

# Acoustic and Odour Assessment for Proposed Cafe at 298 Gray's Inn Road, London, WC1X 8DX.

# Prepared for:

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#### 1. Introduction

1.1. Martin Environmental Solutions has been commissioned to undertake an acoustic and odour assessment to support a planning application for the conversion of the ground & Basement floors of 298 Gray's Inn Road, London WC1X 8DX to a café with associated extraction flue.

#### **Site Location and Context**

- 1.2. The development site is situated along the eastern side of Gray's Inn Road and forms a mid-terrace four storey property. Surrounding the site are a mixture of commercial, office and residential properties, with residential units to the upper floors of the building.
- 1.3. An aerial Photograph is enclosed in Figure 1.
- 1.4. It is the potential impact from the extraction system on the neighbouring properties that has prompted this report.



### 2. Policy and Guidance

#### **Noise**

- 2.1. The impact of noise can be a material consideration in the determination of planning applications. The planning system has the task of guiding development to the most appropriate locations. It is recognised that on occasions it will be difficult to reconcile some land uses, such as housing, hospitals, or schools, with other activities that generate high levels of noise. However, the planning system is tasked to ensure that, wherever practicable, noise-sensitive developments are separated from major sources of noise (such as road, rail and air transport and certain types of industrial development).
- 2.2. The Government's publication of the National Planning Policy Framework (NPPF), updated in July 2021, states that planning policies and decisions should prevent new and existing development from contributing to or being put at unacceptable risk from, of being adversely affected by unacceptable levels of noise pollution.
- 2.3. The Government have also issued the Noise Policy Statement for England (NPSE). The NPSE clarifies the Government's underlying principles and aims in relation to noise and sets a vision to promote good health and a good quality of life through the effective management of noise while having regard to the Government's sustainable development strategy. The NPSE aims to mitigate and minimise adverse impacts on health and quality of life through the effective management and control of noise.
- 2.4. The NPSE introduces the following terms, although no sound levels are given to represent these, many authorities have identified the sound level criteria in line with the World Health Organisation, BS8233:2014 and BS4142: 2014 levels. The terms introduced by the NPSE are:
  - NOEL No Observed Effect Level (<30dB(A)inside <50dB(A) outside, 10dB below background)
  - LOAEL Lowest Observed Adverse Effect Level (30-35dB(A) inside 50-55dB(A) outside, background to +5dB)
  - SOAEL Significant Observed Adverse Effect Level (>35dB(A) inside, >55dB(A) outside, >+10dB above background)
- 2.5. The sound levels within the brackets of the previous paragraph are those determined as appropriate levels to indicate the relevant effect levels represented by the NPSE.



- 2.6. Other commonly used examples of standards utilised by Local Planning authorities for the consideration of noise impacts include comparison of the likely noise levels to be experienced at a development, with levels that have been recommended by the World Health Organisation (WHO) as Guidelines for the prevention of Community Noise Annoyance and within BS8233: 2014.
- 2.7. The WHO recommended noise levels for outdoor amenity areas (gardens) that should not be exceeded are 55dB(A) L<sub>Aeq,16hr</sub> in order to avoid 'Serious Community Annoyance or 50dB(A) L<sub>Aeq,16hr</sub> to avoid 'Moderate Community Annoyance' during the day. For indoor levels WHO set 35dB(A) L<sub>Aeq,16hr</sub> during the day to prevent Moderate Annoyance and 30 dB(A) L<sub>Aeq,8hr</sub> at night to prevent sleep disturbance.
- 2.8. The WHO guidance also recommends that maximum sound levels at night should not regularly exceed 45dB(A) within bedrooms to prevent sleep disturbance. Regularly is considered to be more than 10 times during any 8-hour night-time period.
- 2.9. BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' also specifies desirable noise levels to be achieved inside dwellings.
- 2.10. BS 8233:2014 'Sound insulation and noise reduction for buildings Code of Practice' also specifies desirable noise levels to be achieved inside dwellings. BS 8233 presents two levels, the first between the hours of 07:00 23:00 and the second between 23:00 -07:00.
- 2.11. The daytime period suggests internal noise levels of 35dB L<sub>Aeq,16hr</sub>, for resting in living rooms and bedrooms while for night-time a level of 30dB LAeq,8hr is recommended. Criteria for external areas mirrors that within the WHO guidance.
- 2.12. Another commonly used standard is British Standard 4142:2014 'Method for rating industrial and commercial sound' compares the sound predicted by the source in question against the background, L<sub>A90</sub> sound levels.



