

APPENDIX I

Odour Assessment - 14 Jan 2022

Tamya Restaurant

130 Wilmslow Road,
Rusholme

Proof of Evidence – Odour
Issues, Dr Michael Bull

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**MICHAEL BULL
& ASSOCIATES**

Consultants in air quality & odour assessment

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1 Introduction

Michael Andrew Bull will say:

1. I hold a BSc in Chemical Engineering from Exeter University and PhD in Public Health Engineering from Imperial College, London. I am a Chartered Engineer, Chartered Scientist and Chartered Environmentalist, a Fellow of the Institute of Air Quality Management, a Member of the Institute of Environmental Sciences and am a corporate member of the Institution of Chemical Engineers. I sat on the council of the Institute of Air Quality Management (IAQM) from its formation until 2018 and was the Vice Chairman of the Institute for 3 years until 2018. Until January 2021, I was a Director of Ove Arup & Partners Ltd and particularly responsible for leading the air quality and odour assessments undertaken by the company over a 24 year period. In January 2021 I set up and became a Director of Michael Bull and Associates Ltd (MBAL), a specialist company providing air quality and odour advice.
2. I have worked as a professional environmental scientist specialising in air quality and odour for approximately 35 years having previously conducted research in environmental science for three years. I have held posts both within industry and as a consulting scientist. I have contributed to many guidance documents, I was one of the co-authors of the RTPI Good Practice Guide on Air Quality and Land Use Planning, am a contributing author to the National Society of Clean Air's Panel guidance regarding Air Quality and Planning and a member of the group that produced the IAQM guide on Air Quality Monitoring during Construction. Of particular relevance for this appeal is that I was the chair of the working group that produced the IAQM Guidance on the Assessment of Odour for Planning in 2014 and updated in 2018.
3. I have undertaken numerous odour assessment studies for a wide variety of issues including wastewater treatment works, waste transfer, processing and disposal facilities, commercial kitchens and restaurants, intensive agriculture, food processing and chemical manufacturing. These studies have been carried out for Environmental Statements, planning applications, for presentation as evidence at public inquiries and in association with civil action regarding statutory nuisance. I have also published papers concerning odour and planning issues and am a contributing author to the book, 'Designing with Smells' published by Routledge in 2018.
4. In this instance I have been retained by Tamya Restaurant to advise on the odour aspects at their proposed site at 130 Wilmslow Road. This is a former pub which is proposed to be converted to a restaurant and shisha lounge.
5. In this Proof I provide some background information concerning odour assessment, discuss the operation of the site particularly in the context of odour emissions,

undertake an odour risk appraisal using methodologies suggested by Defra and IAQM guidance and present my conclusions on the impact of the site by reason of odour on amenity.

6. A Summary is provided in Section 4 of my Proof.
7. As a member of the IAQM I am bound by its Code of Professional Conduct which requires that members “Maintain professional integrity at all times and be guided by the principle of applying the most appropriate science/practice for any given task. This requires members to display objectivity and refrain from being selective or partial when presenting data or facts for a written report or in oral form”.

2 Odour – Background and Relevant Guidance

8. The environment is rarely “odour free” even in places that are perceived to be clean such as rural areas or by the sea. However, odours can result in a nuisance if they are unwanted or are an unusual feature in the environment.
9. The Department of Environment, Food and Rural Affairs (Defra) produced guidance on the Control on Odour and Noise from Commercial Kitchen Exhaust Systems in January 2005¹ (CD1) and Odour Guidance for Local Authorities in 2010² (CD2). These documents were withdrawn in September 2017 and there is no indication that their guidance will be replaced or updated. However, one of the authors of the original kitchen guidance published their own update in 2018³ which is referred to in this evidence as the Defra/EMAQ+ guidance (CD3). This version of the guidance is widely used and provides background information on odours and an assessment methodology for determining the odour risk level from kitchens.
10. Our response to odours depends on four interlinked (sensory) characteristics:
 - i. **Hedonic tone:** this is a judgement of the relative pleasantness or unpleasantness of an odour made by assessors in an odour panel;
 - ii. **Quality/Characteristics:** this is a qualitative attribute which is expressed in terms of “descriptors”, e.g. “fruity”, “almond”, “fishy”. This can be of use when establishing an odour source from complainants’ descriptions;
 - iii. **Concentration:** the “amount” of odour present in a sample of air. It can be expressed in terms of parts per million, parts per billion or in mg/m³ of air for a single odorous compound. More usually a mixture of compounds is present and the concentration of the mixture can be expressed in odour units per cubic metre (ou_E/m³); and
 - iv. **Intensity:** is the magnitude (strength) of perception of an odour (from faint to strong). Intensity increases as concentration increases but the relationship is logarithmic. Increases or decreases in concentration of an odour do not always produce a corresponding proportional change in the odour strength as perceived by the human nose.
11. The Defra local authority guidance² (CD2) notes that the main issue with odour is its ability to result in an effect that is “objectionable”. The guidance notes that an offensive odour can occur at concentrations of compounds that are far below the level that would result in an effect on the physical health of humans.

