measured background noise is as follows:-

New Equipment Operating	36	dB(A)
Background Sound Level	48	dB(A)
Difference	-12	dB(A)

9.9 The LB Camden criterion for distinctive mechanical equipment is achieved for the range of new equipment, based on these calculations.

9.10 The new equipment is quieter than the existing equipment.

9.11 With all new and existing equipment operating, the mechanical equipment noise is expected to be markedly lower than background sound level during the quietest period of daytime or evening by some 7dB.

9.12 Within a planning context, the new equipment is the critical test of compliance with LB Camden criteria as the application does not include replacement of existing equipment.

9.13 The proposed scheme is expected to result in compliance with the LB Camden criteria during the day and evening.

9.14 The total noise level is expected to remain reasonable and avoid significant adverse effects by:-

- Ensuring new equipment is quieter than existing equipment
- Limiting change in noise level to 1dB or less

9.15 No equipment is proposed to operate at night ensuring critical protection of residential bedrooms at night is maintained.

9.16 Further mitigation will apply as the units will not operate for the full operating periods and full operation is not expected to be sustained for large proportions of a week. There will be significant quiet periods without use.

9.17 In general, the equipment is not expected to be tonal or otherwise distinctive in the context of an environment already subject to building services mechanical equipment noise. The new equipment is expected to achieve the -5dB criterion for equipment without acoustic distinctiveness and be quieter than necessary for reasonable conditions.

9.18 The LB of Camden criterion are achievable with a typical range of equipment and by a significant margin for the new equipment subject to the application.

Note – the assessment assumes continuous and simultaneous operation of all equipment as demonstration of the expected worst case for noise generation.

10.0 Existing Equipment

10.1 Where existing equipment exists, is permitted or clearly long-established, then the noise emissions are taken into account in Section 9.0. Existing equipment is considered in:-

- Determining existing background and ambient sound levels
- Determining the maximum sound levels permissible

10.2 The over-riding objective is to make the existing situation no worse in terms of subjective impact.

10.3 The investigations and assessment do not take account of an underlying background noise level in the absence of existing equipment unless the equipment is:-

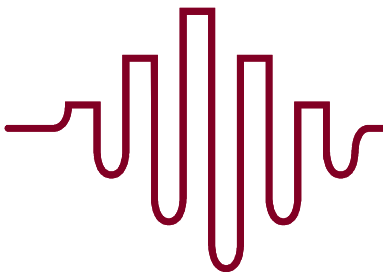
- Not permitted
- Causing a nuisance or disturbance demonstrated by complaints

10.4 In other words, the existing equipment forms an element of the prevailing noise climate at the application site and is treated as such.

10.5 The equipment in the area is of a type that would normally be subject to permission.

10.6 The noise emissions, whilst audible, are quiet and are unlikely to be sufficient to cause a nuisance or disturbance.

10.7 The proposed equipment is designed and selected to attain modern noise emissions standards and comply with a stringent general level of noise emission. Modern standards of cleaning and maintenance are more likely to maintain these noise conditions compared to past approaches.



11.0 Other Mitigation Measures

11.1 In addition to the attenuators listed in the equipment schedule, there are several key noise mitigation measures proposed:-

- SF01 to be located inside ground floor
- SF01 to have primary and secondary attenuators
- EF01 fan to incorporate acoustic jacket casing to reduce casing breakout noise
- EF01 to have upstream and downstream attenuators
- Ductwork to be acoustically lagged in polymeric sound barrier mat (surface mass 10kg/m^2) on 50-75mm mineral fibre (density 65kg/m^3) including fan connections, attenuators, filters and attenuators
- Each section of ductwork, filters and fans to be vibration-isolated using pads, mounts or hangers capable of attaining 97-99% isolation efficiency at key fan and motor rotational frequency under load
- Condensers C1 and C2 to be vibration-isolated using pads, mounts or hangers capable of attaining 97-99% isolation efficiency at key fan and motor rotational frequency under load
- Equipment containing fans and motors to have different isolation to other parts of system
- Use of stabilised “jumbo foot” frames and supports

11.2 The estimated performance of the vibration isolation treatment required is:-

- EF01 1465rpm 24Hz Approx. 10-15mm static deflection spring, pad or LDS mount under point load
- SF01 1128/1383rpm 19-23Hz Approx. 10-15mm static deflection pad or LDS mount or hanger under point load
- Ductwork Use 5-10mm static deflection pads, mounts or hangers (includes any filter sections)
- Other fans use 5-10mm static deflection pads, mounts or hangers
- Condenser units Use 7-10mm static deflection pads, mounts or hangers

11.3 No element of the main ductwork systems or mechanical equipment at roof level shall be unisolated.

11.4 The isolation shall not rely solely on the jumbo feet rubber pads unless static deflection and isolation performance can be demonstrated. Isolation between fans and supporting frame is recommended.

12.0 Conclusions

12.1 Aulos Acoustics has completed an investigation of the environmental noise exposure expected due to the proposed food innovation centre at 12 Charlotte Mews, London W1T 4EQ. A notional, typical mechanical equipment schedule has been used in the investigation.

12.2 A moderate performance noise and vibration control package is included and the location of equipment is determined to minimise noise impact. Ducted fans will be located outside. Constraints of space and efficient layout mean that internal location of main fans is not feasible. There will be no external catering refrigeration.

12.3 Noise and vibration control measures include anti-vibration mountings to all equipment and attenuators to main fans. Where unattenuated ducts, connections, attenuators or fan casings are used externally, acoustic lagging will be applied on all unattenuated sections.

12.4 The installation has been checked for impact against reasonable noise criteria and LPA criteria, whether these are lower or higher.

12.5 Risk assessments have been completed to determine if a site requires investigation incorporating a full detailed assessment, noise surveys and secondary noise control, or if a desktop review is sufficient. LB of Camden requires a specific review.

12.6 The new, proposed mechanical equipment is capable of achieving reasonable noise levels at the assumed residential premises to the north-west. Negligible impact is expected on residential receivers nearby, under normal and reasonable operating conditions.

12.7 When assessing against the requirements of LB Camden, the proposed installation is expected to achieve a sound level at least 10dB below the minimum background sound level during the day, evening or night.

12.8 This provides significant margin compared to the criterion of 5dB below background level for equipment without distinctive acoustic features, in terms of both the overall sound level and the operating times.

