



Acoustic and Odour Assessment for Proposed development at, 142 Wood Street, Middleton, Manchester, 24 4BB.

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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 floor of 142 Wood Street, Middleton, Manchester M24 4BB to a 'dark' kitchen, i.e., a commercial kitchen/restaurant with no visiting customers.

Site Location and Context

- 1.2. The development site is situated to the north of Wood Street, a busy road leading into the centre of Middleton. The site, a former public house is a detached property with residential properties to the rear and above. To the east a detached nursery, on the opposite side of the road residential properties and to the west a green.
- 1.3. An aerial Photograph is enclosed in Figure 1.
- 1.4. The report has been written following concerns raised over the potential impact of the development on the surrounding land uses.



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 February 2019, 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) $L_{Aeq,16hr}$ in order to avoid 'Serious Community Annoyance' or 50dB(A) $L_{Aeq,16hr}$ to avoid 'Moderate Community Annoyance' during the day. For indoor levels WHO set 35dB(A) $L_{Aeq,16hr}$ during the day to prevent Moderate Annoyance and 30 dB(A) $L_{Aeq,8hr}$ 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 $L_{Aeq,16hr}$, for resting in living rooms and bedrooms while for night-time a level of 30dB $L_{Aeq,8hr}$ 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_{A90} sound levels.



- 2.13. The "residual" L_{Aeq} measurement is then subtracted from the "ambient" L_{Aeq} 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_{A90} 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 $L_{Aeq,16hr} < 50dB$ $L_{Aeq,8hr} < 40dB$	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 $L_{Aeq,16hr} 50-63dB$ $L_{Aeq,8hr} 40-55dB$	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 $L_{Aeq,16hr} 63-69dB$ $L_{Aeq,8hr} 55-60dB$ $L_{AFmax} > 80dB^{**}$	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 $L_{Aeq,16hr} > 69dB$ $L_{Aeq,8hr} > 60dB$ $L_{AFmax} > 80dB^{**}$	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.



3. The Assessment

The proposed development

- 3.1 The proposed development consists of a conversion of the ground floor, former public house to a 'dark kitchen' this will include the addition of a new extraction system. The first floor is currently residential and this represents the closest sensitive receptors. The proposed plans are shown in Figure 2.
- 3.2 The first-floor receptors are located 6.5m from the proposed extraction equipment and this window represents a kitchen, bedroom windows are located to the front and rear of the property and do not have a clear line of sight to the extraction equipment. The next nearest receptors are the residential dwellings to the north, the closest being 18m to the boundary from the proposed extraction equipment.

Impact Assessment Extraction

Noise

- 3.3 The exact specifications for the extraction system have not been chosen beyond the diameter for the flue being 500mm and so this assessment will identify a suitable system to ensure no adverse impact is experienced in line with the guidance sound levels identified above and the Councils standard requirements which mirror the same levels.
- 3.4 The extract location will be to the rear of the site and the proposed kitchen which is an annex to the main building and has no rooms above it. The nearest residential property being the flats above the site and in the main section of the building, 6.5m to the nearest window being the kitchen.
- 3.5 It is recommended that the extraction system termination point is altered so that it terminates at a height above the eaves of the main building and straight up (not bent at 90°) with a jet cowl fitted to the final opening. This will result in the extraction system terminating at a higher point than the nearby window and at a distance of just over 6.5m from the nearest window.
- 3.6 The recommended internal sound level for a kitchen/diner according to BS8233:2104 is 40dB(A) during the daytime. An open window provides a 15dB attenuation¹ (it is noted however that some Manchester authorities prefer a 13dB reduction is used

¹ BS8233: 2014; Guidance on sound insulation and noise reduction for buildings



within assessment, therefore the external sound level will need to be 53dB(A) at the window in order to achieve the required internal sound levels.