¹ Defra, Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems, January 2005 (withdrawn September 2017).

² Defra, Odour Guidance for Local Authorities, March 2010 (withdrawn September 2017).

³ EMAQ+ Control of Odour and Noise from Commercial Kitchen Exhaust Systems, Update, Dr Nigel Gibson, 2018

12. The scale of the effect of odours on people is determined by the Frequency, Intensity, Duration and Offensiveness of the odours. Combined with the sensitivity of the location exposed (known as a receptor) these parameters determine the magnitude of the effect. These are often referred to as FIDOL factors (where L stands for Location, a surrogate for the sensitivity of the receptor). The FIDOL factors demonstrate that odours are more likely to be unacceptable where they are present frequently, and of a higher intensity. Unpleasant odours are more likely to result in a nuisance although even pleasant odours can cause problems if they are unwanted.
13. Commercial kitchens require ventilation for health and safety reasons as well as for environmental controls. A good level of ventilation is required to remove heat and the products of combustion from the cooking equipment. Above the cooking area, air is extracted through a cooker hood that contains grease filters – this equipment exists in nearly all commercial kitchens. Following the grease filter, further odour control equipment can be added if necessary. The extracted and treated air is released to the atmosphere through a vent – ideally this should be vertically mounted and in an unobstructed area. Whether further odour control equipment is required depends on the location of the vent and the quantity and nature of the odours emitted.
14. The Defra/EMAQ+ kitchen ventilation guidance¹ (CD3) provides three factors that influence the production of odour from a commercial kitchen:
 - Size of the facility** – This influences the volume of ventilation air handled and the intensity of the odour.
 - Type of food prepared** – This affects the chemical constituents in the ventilation air.
 - Type of cooking appliances used** – This dictates the level of fat, water and the temperature of the ventilation air.
15. In general, the amount of odour released depends on the amount of oil/grease in the vented air and the quantities of spices used in the cooking. Hence deep fat frying and open grills and the cooking of more highly spiced food result in the highest odour releases.
16. The approach suggested in the Defra/EMAQ+ guidance¹ (CD3) is to provide sufficient mitigation to reduce odour emissions at source to avoid emissions causing nuisance when released into the environment. The guidance provides an assessment method that categorises the potential risk of adverse odour impacts into three different categories, Low- Medium, High and Very High. The outcome of this risk assessment is then used to determine the type of odour control equipment required to reduce the risk to an acceptable level. If the appropriate level of odour control is provided, then nuisance by reason of odour would be prevented.

17. The odour risk category is based on four factors which are each assigned a score, these factors are:
- i. The location and discharge velocity of the exhaust vent, ideally located 1m above the roof ridge height or the eaves;
 - ii. The location of nearby sensitive receptors – where receptors are located closer to the point of emission, odours have less chance to disperse and therefore are at greater risk of an odour nuisance;
 - iii. The size of the kitchen – a larger kitchen would result in a higher odour risk; and
 - iv. The type of cooking – as noted earlier some types of cooking are more odorous.
18. The Defra/EMAQ+ guidance (CD3) provides a scoring matrix for these four factors that is reproduced in Table 1. Each of the four factors is assessed and a total score determined. The risk category is then determined from the total score as shown in Table 2. In practice, it is relatively rare for the assessment to conclude that a Low-Medium risk level exists. To achieve this score, a kitchen would have to be located some distance from sensitive receptors, be small and cook low odour foods. In practice in an urban area, most sites would be assessed as at least a High odour risk category and I have only once found an urban site to fall into the Low-Medium risk category.
19. The guidance also provides some examples of odour control systems that would achieve the three categories of odour control. It suggests the following:
- Low to medium** level control may include:
1. Fine filtration or Electrostatic Precipitator (ESP) followed by carbon filtration (carbon filters rated with a 0.1 second residence time).
 2. Fine filtration followed by counteractant/neutralising system to achieve the same level of control as 1.
- High** level odour control may include:
3. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.2-0.4 second residence time).
 4. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 3.
- Very high** level odour control may include:
5. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.4–0.8 second residence time).