12.9 No night-time operation of new mechanical equipment is proposed. Catering refrigeration will be maintained inside the building.

12.10 No significant adverse effect is expected and negligible impact applies.

12.11 The proposed new mechanical equipment installation is expected to have negligible impact on residential amenity due to environmental noise even if:-

- Full day and evening period of 07.00-23.00h is taken into account
- A substantial range of ventilation and refrigeration equipment is assessed
- Only moderate attenuation and noise-vibration control is included
- All equipment is located at roof level and in sight of the residential use

12.12 Any variation to the equipment selections will need to be reviewed and confirmed. Technical design of the noise-vibraton control package will be necessary.

12.13 Further attenuation of existing equipment is not proposed.

12.14 In the context of the NPPF, PPG – Noise and the summarised description of impact in Table 2 above, the perception of the new equipment sound is expected to be “Not noticeable” or “Noticeable and not intrusive”. There is expected to be either no effect acoustically or no adverse effect. Significant effects are avoided and the impact is minimised through the use of noise and vibration control measures.

James Tomalin MIOA

Author

Consultant	James Tomalin	Director	**Date**	20/12/2017
Qualifications	MIOA	Corporate Member Institute of Acoustics		
Experience	Building acoustics; building services acoustics; environmental acoustics			
Length	29 years			
Profile	LinkedIn profile			

Location

12 Charlotte Mews, London W1T 4EQ

Equipment

Norsonic NOR140 Real time analyser Set 1664447

Tests

Standard(s)	BS7445 (parts as UK)	with reference to BS4142:2014 as appropriate
Source Type(s)	Environmental noise	
	HVAC Mechanical Noise	
Measurement	Continuous 15-minute sample	

Sources

HVAC mechanical noise determining factor
Traffic and street noise significant contribution
Interference by construction during day

Weather

		Day 1	Night 1	Day 2	Night 2
Temperature, °C		1-7	7-9	7-9	N/A
Wind Speed, m/s	<4	1.5-4.6	4.1-7.7	3.6-6.7	N/A

See more detailed reference data for London City Airport

Precipitation, mm	Minor at night	Streets dry on second day but puddles remain in sheltered areas
Cloud cover	Varied but not substantive	

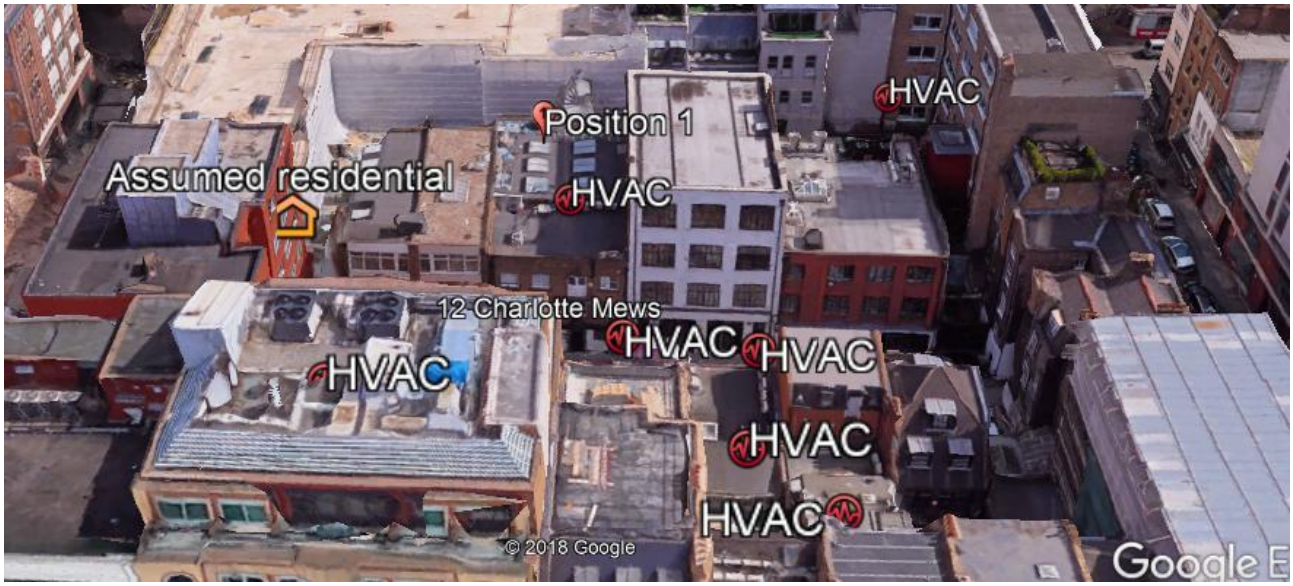
Sheltered location displayed low wind speeds and isolation from road traffic noise. Wet road noise not significant.

Survey

Start	12 December 2017 11.00h
Finish	13 December 2017 11.15h
Type	Environmental noise; planning grade
Comment	Good conditions other than construction noise interference

Measurement & Equipment Location View


HVAC
Assumed residential
HVAC
HVAC
HVAC
HVAC
Position 1
HVAC
12 Charlotte Mews
HVAC