- 2.13. The "residual" L<sub>Aeq</sub> measurement is then subtracted from the "ambient" L<sub>Aeq</sub> measurement (with the sound source) to calculate the sound level created by the "problem" sound alone -termed the "specific" sound level.
- 2.14. If the "problem" sound is tonal, such as whine or hum, or if it is impulsive such as bangs or clatters or if it is irregular enough to attract attention a correction is added to the "specific level" to produce the "rating level". The "background" L<sub>A90</sub> measurement is then compared against the "rating level".
- 2.15. If the "rating level" exceeds the "background" by around 10dB(A) or more this "indicates a significant adverse impact". A difference of around 5dB(A) 'indicates an adverse impact. The lower the commercial noise level is, the lower the likely impact. In addition, the published 'ProPG Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development' provides a 4-staged approach to undertaking a risk assessment in relation to anticipated sound levels at new residential development and the provision of mitigation measures. The guidance is principally aimed at sites exposed predominantly to noise from transportation sources.
- 2.16. In addition, the 'ProPG Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development' provides a 4-staged approach to undertaking a risk assessment in relation to anticipated sound levels at new residential development and the provision of mitigation measures. The guidance is principally aimed at sites exposed predominantly to noise from transportation sources.
- 2.17. The first stage consists of an initial noise risk assessment, based on indicative day and night-time *noise* levels. Simply put, the higher the ambient noise in an area the greater the impact. The levels given are shown below although it should be noted that these are in excess of both the Lancashire guidance, WHO and BS 8233: 2014.



Noise Risk Category*	Potential Effect if Unmitigated	Pre-Planning Application Guidance
0 – Negligible L <sub>Aeq,16hr</sub> <50dB L <sub>Aeq,8hr</sub> <40dB	May be noticeable but no adverse effect on health and quality of life	In this category the development is likely to be acceptable from a noise perspective, nevertheless a good acoustic design process is encouraged to improve the existing environment and/or safeguard against possible future deterioration and to protect any designated tranquil areas. A noise assessment may be requested to demonstrate no adverse impact from noise. Application need not normally be delayed on noise grounds.
1 – Low L <sub>Aeq,16hr</sub> 50-63dB L <sub>Aeq,8hr</sub> 40-55dB	Adverse effect on health and quality of life	In this category the development may be refused unless a good acoustic design process is followed and is demonstrated via a Level 1 Acoustic Design Statement which confirms how the adverse impacts of noise on the new development will be mitigated and minimised and that a significant adverse impact will not arise in the finished development. Planning conditions and other measures to control noise may be required.
2 – Medium L <sub>Aeq,16hr</sub> 63-69dB L <sub>Aeq,8hr</sub> 55-60dB L <sub>AFmax</sub> >80dB**	Significant adverse effect on health and quality of life	In this category the development is likely to be refused unless good acoustic design process is followed and is demonstrated via a Level 2 Acoustic Design Statement which confirms how the adverse impacts of noise on the new development will be mitigated and minimised, and clearly demonstrates that a significant adverse noise impact will not arise in the finished development. Planning conditions and other measures to control noise will normally be required.
3 - High L <sub>Aeq,16hr</sub> >69dB L <sub>Aeq,8hr</sub> >60dB L <sub>AFmax</sub> >80dB**	Unacceptable adverse effect of health and quality of life	In this category the development is very likely to be refused on noise grounds, even if a good acoustic design process is followed and is demonstrated via a Level 2 Acoustic Design Statement. Applicants are advised to seek expert advice on possible mitigation measures. Advice on the circumstances when the refusal of a new housing on noise grounds should normally be anticipated is included in the ProPG.

- 2.18. Stage 2, consists of a full assessment of the prevailing ambient noise and requires 4 elements to be considered:
  - I. Element 1 Good Acoustic Design
  - II. Element 2 Internal Noise Level Guidelines
  - III. Element 3 External Amenity Area Noise Assessment
  - IV. Element 4 Assessment of Other Relevant Issues
- 2.19. A good acoustic design is implicit in meeting the requirements of the NPPF and can help to resolve many potential acoustic issues.
- 2.20. Details of the criteria considered suitable are provided above for both internal and external sound levels. Element 4 includes such issues as local and national policy, likely occupants, wider planning objectives.