6. Fine filtration or ESP followed by carbon filtration and by counteractant/neutralising system to achieve the same level of control as 5.
7. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 5.
8. Fine filtration or ESP followed by wet scrubbing to achieve the same level of control as 5.
20. Each level of control follows the same principle – firstly removal of particulate matter (including fats and grease) using filtration and/or ESP, then a step that removes odorous gases (typically a UV/ozone system or carbon filter). The higher levels of control are provided by either more equipment or equipment rated at a higher capacity.
21. The Defra/EMAQ+ Guidance (CD3) is applicable for commercial kitchens although I consider that some of its recommendations are equally applicable to other odours such as the those from the shisha lounge. Discharge of odorous gases at high level is a robust method of dealing with odours in an urban environment and the distance to sensitive receptors is also important. However, its risk assessment method is not applicable and therefore a second method for assessment has been used. This approach is also consistent with another recommendation in the IAQM guidance that suggests using more than one assessment method.
22. The Institute of Air Quality Management (IAQM) produced guidance in 2014⁴ (CD4) with the specific intention to provide advice for “assessing odour impacts for planning purposes”. I chaired the working group that produced this guidance and the update in 2018. One of its main recommendations was that more than one assessment technique be used to assess odour impacts. It recommends various assessment techniques including the use of a qualitative Source, Pathway, Receptor (SPR) model. The risk of an adverse odour impact is determined by examining the source characteristics, how effectively the odours can travel from the Source to a Receptor (i.e. the Pathway) and examining the sensitivity of the Receptor. Table 3 provides an outline of the factors considered for each of the three parameters and Table 4 provides the framework for assessing the likely impact.
23. The assessment I have carried out for this site has combined the Defra/EMAQ+ Odour Risk assessment approach and the IAQM SPR methodology to provide evidence of the likely odour impacts from the proposed development.

⁴ Bull M, IAQM, Guidance on the assessment of odour for planning, May 2014. Updated 2018.

3 Odour Assessment

3.1 The site and surroundings

24. The site is at 130 Wilmslow Road, M14 5AH, this area is an urban town centre location. Most of the buildings on the road have three storey with retail uses on the ground floors and residential and commercial uses on the upper floors. There are several restaurant and takeaways located in the area, with fried chicken, fish and chips, Turkish, Mediterranean, Egyptian and Indian food⁵ being prepared. Food preparation odours are therefore an expected feature of this environment.
25. The proposed development is located in a two storey former pub, it is next to a food store which is at the same level and a single storey retail unit. To the rear of the development is a carpark and there are two storey residential buildings in Claremont Road.
26. The residential properties nearest that would be considered sensitive receptors are shown below with their approximate distance from the odour source:
- Wilmslow Road – 25m
 - Claremont Road (north) – 45m
 - Claremont Road (west) – 65m
 - Whitecliffe Close – 80m
- These are all therefore a “medium” distance from the odour source as defined by the Defra/EMAQ+ Guidance.
27. The plans and elevations of the proposed restaurant and shisha lounge are provided in Figure 2. The restaurant area is located on the first floor at the rear of the building and serves food such as burgers, pizza and nachos. The kitchen for the restaurant will have an active ventilation system that extracts through grease traps above the cooking area before discharging through a vent mounted above the eaves height near the front of the building (see Figure 2).
28. The shisha lounge is located below the restaurant on the ground floor. The shisha lounge will have opening along two sides (see Figure 3) and will have an active ventilation system that extracts through the ceiling and discharges at high level at the same level as the kitchen vent. The open sides are located within approximately one metre of a high wall (see Figure 3) which results in any odours passing through the windows being largely discharged at high level.
29. There are therefore two main potential odour sources in the proposal, cooking odours from the kitchen and odours from the shisha lounge. I have initially

⁵ Identified from Google streetview

considered these sources separately but then assessed their cumulative impact through the use of the IAQM SPR methodology.

30. The frequency of the wind direction is also an important factor when considering risks from odours. I have therefore obtained the recorded wind speed and direction from the Manchester Airport monitoring site for the years 2016-2020 and prepared a wind rose that is shown in Figure 4. This indicates that the predominant winds are from the south and south westerly, this is blowing away from the larger area of residential properties to the south and north west of the site.