Position 1
HVAC
Assumed residential
HVAC
12 Charlotte Mews
HVAC
HVAC
HVAC
HVAC
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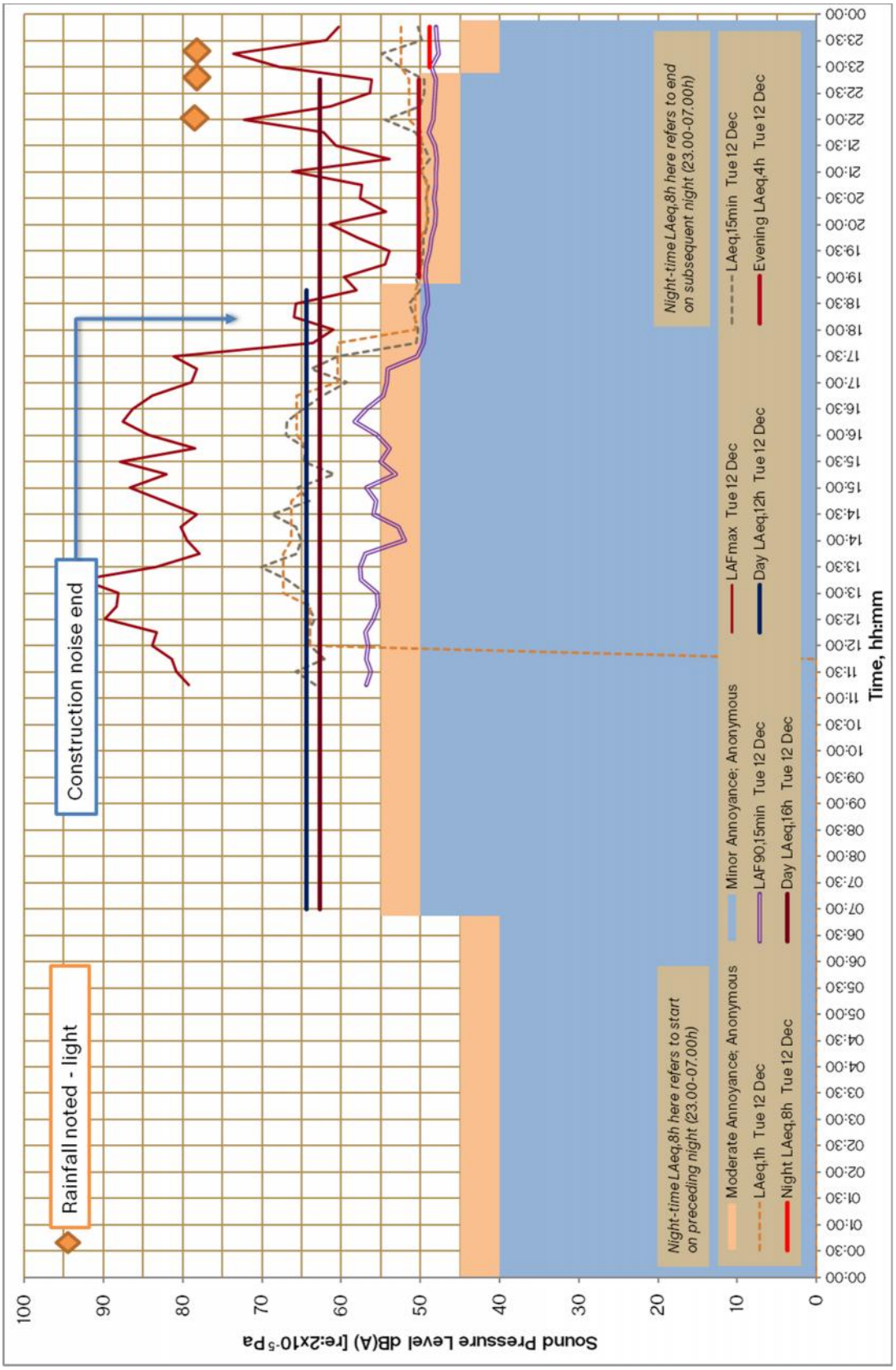
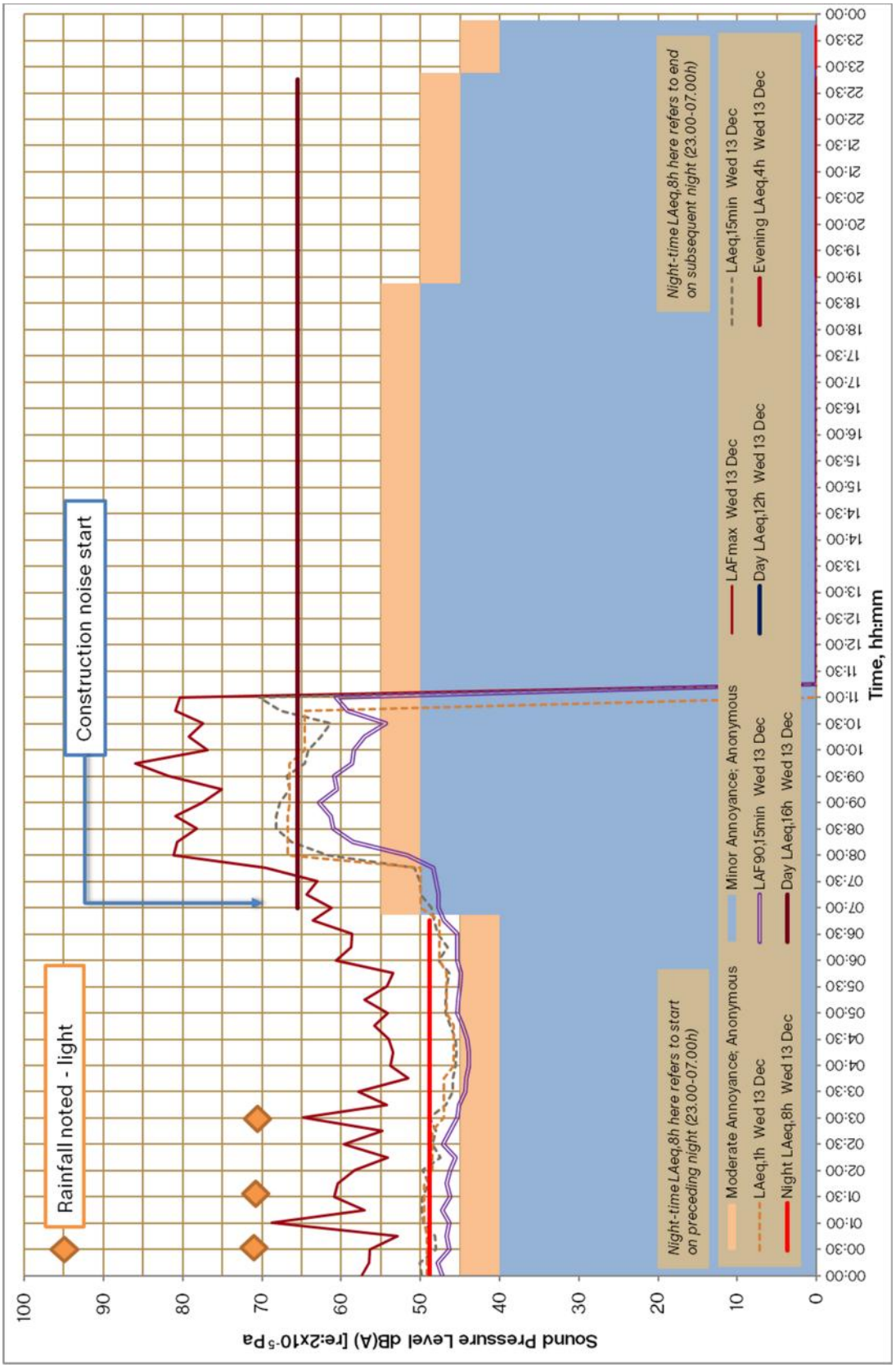
Background Sound Level $L_{A90,T}$