- 3.7 The above will also ensure no adverse impact is experienced at the residential dwellings to the north which are located further away at a distance of 18m, with an additional 8,8dB attenuation.
- 3.8 In order to achieve the required sound levels, it is recommended that a Flaktwood, 50 MaXfan Compac fan is used within the system combined with two (DBA) Technical Services Ltd CDAP.1D sound attenuator's (silencer).
- 3.9 This will result in a sound level of 43.7dB(A) at the window and therefore a sound level of 28.7dB(A) internally (See Appendix A). At the boundary of the property to the north a level of 34.9dB(A). In addition, due to the directivity of the extraction flue a further reduction of up to 9dB can be obtained. Below the guideline values and the criteria required by the BS8233:2014/WHO.
- 3.10 Breakout noise from the fan at a distance of 6.5m will also result in a sound level of 43.7dB(A) at the window, 34.9dB(A) internally. Below the recommended sound level and identified criterion of 40dB(A).
- 3.11 Monitoring of existing levels has not been undertaken and therefore it is not possible to undertake a BS4142:2014 assessment. However, the development is located on a busy main road and bus route into the town centre. Background sound levels are therefore anticipated to be largely influenced by passing traffic and reasonable high.
- 3.12 The sound levels to be produced by the extraction system have been reviewed and no tonal characteristics are present, the system will not result in an impact noise and will be switched on for the duration of operation so no intermittent noise will be produced. As such no additional corrections would be applied to the sound level/rating level.
- 3.13 The calculated impact at the nearest receptors are below that detailed within BS8233:2014 and by the World Health Organisation and are likely to be significantly below the background sound level in the area due to the busy road.



Odour

- 3.14 The proposed extraction system is located toward the rear of the development, and it is recommended that it should terminate above the eaves of the main building. The nearest residential property being the first floor flat.
- 3.15 The development is medium in size, serving low numbers of guests each day.
- 3.16 Prevailing wind direction for the area, obtained from the Manchester Airport weather station, Appendix B, is west / south westerly. This would carry any odours away from the nearest residential properties above the site but towards those properties to the north.
- 3.17 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.
- 3.18 The following are included within the extraction design:
- The extraction system to terminate above the eaves of the adjacent main building (and ridge of the kitchen annex). The system will be fitted with a jet cowl, with a velocity above 10m/s, in line with the guidance a score of 10 is applied.
 - The nearest residential receptor is located within 20m away, as such a score of 10 is applied.
 - The business has identified as "medium", and therefore score 3 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.
- 3.19 Based on the above parameters the risk assessment has been conducted, see Appendix C, and has identified a very high potential odour impact risk.



- 3.20 In order to mitigate against this potential impact and to ensure no adverse impact, in line with the guidance, the following measures are recommended as part of the extraction system.
- Prefilters (baffle filters) attached to the extraction hood in the cooking range
 - An Electrostatic precipitator to remove grease from the air
 - To remove odour from the extracted air an activated carbon filter with a designed 0.2s contact time to remove odour
- 3.21 Alternatively, to minimise ongoing maintenance costs the activated carbon filter can be changed for an ozone system.
- 3.22 The system will need to be maintained and cleaned in line with the manufacturer's instructions and a separate cleaning schedule will be produced and maintained once the chosen unit has been installed.
- 3.23 The installation of the above mitigation measures will ensure suitable removal of grease and odour from the extraction system. The height of the flue and use of an accelerator jet cowl will further ensure that should any odours not be treated they will be directed vertically into the atmosphere for dilution without affecting the adjacent or any other nearby properties.



4 Conclusion

- 4.1 A consideration of the development and the surrounding area has been undertaken. This has enabled a design for the proposed extraction unit to be produced, incorporating mitigation measures to ensure that there will be no adverse impact from the extraction unit by way of noise or odour on the existing or future residential properties.
- 4.2 The chosen fan and silencer design will ensure suitable levels are experienced at the façade/boundary of the nearest receptors ensuring that the recommended levels with BS8233:2014 d from the World Health Organisation are not exceeded.
- 4.3 The inclusion of the identified extraction system will ensure that the development will have a No Observe Effect on the future residents in line with the Noise Policy Statement for England.
- 4.4 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 future residents. The development is therefore considered to be acceptable in terms of noise and odour.

Figure 1 – Aerial Photograph



This detailed floor plan shows a building with a complex layout. The main building has several rooms: a large central hall, a kitchen, a dining area, a living area, a bedroom, a bathroom, a storage room, and a room labeled 'OFFICE'. There are also two 'STORAGE' rooms and a 'HALL' area. The building is surrounded by a 'BRICK WALL' and a 'METAL SHUTTER FENCE'. Outside, there are two 'COURTYARD' areas and a 'PARKING' area with six spaces labeled 'PARKING 1' through 'PARKING 6'. A 'GATE' is located near the top of the building. A 'STAIR' is shown with an 'UP' arrow. A 'W.C.' (water closet) is also indicated. The plan includes various architectural details like doors, windows, and furniture.