#### **Odour**

- 2.21. The Government sets out its policy in relation to planning in the National Planning Policy Framework (NPPF). The NPPF states that planning policies and decisions should "preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"; and "In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment"
- 2.22. While Odour is not specifically mentioned in is implied by the above and the Planning Practice Guidance (PPG) note issued by the government on Air Quality states "odour and dust can also be a planning concern, for example, because of the effects on local amenity" it continues to state, "mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact".
- 2.23. Before an odour can be present an adverse effect, there must be exposure to the odour and therefore a source, a pathway, and a receptor without these three links no exposure can occur. In the case of this application the source is the take-away. The pathway is the air, and the receptor are the occupants of the nearby existing dwellings.
- 2.24. In assessing the impact of odour on or from a development the scale of the exposure and therefore impact is determined by the parameters collectively known as the FIDO factors (Frequency, Intensity, Duration and Offensiveness) In addition the sensitivity of the receptor (location) will determine the magnitude of the exposure. Factors that influence the magnitude of a commercial odour problem include the size/volume of the cooking facility, the type of food being prepared, and the type of cooking appliances being used.
- 2.25. Furthermore, new and updated guidance on assessing the impact of extraction systems from commercial kitchens has been published by EMAQ 'Control of Odour and Nose from Commercial Kitchen Extraction Systems'. This is a revision of the 2005 guidance document 'Control of Odour and Nose from Commercial Kitchen Extraction Systems' produced by NETCEN and DEFRA which has been withdrawn.



2.26. This document details a methodology which should be followed to assess the potential impact from commercial kitchen extraction systems on nearby land uses and how to identify suitable control and mitigation measures as required.



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#### 3. The Assessment

#### The proposed development

- 3.1 The proposed restaurant will operate between 10:00-23:00 Monday-Sunday.
- 3.2 The site will occupy both the ground and basement floor of the building. As part of the development a new extraction system is to be installed to the rear of the site. Full details of the extraction system have not been determined. There will be no external areas to the development.
- 3.3 The adjacent properties consist of office accommodation to the north and residential accommodation to the west, south and east.

#### **Nearby Receptors**

- 3.4 On-site monitoring to established the current background sound levels for the area have not been undertaken, however given its city centre location along a busy A road the sound levels are unlikely to be extremely quiet. The guidance values within the identified guidance documents, detailed above, have therefore been utilised to determine a suitable sound level limit criterion for the development.
- 3.5 In line with BS4142 a review of the proposed extraction system, detailed below, has not identified any tonal element to the fan, it is also to be switched on throughout the operation of the site, being turned off at 23:00 and as such will not have any intermittent qualities to the sound emissions.
- 3.6 The identified criterion at the nearby receptors is there 50dB(A) within the garden and 35dB(A) inside.
- 3.7 The nearest residential property are the units above the development at a minimum distance of 4m from the extraction system to the nearest window. In addition, the rear garden of the property along Frederick Street to the east is 2m from the extraction system.

#### **Impact Assessment**

#### Noise

3.8 It is proposed that the extraction system be fitted with a Flaktwood 45JM/16/4/5/30 axial fan. The sound emissions from this unit have been obtained from the manufacturers and are provided within Appendix A.



3.9 These values have been used to calculate the sound level at the nearest identified receptors. This has identified the need to include a silencer after the fan to reduce the sound emissions below the identified criterion values. It is recommended that a Flaktwood BDER-61-050-120 silencer be fitted.

3.10 Appendix A contains a copy of the calculations undertaken but the resulting sound level at the window of the nearest noise sensitive premises is 28.2dB(A).

3.11 Given an open window provides 15dB attenuation<sup>1</sup> the resulting internal sound level within the properties will be 13.2dB(A) during the day. Significantly below the guideline criteria value of 35dB(A).

3.12 To the east the sound level will be 32.0dB(A), significantly below the recommended 50dB(A) criterion.

3.13 It is recommended that the fan be installed internally or within a suitable acoustically insulated enclosure to prevent break-out sound emissions causing any adverse impact.

3.14 The use of the Flaktwood fan and silencer will there not result in any adverse impact on the nearby noise sensitive properties.

#### Odour

3.15 The proposed extraction system is located toward the rear of the development, and will terminate above the eaves of the buildings rear annex at a height of approx. 9m. The nearest residential property is located over 4m away.

3.16 The development is small in size, serving low numbers of guests each day. The food classification type is currently underknown and so a very high cooking type has been chosen for the assessment.