Period	1 Tue 12 Dec LAF90,15min Lowest	2 Wed 13 Dec LAF90,15min Lowest	
07.00-19.00	49.1	47.7	dB
19.00-23.00	47.9		dB
23.00-07.00	43.9		dB
09.00-23.00	47.9	54.3	dB
09.00-00.00	47.7	54.3	dB
09.00-01.00	46.4	54.3	dB
	LA90,1h est Lowest	**LA90,1h est Lowest**	
07.00-19.00	49.3	48.0	dB
19.00-23.00	48.2		dB
23.00-07.00	44.2		dB
09.00-23.00	48.2	57.6	dB
09.00-00.00	48.1	57.6	dB
09.00-01.00	47.1	57.6	dB

Ambient Sound Level L_A

Period	1 Tue 12 Dec LAeq,15min T Average	2 Wed 13 Dec LAeq,15min T Average	
07.00-19.00	64.4	65.4	dB
19.00-23.00	50.2		dB
23.00-07.00	48.8		dB
09.00-23.00	62.7	66.5	dB
09.00-00.00	62.4	66.5	dB
09.00-01.00	62.1	66.5	dB
	LAeq,1h T Average	**LAeq,1h T Average**	
07.00-19.00	64.4	65.4	dB
19.00-23.00	50.2		dB
23.00-07.00	48.8		dB
09.00-23.00	62.7	66.5	dB
09.00-00.00	62.4	66.5	dB
09.00-01.00	62.1	66.5	dB


Sound Pressure Level dB(A) [re:2x10-5Pa
Time, hh:mm
Construction noise end
Rainfall noted - light
Night-time LAeq,8h here refers to start on preceding night (23.00-07.00h)
Night-time LAeq,8h here refers to end on subsequent night (23.00-07.00h)
Moderate Annoyance; Anonymous
Minor Annoyance; Anonymous
LAeq,1h Tue 12 Dec
LAF90,15min Tue 12 Dec
LAeq,15min Tue 12 Dec
Night LAeq,8h Tue 12 Dec
Day LAeq,16h Tue 12 Dec
Day LAeq,12h Tue 12 Dec
Evening LAeq,4h Tue 12 Dec
LAFmax Tue 12 Dec


Sound Pressure Level dB(A) [re:2x10-5Pa
Time, hh:mm
Rainfall noted - light
Construction noise start
Night-time LAeq,8h here refers to start on preceding night (23.00-07.00h)
Night-time LAeq,8h here refers to end on subsequent night (23.00-07.00h)
Moderate Annoyance; Anonymous
Minor Annoyance; Anonymous
LAeq,1h Wed 13 Dec
LAF90,15min Wed 13 Dec
Night LAeq,8h Wed 13 Dec
Day LAeq,16h Wed 13 Dec
LAFmax Wed 13 Dec
Day LAeq,12h Wed 13 Dec
LAeq,15min Wed 13 Dec
Evening LAeq,4h Wed 13 Dec

Weather Conditions - London City Airport (unvalidated)

Date	12/12/2017						Date	13/12/2017					
Column1	Column2	Column3	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column9	Column1	Column11	Column12
Time	RH %	Temp C	Pmsl, hPA	Wind m/s	Wind degs	Notes	Time	RH %	Temp C	Pmsl, hPA	Wind m/s	Wind degs	Notes
	100	15	1050	15	360			100	15	1050	15	360	
01:50	80	0	1001	2.6	247.5		01:50	87	8	1002	6.2	180.0	Moderate rain
02:50	80	1	1002	5.7	225.0		02:50	87	9	1001	6.2	180.0	Moderate rain
03:20	80	0	1003	4.6	270.0		03:50	87	9	1000	6.7	202.5	Moderate rain
03:50	80	0	1003	3.6	270.0		04:20	87	9	1000	5.1	270.0	
04:50	80	0	1005	3.1	270.0		04:50	87	9	1000	6.2	270.0	
05:50	80	0	1005	2.6	270.0		05:20	81	9	1000	7.7	225.0	
06:50	86	-1	1006	4.1	202.5		05:50	81	8	1000	6.2	225.0	
07:20	86	-1	1007	3.1	270.0		06:50	81	7	1001	5.1	270.0	
07:50	80	0	1007	4.6	270.0		07:50	81	7	1000	4.1	270.0	
08:20	86	-1	1008	4.6	270.0		08:50	81	7	1000	6.7	202.5	Moderate rain
08:50	80	0	1009	4.1	202.5		09:50	81	8	999	6.2	270.0	Moderate rain
09:20	80	0	1009	5.1	202.5		10:50	87	8	998	3.6	202.5	Moderate rain
09:50	80	0	1009	3.6	202.5		11:50	81	9	996	5.1	202.5	Moderate rain
10:50	80	1	1010	3.1	270.0		12:50	81	9	995	5.7	202.5	Moderate rain
11:50	74	3	1009	3.1	270.0		13:50	81	10	992	6.2	202.5	
12:50	75	4	1010	3.6	270.0		14:20	81	10	991	6.7	202.5	
13:50	70	5	1010	3.1	270.0		14:50	81	10	991	7.7	202.5	
14:20	70	5	1009	3.1	202.5		15:50	81	9	990	11.8	225.0	Moderate rain
14:50	75	4	1010	3.6	270.0		16:20	81	8	991	7.7	225.0	Moderate rain
15:50	75	4	1010	3.6	180.0		16:50	70	8	991	8.2	225.0	
16:50	75	4	1010	2.1	202.5		17:20	70	7	991	8.7	225.0	
17:50	75	4	1010	1.5	202.5		17:50	70	6	991	9.3	225.0	
18:20	75	4	1009	2.6	180.0		18:20	70	6	991	7.2	270.0	
18:50	75	5	1009	3.6	112.5		18:50	75	5	991	7.2	270.0	
19:50	75	6	1009	4.6	180.0		19:20	80	5	991	6.2	270.0	
20:50	75	6	1008	4.6	180.0		19:50	80	5	991	6.2	270.0	
21:50	75	7	1007	4.6	112.5	Moderate rain	20:50	75	6	990	6.7	270.0	Moderate rain
22:50	81	7	1006	4.1	180.0	Moderate rain	21:20	86	4	989	9.3	270.0	
23:50	87	7	1005	4.6	180.0	Moderate rain	21:50	86	4	989	5.7	270.0	
00:50	87	8	1004	4.1	180.0	Moderate rain	22:20	80	5	989	9.8	270.0	Moderate rain
							22:50	80	5	990	11.3	270.0	Moderate rain
							23:50	70	5	991	10.3	225.0	
							00:50	75	4	992	9.8	270.0	

Appendix A.2- Food Innovation Centre – Mechanical Equipment

Reference shall be made to the full Equipment Schedule which details status of equipment, internal equipment and attenuation details.