Appendix A – Extraction Detail

50 MaXfan Compac	2.63 m3/s	400	Inlet*	83	79	87	88	86	85	81	78	94	71
50 MaXfan Compac	2.63 m3/s	400	Outlet*	85	79	90	89	86	86	81	79	95	72
50 MaXfan Compac	2.63 m3/s	400	Breakout*	75	61	68	66	61	58	59	55	77	48

STANDARD CIRCULAR SILENCER INSERTION LOSS DATA

@ +20oC and 5m/sec FACE VELOCITY

SILENCER SIZE	CODE	P.A	OCTAVE BAND CENTRE FREQUENCIES (Hz)							
			63	125	250	500	1K	2K	4K	8K
200-550 dia	CDA.1D	ALL	2	4	6	10	14	10	7	8
	CDA.2D	A	4	8	13	17	23	17	12	11
		B	4	8	12	17	23	17	12	10
		C	4	7	10	15	19	16	12	9
	CDAP.1D	A	4	6	8	12	21	21	18	15
		B	4	6	8	11	18	19	17	14
		C	4	6	8	11	14	16	11	10
	CDAP.2D	A	7	10	12	24	29	29	27	23
		B	7	10	12	21	26	26	24	22
		C	7	10	11	18	21	20	17	15



Inlet										
	63	125	250	500	1000	2000	4000	8000	Lw	Lp@6.5m
50 MaXfan Compac	85	79	87	88	86	85	81	78	94	69.7
silencer - CDAP.1D	4	6	8	11	14	16	11	10		
silencer - CDAP.1D	4	6	8	11	14	16	11	10		
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1		
resulting sound level	50.8	50.9	62.4	62.8	58	54.2	60	56.9	68.0	43.7
Breakout										
50 MaXfan Compac	75	61	68	66	61	58	59	55	77	52.7
a-weighting	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1		
resulting sound level	48.8	44.9	59.4	62.8	61	59.2	60	53.9	67.9	43.7

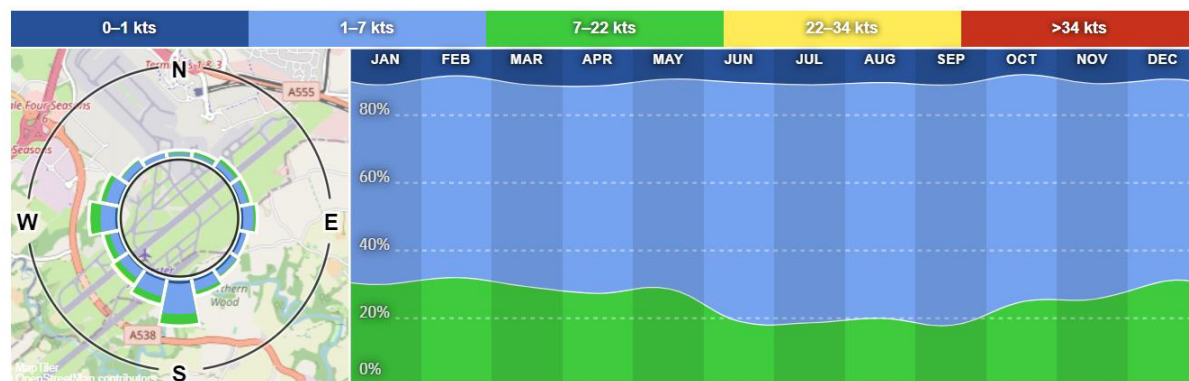
Appendix B – Weather Station Data Manchester Airport

Monthly wind speed statistics and directions for Manchester Airport

 **Dominant wind direction**

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
											
SW	SW	SW	W	WSW	WSW	WSW	WSW	SW	SSW	SSW	SSW

Monthly wind direction and strength distribution





Appendix C – Odour and Grease Risk 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 Receptors	Medium	10	Closest sensitive receptor 6.5m from kitchen discharge
Size of Kitchen	Medium	3	
Cooking type	Very high	10	
Total		33	