3.17 Prevailing wind direction for the area, obtained from London City Airport weather station, Appendix B, is south-westerly. This would take any odours away from the closest receptors.

<sup>1</sup> BS8233: 2014; Guidance on sound insulation and noise reduction for buildings



- 3.18 The EMAQ document identifies a number of control measures to avoid odour emissions from commercial kitchens becoming a problem. The document lists the various control measures available and identifies minimum standards to ensure odour emissions will not create a problem to neighbouring land uses. 'Appendix 3' of the document identifies a risk assessment to assess the impact and control measures required, and this will be used as the basis of this assessment.
- 3.19 The following are included within the extraction design:
  - The extraction system will terminate above the eaves of the building. The system will be fitted with a jet cowl, in line with the guidance a score of 10 is applied.
  - The nearest residential receptor is located within 20m, as such a score of 10 is applied.
  - The business has identified as "small", and therefore score 1 has been applied.
  - The odour characteristics from the venue are considered to be very high, in line with the guidance document a scoring of 10 is applied.
- 3.20 Based on the above parameters the risk assessment has been conducted, see Appendix C, and has identified a high potential odour impact risk.
- 3.21 It is proposed that the extraction system be fitted with the following equipment in order to control and remove grease and odour from the extracted air.
  - Stainless canopy over cooking range (size to be determined) fitted with baffle or fine filters to remove grease.
  - Electrostatic precipitator to remove grease
  - An UV ozone system to remove odour, fitted after the ESP. For example, a
    Fusion Air, FUSION-OZ10 or similar. This unit will generate ozone which will
    be released into the extracted air stream neutralising the odour. The resistance
    time from the ozone system to the final extraction point should be as long as
    possible, thus the ozone system fitted shortly after the EPC.
- 3.22 The system will need to be maintained and cleaned in line with the manufacturer's instructions and a separate cleaning schedule will need to be produced and maintained once the chosen unit has been installed.



3.23 The installation of the above mitigation measures will ensure a high level of grease and odour removal from the extracted air. The height of the flue and use of an accelerator jet cowl will further ensure a minimum impact with the prevailing wind direction removing any extracted air away from the nearest sensitive properties.



#### 4 Conclusion

- 4.1 An extract fan and associated silencer has been identified to ensure no adverse impact will be experienced from sound emissions from the system.
- 4.2 In additional as assessment of the potential impact from odour an degrease emissions has been carried out and has identified the need to install a high level of mitigation in the form of filters, electrostatic precipitator and an ozone system to remove grease and odour from extracted air.
- 4.3 The above systems will ensure no adverse impact will be experienced by surrounding sensitive properties.
- 4.4 The inclusion of the above mitigation measures to all habitable rooms will ensure that the internal and external sound levels are acceptable and will result in a No Observe Effect on the future residents in line with the Noise Policy Statement for England.
- 4.5 As such the development will meet the objectives of the National Planning Policy Framework in ensuring that no significant adverse impact is experienced by the nearby properties from either sound of odour emissions. The development is therefore considered to be acceptable in terms of noise & odour.



# Figure 1 - Aerial Photograph





### **Appendix A - Sound emission Calculations**

#### **Extraction Fan**

Fan Code 45JM/16/4/5/30 Fan Diameter / Size 450 Size / mm

Blades

Fan Speed 1420 rpm
Velocity 7.6 m/s
Blade Angle 30°
Installation Type / Form of Running D / B
Fan Casing Long

Requested Duty 1.2m³/s @ 135 Pa (static)

Outlet Dynamic Pressure 35 Pa

 Duty Shaft Power
 0.322 kW

 Max Shaft Power
 0.331 kW

 Total Efficiency
 64.1 %

 Pitch Angle Range
 24° - 30°

Motor Frame BT9 (Sized at 1.2kg/m3 Air Density)

 Motor Grade
 IE1

 Motor Rating
 0.320 kW

 Full Load Current
 2.2 A

 Starting Current
 5 A

 Motor Mounting
 Pad

Electrical Supply 220-240 Volts 50 Hz 1 Phase

Start Type DOL
Motor Winding Standard
Enclosure Standard All

ErP [FMEG] Rating N 51 (ErP Compliant 2013)

ErP [FMEG] Target N 50
Measurement Category D
Efficiency Category Total

Fan + Motor Efficiency 43.0% (1.5 m³/s @ 132 Pa)