New Equipment Schedule

Ref	Location	Description	Main Time From	To	Control	On	Type
EF01	Front	General Extract Fan	08:00	23:00	Time	100%	Helios GBD 710/4
EF02	Roof	Toilet Extract Fan	08:00	23:00	Time	100%	Helios GX/150
SF01	Roof	Supply AHU	08:00	23:00	Time	100%	Helios GBD 630/4/4
C3	Rear	Chiller	-	-	-	70%	Not proposed
C4	Rear	Freezer	-	-	-	70%	Not proposed
C1	Roof	Condensing Unit	08:00	23:00	Time	70%	Mitsibushi Existing PUMY-P140VKM1
C2	Roof	Condensing Unit	08:00	23:00	Time	70%	Mitsibushi ExistingPUMY-P200YKM
SF02	Front	Supply Fan	08:00	23:00	Time	100%	Helios HVR 150/2 E

xx01 *Subject to application*

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

Main Time Are the primary operating times. Units are either timed or occupancy controlled.
Outdoor 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
EF02	Outlet	Open Lw	52	49	47	49	49	48	45	40	38	c
EF01	Outlet	Open Lw	87	81	86	81	85	83	79	71	63	d
EF01	Casing	Unit Lw	70.1	78	82	76	60	55	51	46	41	
SF01	Inlet	Open Lw	78	79	84	78	75	71	70	67	63	d
SF02	Casing	Unit Lw	65.2	76	80	62	56	52	49	45	41	
C1	Unit	Unit Lp @ 1 m Heat	53	*59*	*60*	*50*	*52*	*46*	*42*	*36*	*31*	b
C1	Unit	Unit Lp @ 1 m	51	*64*	*52*	*51*	*50*	*45*	*40*	*33*	*28*	
C2	Unit	Unit Lp @ 1 m Heat	61	64	61	61	58	57	52	49	41	b
C2	Unit	Unit Lp @ 1 m	56	*65*	*59*	*54*	*53*	*52*	*47*	*41*	*35*	
SF02	Inlet	Open Lw	65	62	60	62	62	61	58	53	51	c

xx01 Fully published / supplied data unless otherwise stated.

a *Internal self-contained refrigeration is proposed for catering equipment*

b *Spectra for condenser under heating duty. A-weighted value is published value.*

c *Spectra estimated from Beranek basic axial correction*

d *Corrected for A-weighting stated in issued data*

NB: all equipment is primary final selection and only minor amendment is expected before installation.

Full Schedule of Pizza Express Equipment

Appendix B.1- Calculation Standard Attenuation to Resident

All Pizza Express Equipment – New & Existing

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**	
EF01	**Outlet**	Open Lw	87	81	86	81	85	83	79	71	63	
Losses	**Attenuator**	**RDS 710/1200mm L**		-3	-5	-10	-14	-13	-13	-10	-7	Limited
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			70.1	76	79	68	66	65	61	56	51	
SF01	**Inlet**	Open Lw	78	80	84	78	75	71	70	67	63	
Losses	**Attenuator**	**RDS 630/1200mm L x 2**		-6	-10	-20	-32	-30	-30	-22	-16	
	Coils, Plenum, Filters			-2	-3	-5	-7	-8	-8	-9	-9	
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5	
Radiated Lw			53.8	70	69	50	31	28	27	31	33	
EF02	**Outlet**	Open Lw	52	49	47	49	49	48	45	40	38	
Losses	**None**			0	0	0	0	0	0	0	0	
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			47.5	47	45	46	44	43	40	35	33	
SF02	**Inlet**	Open Lw	65	62	60	62	62	61	58	53	51	
Losses	None			0	0	0	0	0	0	0	0	
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			60.5	60	58	59	57	56	53	48	46	
C1	**Intake**	Unit Lp @ 1 m Heat	53	59	60	50	52	46	42	36	31	
Losses	Correction to Lw; Q=2			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			60.7	67.0	68	58	60	54	50	44	39	
C2	**Intake**	Unit Lp @ 1 m Heat	61	64	61	61	58	57	52	49	41	
Losses	Correction to Lw; Q=2			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			69.2	72.0	69	69	66	65	60	57	49	
Combined	Operating	Radiated Lw	73.3	78.6	80.1	72	69.8	68.4	64.1	60	54.1	
Combined	Overnight	Radiated Lw	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
r	20 m		**Minimum distance to residential in nearest block**									
-20 lg r			-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	
-11			-11	-11	-11	-11	-11	-11	-11	-11	-11	
Q	2		3	3	3	3	3	3	3	3	3	

Sound Level at Residential

Combined	Operating	Lp	**39.2**	44.5	46.1	38.0	35.8	34.4	30.1	26.0	20.1
Combined	Overnight	Lp	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Above are Specific Noise Level Uncorrected to Residential Positions during Operating Time and Overnight / 24 hours.

The above would place all units below minimum daytime and evening background sound level.
There is a marginal increase on existing condensers C1 & C2 noise levels and levels are below noise levels for all condensers

RDS 710/ 600+1200mm L	-4	-7	-12	-16	-16	-16	-13	-8
RDS 710/600mm L	-2	-3	-5	-7	-7	-7	-6	-4
RDS 710/1200mm L	-3	-5	-10	-14	-13	-13	-10	-7

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**		
EF01	**Outlet**	Open Lw	87	81	86	81	85	83	79	71	63		
Losses	**Attenuator**	**RDS 710/1200mm L**		-3	-5	-10	-14	-13	-13	-10	-7	Limited	
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5		
	Screening	None		0	0	0	0	0	0	0	0		
Radiated Lw			70.1	76	79	68	66	65	61	56	51		
SF01	**Inlet**	Open Lw	78	80	84	78	75	71	70	67	63		
Losses	**Attenuator**	**RDS 630/1200mm L x 2**		-6	-10	-20	-32	-30	-30	-22	-16		
	Coils, Plenum, Filters			-2	-3	-5	-7	-8	-8	-9	-9		
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5		
Radiated Lw			53.8	70	69	50	31	28	27	31	33		
EF02	**Outlet**	Open Lw	52	49	47	49	49	48	45	40	38		
Losses	**None**			0	0	0	0	0	0	0	0		
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5		
	Screening	None		0	0	0	0	0	0	0	0		
Radiated Lw			47.5	47	45	46	44	43	40	35	33		
SF02	**Inlet**	Open Lw	65	62	60	62	62	61	58	53	51		
Losses	None			0	0	0	0	0	0	0	0		
	Other	**Directivity 90°**		-2	-2	-3	-5	-5	-5	-5	-5		
	Screening	None		0	0	0	0	0	0	0	0		
Radiated Lw			60.5	60	58	59	57	56	53	48	46		

Combined	Operating	Radiated Lw	70.7	77.1	79.4	68.6	66.5	65.5	61.7	56.7	52.3
Combined	Overnight	Radiated Lw	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
r	25	m	**Minimum distance to residential in nearest block**								
-20 lg r			-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
-11			-11	-11	-11	-11	-11	-11	-11	-11	-11
Q	2		3	3	3	3	3	3	3	3	3

Sound Level at Residential

Combined	Operating	Lp	**34.7**	41.1	43.5	32.7	30.6	29.6	25.7	20.7	16.3
Combined	Overnight	Lp	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Above are Specific Noise Level Uncorrected to Residential Positions during Operating Time and Overnight / 24 hours.
The above would place all units below minimum daytime and evening background sound level.

New Pizza Express Equipment Only – Casing & Duct Breakout – No attenuators

Calculation to Outside __ Breakout & Casing Breakout

				Level [dB re 2x10-6 Pa] @Octave Band Mid Frequency [Hz]									
Ref			**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**		
EF01	**Casing**	Unit Lw	70.1	78	82	76	60	55	51	46	41		
Losses	**Casing**	**Helios Jacket**		-12	-18	-24	-32	-34	-35	-35	-35	Limited	
	Other			0	0	0	0	0	0	0	0		
	Screening	None		0	0	0	0	0	0	0	0		
Radiated Lw			49.7	66	64	52	28	21	16	11	6		
SF01	**Casing**	Not applicable. Indoor unit											
Losses													
Radiated Lw													
EF01	**Outlet**	Open Lw	87	81	86	81	85	83	79	71	63		
Losses	**Duct R**	**Rolled circular**		-20	-25	-25	-20	-22	-30	-28	-31	Limited	
	X Area, m2	**0.407150408**		9.47	9.47	9.47	9.47	9.47	9.47	9.47	9.47		
	Surface, m2	3.6											
Radiated Lw			74.3	70.5	70.5	65.5	74.5	70.5	58.5	52.5	41.5		
Losses	Silencer	**RDS 710/1200mm L**											
	Lagging	10kg/sq.m polymeric		-6	-7	-8	-11	-11	-8	-8	-8		
Radiated Lw			63.6	64.5	63.5	57.5	63.5	59.5	50.5	44.5	33.5		
SF01	**Inlet**	Open Lw	78	79	84	78	75	71	70	67	63		
Losses	**Duct R**	**Rolled circular**		-20	-25	-25	-20	-22	-30	-28	-31	Limited	
	X Area, m2	**0.25**		10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3		
	Surface, m2	2.638937829											
Radiated Lw			65.2	69.3	69.3	63.3	65.3	59.3	50.3	49.3	42.3		
Losses	Silencer	**RDS 630/1200mm L**											
	Bend	Radius 560		0	0	-1	-2	-3	-3	-3	-3		
	Lagging	10kg/sq.m polymeric		-6	-7	-8	-11	-11	-8	-8	-8		
	Screen	Line sight assumed		-5	-5	-5	-5	-5	-5	-5	-5		
Radiated Lw			48.4	58.3	57.3	49.3	47.3	40.3	34.3	33.3	26.3		
Combined	Operating	Radiated Lw	63.9	68.7	67.2	59	63.6	59.5	50.6	44.8	34.2		
Combined	Overnight	Radiated Lw	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
r	25	m	**Minimum distance to residential in nearest block**										
-20 lg r			-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0		
-11			-11	-11	-11	-11	-11	-11	-11	-11	-11		
Q	2		3	3	3	3	3	3	3	3	3		

Sound Level at Residential

Combined	Operating	Lp	**28.0**	32.8	31.3	23.1	27.6	23.6	14.6	8.8	-1.7
Combined	Overnight	Lp	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sound Level at Residential - with Breakout

Combined	Operating	Lp	**35.6**	41.7	43.8	33.1	32.4	30.6	26.0	21.0	16.4
Combined	Overnight	Lp									

Above are Specific Noise Level Uncorrected to Residential Positions during Operating Time and Overnight / 24 hours.

The above would place all units below minimum daytime and evening background sound level.

Existing Condenser C1 & C2 Noise

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**
EF01												
Losses												
Radiated Lw												
SF01												
Losses												
Radiated Lw												
EF02												
Losses												
Radiated Lw												
SF02												
Losses												
Radiated Lw												
C1	**Intake**	Unit Lp @ 1 m Heat	53	59	60	50	52	46	42	36	31
Losses	Correction to Lw; Q=2			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	Screening	None		0	0	0	0	0	0	0	0
Radiated Lw			60.7	67.0	68	58	60	54	50	44	39
C2	**Intake**	Unit Lp @ 1 m Heat	61	64	61	61	58	57	52	49	41
Losses	Correction to Lw; Q=2			8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	Screening	None		0	0	0	0	0	0	0	0
Radiated Lw			69.2	72.0	69	69	66	65	60	57	49
Combined	Operating	Radiated Lw	69.8	73.2	71.5	69.3	67	65.3	60.4	57.2	49.4
Combined	Overnight	Radiated Lw	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
r	18	m	**Minimum distance to residential in nearest block**								
-20 lg r			-25.1	-25.1	-25.1	-25.1	-25.1	-25.1	-25.1	-25.1	-25.1
-11			-11	-11	-11	-11	-11	-11	-11	-11	-11
Q	2		3	3	3	3	3	3	3	3	3

Sound Level at Residential

Combined	Operating	Lp	**36.7**	40.1	38.4	36.2	33.9	32.2	27.3	24.1	16.3
Combined	Overnight	Lp	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Above are Specific Noise Level Uncorrected to Residential Positions during Operating Time and Overnight / 24 hours.