Motor Input Power (ErP) 0.463 kW

SFP value 0.41 W/(l/s)

Energy Consumption 999 kWh (2000 h/year)

Running Cost / Year £90

Air Density 1.2 kg/m<sup>3</sup> / 20 °C / 0 m / 50% RH

Smoke Venting Non Smoke Venting

Product Number EJ461466

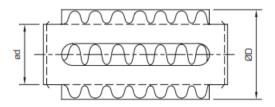
	Sou	ınd Sp	ectru	Overall						
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3 m**
Inlet*	75	74	70	68	64	63	59	55	79	50
Outlet*	76	74	70	68	64	63	60	56	79	50
Breakout*	66	56	48	45	39	35	38	32	67	28
* Lw dB re 10	12 W					**	dBA r	e 2x10	5 P	a



Silencer

#### BDER-61

#### **DIMENSIONS AND WEIGHTS**



BDER-61			Dimensions (mm)		Weight	EI 30	EI 60
size -	· length	Ød	L	ØD	(kg)	2,5 kW safety distance	2,5 kW safety distance
	-060	315	600	515	16,6	0	180
031	-090	315	900	515	20,5	0	180
	-120	315	1200	515	31,3	180	360
040	-090	400	900	630	33,9	180	360
040	-120	400	1200	630	42,7	180	360
050	-090	500	900	711	39,6	180	360
050	-120	500	1200	711	53,7	180	360
063	-090	630	900	812	47,2	180	360
063	-120	630	1200	812	57,5	180	360

#### SOUND ATTENUATION

BDER-61 size - length			Attenuation (dB) at octave bands, middle frequency (Hz)											
		63	125	250	500	1000	2000	4000	8000					
	-060	4	6	12	21	28	36	33	23					
031	-090	5	9	18	25	35	41	41	27					
	-120	7	11	24	25	34	43	44	32					
040	-090	5	8	16	27	32	40	28	22					
U4U	-120	6	11	20	34	42	44	34	24					
050	-090	5	8	11	25	29	30	23	17					
050	-120	5	10	15	28	32	34	26	18					
063	-090	4	4	8	18	21	21	12	11					
003	-120	5	6	10	21	26	25	15	14					
Tolera	ince ±	6	3	2	2	2	2	2	3					

#### **Nearest Window**

	63	125	250	500	1000	2000	4000	8000	Lw	Lp@5m
45JM/16/4/5/30	76	74	70	68	64	63	60	56	79	54.0
silencer - BDER-61-050-120	-5	-10	-15	-28	-32	-34	-26	-18		
Distance	-23	-23	-23	-23	-23	-23	-23	-23		
Directivity	0	0	-1	-2	-3	-5	-8	-10		
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1		
resulting sound level	21.8	24.9	22.4	11.8	6	2.2	4	3.9		28.2

<sup>\*</sup>Directivity based on 60°



#### Garden

	63	125	250	500	1000	2000	4000	8000	Lw	Lp@5m
45JM/16/4/5/30	76	74	70	68	64	63	60	56	79	54.0206
silencer - BDER-61-050-120	-5	-10	-15	-28	-32	-34	-26	-18		
Distance	-17	-17	-17	-17	-17	-17	-17	-17		
Directivity	0	-2	-6	-10	-15	-20	-22	-22		
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1		
resulting sound level	27.8	28.9	23.4	9.8	0	-6.8	-4	-2.1		32.07

<sup>\*</sup>Directivity based on 120°



## **Appendix B - Weather Data**

### **London City Airport**

*	Dominan	t wind dir	ection									
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ост	NOV	DEC
	7	7	7	A	~	7	7	7	7	7	7	7
	WSW	WSW	WSW	S	WSW	WSW	WSW	WSW	WSW	SW	WSW	WSW
- 0												

#### Monthly wind direction and strength distribution





# Appendix C - Odour Assessment

Impact Risk	Odour Control Requirement	Significance Score*
Low to Medium	Low level odour control	Less than 20
High	High level odour control	20 to 35
Very high	Very high level odour control	more than 35

Criteria	Score	Score	Details
Dispersion	Moderate	10	Discharging 1m above
			the eaves
Proximity to	Close	10	Closest sensitive
Receptors			receptor 4m
Size of Kitchen	Small	1	Small restaurant/take-
			away
Cooking type	Very high	10	Unknown, assumed
			high level of grease
			and odour
Total		31	