The above would place all units below minimum daytime and evening background sound level.
Existing noise level only marginally lower than proposed.

Existing Condensers C1 & C2 and Others - estimated

Calculation to Outside - Existing All Condensers (estimate)

				Level [dB re 2x10-6 Pa] @Octave Band Mid Frequency [Hz]								
Ref			**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Condensers "3 & 4"		Unit Lp @ 1 m Heat	53	59	60	50	52	46	42	36	31	
Losses		Correction to Lw; Q=2		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
	N = 2			3	3	3	3	3	3	3	3	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			63.7	70.0	71.0	61.0	63.0	57.0	53.0	47.0	42.0	
Condensers "5 & 6"		Unit Lp @ 1 m Heat	61	64	61	61	58	57	52	49	41	
Losses		Correction to Lw; Q=2		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
	N = 2			3	3	3	3	3	3	3	3	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			72.2	75.0	72.0	72.0	69.0	68.0	63.0	60.0	52.0	
EF02												
Losses												
Radiated Lw												
SF02												
Losses												
Radiated Lw												
C1	**Intake**	Unit Lp @ 1 m Heat	53	59	60	50	52	46	42	36	31	
Losses		Correction to Lw; Q=2		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			60.7	67.0	68.0	58.0	60.0	54.0	50.0	44.0	39.0	
C2	**Intake**	Unit Lp @ 1 m Heat	61	64	61	61	58	57	52	49	41	
Losses		Correction to Lw; Q=2		8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
	Screening	None		0	0	0	0	0	0	0	0	
Radiated Lw			69.2	72.0	69.0	69.0	66.0	65.0	60.0	57.0	49.0	
Combined	Operating	Radiated Lw	74.5	78	76.3	74.1	71.7	70.1	65.2	62	54.2	
Combined	Overnight	Radiated Lw	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
r	20	m	**Minimum distance to residential in nearest block**									
-20 lg r			-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0	
	-11		-11	-11	-11	-11	-11	-11	-11	-11	-11	
Q	2		3	3	3	3	3	3	3	3	3	

Sound Level at Residential

Combined	Operating	Lp	**40.5**	43.9	42.3	40.1	37.7	36.1	31.2	28.0	20.2
Combined	Overnight	Lp	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Above are Specific Noise Level Uncorrected to Residential Positions during Operating Time and Overnight / 24 hours.
The above would place all units marginally below minimum daytime and evening background sound level.

Appendix C- Noise Impact Assessment [BS4142 & Planning]

BS4142:2014 Assessment Roof - Operating Time - Proposed

Existing		**dB**		**Page**		**Relevant clause**	
Measured ambient sound level		49		4		*7.3.2*	
Residual sound level LAeq,15min		50.2		4		*7.3.3*	
Background sound level LA90,15min		48		4		*8.3*	See Results
Assessment made based on night-time 15 min intervals						*7.2*	
Specific sound level	LAeq(15min)	34.7	35.6	4			
		Duct-radiated	Duct+casing+breakout				
To		**Position**		**R**			
Distance Correction	None						
Screening	Allowed For					dB	
Intermittent Operation	None					*7.3.14*	
On Time	Allowed For					dB	
Specific sound level corrected						*7.3.4*	
To		**Position**		**R**	**R**		
	Ls	dB		34.7	35.6		
Acoustic feature	Tonality	dB		0	0	*9.3*	No tonality shown
	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		34.7	35.6		
Rating Level	**Lr**	dB		**35**	**36**	*9.3.1*	Rounded once
Background sound level	LA90,T	dB		48	48		
Level Difference		dB		**-13**	**-12**	*11*	
7.3.3							
Assessment of impact		**R**		Negligible	Negligible	*11*	

Assessment indicates the residential or potential residential receivers are currently subject to a low risk of adverse impact
In normal circumstances and in context, this relates to negligible impact.

Uncertainty

Measurement	A small degree of uncertainty exists due to the time period and constraints on the survey period
Calculation	Uncertainty is minor - large differences below background noise and excluding complex corrections
	Allowances ignored: No directivity correction. No screening to EF01.
Features	Context is one of prevalent mechanical equipment & an existing installation.
Rating	Minor - evening measured LA90,T up to 23.00h is taken in assessment; not all items will operate as late

Local Planning Outcome

The examples of proposed equipment meets the requirements of the LB Camden planning policy for noise from mechanical equipment being more than 5dB(A) below background noise level at residential positions (equipment without significant tonal or other character). NB: the equipment meets the LBC requirement for tonal equipment of 10dB(A) below background level. The targeted 10dB(A) below is to ensure there is contingency within the assessment for variation in conditions.

BS4142:2014 Assessment Roof - Operating Time - Existing Condensers C1 & C2

Existing			dB		Page	Relevant clause	
Measured ambient sound level			49		4	*7.3.2*	
Residual sound level LAeq,15min			50.2		4	*7.3.3*	
Background sound level LA90,15min			48		4	*8.3*	See Results
Assessment made based on night-time 15 min intervals						*7.2*	
Specific sound level		LAeq(15min)	39.2		4		

To		Position		R			
Distance Correction	None						
Screening	Allowed For					dB	
Intermittent Operation	None					*7.3.14*	
On Time	Allowed For					dB	
Specific sound level corrected						*7.3.4*	
To		**Position**		**R**			
	Ls	dB		39.2			
Acoustic feature	Tonality	dB		0		*9.3*	No tonality shown
	Impulsivity	dB		0		*9.2*	None
	Other	dB		0		*9.2*	No distinctiveness
	Intermittency	dB		0		*9.2*	No distinctiveness
	Lr,full	dB		39.2			
Rating Level	**Lr**	dB		**39**		*9.3.1*	Rounded once
Background sound level	LA90,T	dB		48			
Level Difference		dB		**-9**		*11*	
7.3.3							
Assessment of impact			**R**	Negligible impact		*11*	

Assessment indicates the residential or potential residential receivers are currently subject to a low risk of adverse impact
In normal circumstances and in context, this relates to negligible impact.

Uncertainty	
Measurement	A small degree of uncertainty exists due to the time period and constraints on the survey period
Calculation	Uncertainty is minor - large differences below background noise and excluding complex corrections
	Allowances ignored: No directivity correction. No screening to SF01.
Features	Context is one of prevalent mechanical equipment & an existing installation.
Rating	Minor - evening measured LA90,T up to 23.00h is taken in assessment; not all items will operate as late

Local Planning Outcome

The examples of proposed equipment meets the requirements of the LB Camden planning policy for noise from mechanical equipment being more than 10dB(A) below background noise level at residential positions

BS4142:2014 Assessment Roof - Operating Time - Existing All Condensers

Existing			dB		Page	Relevant clause	
Measured ambient sound level			49		4	*7.3.2*	
Residual sound level LAeq,15min			50.2		4	*7.3.3*	
Background sound level LA90,15min			48		4	*8.3*	See Results
Assessment made based on night-time 15 min intervals						*7.2*	
Specific sound level		LAeq(15min)	39.2		4		

To		**Position**		**R**			
Distance Correction	None						
Screening	Allowed For					dB	
Intermittent Operation	None					*7.3.14*	
On Time	Allowed For					dB	
Specific sound level corrected						*7.3.4*	
To		**Position**		**R**			
	Ls		dB	39.2			
Acoustic feature	Tonality		dB	0		*9.3*	No tonality shown
	Impulsivity		dB	0		*9.2*	None
	Other		dB	0		*9.2*	No distinctiveness
	Intermittency		dB	0		*9.2*	No distinctiveness
	Lr,full		dB	39.2			
Rating Level	**Lr**		dB	**39**		*9.3.1*	Rounded once
Background sound level	LA90,T		dB	48			
Level Difference			dB	**-9**		*11*	
7.3.3							
Assessment of impact			**R**	Negligible impact		*11*	

Assessment indicates the residential or potential residential receivers are currently subject to a low risk of adverse impact
In normal circumstances and in context, this relates to negligible impact.

Uncertainty	
Measurement	A small degree of uncertainty exists due to the time period and constraints on the survey period
Calculation	Uncertainty is minor - large differences below background noise and excluding complex corrections
	Allowances ignored: No directivity correction. No screening to SF01.
Features	Context is one of prevalent mechanical equipment & an existing installation.
Rating	Minor - evening measured LA90,T up to 23.00h is taken in assessment; not all items will operate as late

Local Planning Outcome

The examples of proposed equipment meets the requirements of the LB Camden planning policy for noise from mechanical equipment being more than 10dB(A) below background noise level at residential positions

BS4142:2014 Assessment Rear - Overnight

Existing			dB		Page	Relevant clause	
Measured ambient sound level			49		4	*7.3.2*	
Residual sound level LAeq,15min			50.2		4	*7.3.3*	
Background sound level LA90,15min			43.9		4	*8.3*	See Results
Assessment made based on night-time 15 min intervals						*7.2*	
Specific sound level		LAeq(15min)	0		4		

To		**Position**		**R**		
Distance Correction	None				dB	
Screening	Allowed For				*7.3.14*	
Intermittent Operation	None				dB	
On Time	Allowed For				*7.3.4*	
Specific sound level corrected						
To		**Position**		**R**		
	Ls	dB		0		
Acoustic feature	Tonality	dB		0	*9.3*	No tonality shown
	Impulsivity	dB		0	*9.2*	None
	Other	dB		0	*9.2*	No distinctiveness
	Intermittency	dB		0	*9.2*	No distinctiveness
	Lr,full	dB		0		
Rating Level	**Lr**	dB		**0**	*9.3.1*	Rounded once
Background sound level	LA90,T	dB		44		
Level Difference		dB		**-44**	*11*	
7.3.3						
Assessment of impact			**R**	Negligible impact	*11*	

Assessment indicates the residential or potential residential receivers are currently subject to a low risk of adverse impact
In normal circumstances and in context, this relates to negligible impact.

Uncertainty	
Measurement	A small degree of uncertainty exists due to the time period and constraints on the survey period
Calculation	Uncertainty is minor - large differences below background noise and excluding complex corrections
	Allowances ignored: No directivity correction. No screening to SF01.
Features	Context is one of prevalent mechanical equipment & an existing installation.
Rating	Minor - evening measured LA90,T up to 23.00h is taken in assessment; not all items will operate as late

Local Planning Outcome

The examples of proposed equipment meets the requirements of the LB Camden planning policy for noise from mechanical equipment being more than 10dB(A) below background noise level at residential positions

Appendix D - 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 time 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 E - 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.

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9. **World Health Organization.** *Guidelines for Community Noise.* SDE, PHE, OEH, WHO. Geneva : World Health Organization, 1999. Guidelines.

10. **World Health Organization Europe.** *Night Noise Guidelines for Europe.* Regional Office for Europe, WHO. Geneva : WHO, 2009. p. 154, Guidelines. ISBN 978 92 890 4173 7.

11. **BSI.** *BS4142:1997 'Method for rating industrial noise affecting mixed residential and industrial areas'.* EH/1, BSI. London : BSI, 1997. p. 20, Standard. ISBN 0 580 28300 3.

12. **HM Government.** *Calculation Of Road Traffic Noise: 1988.* DoT – Welsh Office, HM Government. London : HMSO, 1988. Calculation method. ISBN 0 11 550847 3.

13. **The Highways Agency et al.** *Design Manual for Roads and Bridges Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 7 HD 213/11 - Revision 1 Noise & Vibration.* London : Highways Agency et al, 2011. p. 65, Guidance. HD213/11.

DP POLICY

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:

a) visual privacy and overlooking;
b) overshadowing and outlook;
c) sunlight, daylight and artificial light levels;
d) noise and vibration levels;
e) odour, fumes and dust;
f) microclimate;
g) the inclusion of appropriate attenuation measures.

We will also require developments to provide:

h) an acceptable standard of accommodation in terms of internal arrangements, dwelling and room sizes and amenity space;
i) facilities for the storage, recycling and disposal of waste;
j) facilities for bicycle storage; and
k) outdoor space for private or communal amenity space, wherever practical.

DP POLICY

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	55dBL_{Aeq}