3.2 Defra/EMAQ+ Assessment

31. The Defra/EMAQ+ guidance approach is appropriate for the kitchen odours but as noted earlier, some aspects are also relevant for the shisha lounge.
32. The extract vent for the kitchen is located approximately 1m above the eaves near the front of that building. The grease traps fitted will remove some odours but are primarily designed to remove larger fat particles from the discharged air. This arrangement meets the secondary requirements of the Defra/EMAQ+ Guidance (i.e. vent mounted 1m above eaves height).
33. I have used the Defra/EMAQ+ odour risk assessment methodology (CD3) and assessed the site as shown in Table 4. The total score is 22-25 (depending on the food type) and therefore the site requires a “High” level of odour control. As noted in Paragraph 18, this is a very common outcome for a restaurant in an urban area.
34. Based on this outcome I have proposed that odour control equipment that meets the requirements for a “High” level of odour control is provided. I have suggested that an electrostatic precipitator and a UV/Ozone system is fitted, typical specifications for this equipment are provided in Appendix A. In my experience, this is the most common combination of odour control fitted to commercial kitchens when this level of odour control is needed.
35. Looking at the odours from the shisha lounge, this is a more diffuse source of odours and hence the initial concentration of odours will be lower. The source of odour is less constrained (because of the open sided wall) and the highest risks of odour impacts would occur in low wind speed conditions. This is because odours disperse less in low wind speeds (essentially the rate of dispersion is proportional to the wind speed – the higher the speed, the greater the dispersion and hence the lower the odour concentration). In lower wind speeds a greater proportion of the odours within the building will be discharged through the ventilation system rather than the open sided parts of the building. In any event, because of the wall near to the open windows, the local wind speeds near the window are likely to be close to zero.
36. The ground floor shisha lounge will have extraction vents built into the ceiling that are designed to draw air into the building through the open sides and discharge at

high level. As noted in Paragraph 35, because of the wall obstructing the air flow into the open side of the building the wind speeds are likely to be close to zero near the building and hence the active ventilation system will be the main extract point for the lounge. The active ventilation system will further dilute the odours by mixing with clean air and not allowing odours to accumulate within the building. As a result, it can be expected that the odours will be at a relatively low concentration and their discharge at high level is unlikely to result in an adverse impact at nearby properties. This is assessed more easily using the IAQM SPR approach in Section 3.3.

3.3 IAQM SPR Assessment

37. I have also used the Source Pathway Receptor approach suggested in the IAQM guidance (CD4). This examines the source odour potential, the effectiveness of the pathway between the source and sensitive receptors, and the location of sensitive receptors. I have applied this assessment method to both the odours from the kitchens and the Shisha lounge. The outcome of this assessment is shown in Table 5.
38. As can be seen, I have concluded that there is a negligible risk of adverse odour impacts from both the restaurant and shisha lounge. The odour sources are both small as the cooking odours should be largely removed by the ESP and UV/ozone system and the shisha lounge odours are diluted by the ventilation system. Both are discharged at high level reducing the effectiveness of the pathway to sensitive receptors.
39. As both sources give rise to a negligible impact, their cumulative effect will also be negligible.

4 Summary and Conclusions

40. I have carried out an assessment of the risk of odour from Tamya Restaurant, 130 Wilmslow Road, M14 5AH. My appraisal has followed guidance produced by Defra/EMAQ+ (CD3) and by the Institute of Air Quality Management (IAQM) (CD4).
41. The proposal is for a restaurant serving hot food such as burgers, pizza and nachos located on the first floor of the building. The restaurant kitchens will be ventilated through a vent mounted above eaves height near the front of the building. There is also a shisha lounge at ground level. This has openings on two sides and has an active extraction system at ceiling height that discharges at high level. This is a more diffuse source of odours and hence the initial odour concentrations will be much lower than those from the cooking area.
42. I have carried out an odour risk assessment following the methodology detailed in the Defra kitchen ventilation guidance. This methodology is a simple method that determines the level of odour control required to prevent nuisance from odour emissions. Following the methodology, the proposal is considered to have a high odour risk. This is a very common outcome in an urban area.
43. Based on this outcome I have recommended odour control equipment is installed to provide a High level of odour control as defined by the Defra/EMAQ+ guidance (CD3). This would consist of an ESP and a UV/Ozone system (or equivalent that would provide the same level of odour control).
44. I have also carried out a Source Pathway Receptor (SPR) assessment, an approach recommended by the IAQM. This assessment method has been applied to both the odours from the kitchens and the shisha lounge. The SPR assessment concludes that the risk of an adverse odour impact is negligible from both sources.
45. Given the outcome of the two assessment techniques and the installation of the odour control equipment I conclude that the proposal can operate without adverse impacts on amenity by reason of odour.

Tables

Table 1 Defra Odour Risk Assessment Scoring

Criteria	Score	Score	Details (DEFRA Guidance)	Details (Updated 2018 Guidance)
Dispersion	Very poor	20	Low level discharge, discharge into courtyard or restriction on stack	Low level discharge, discharge into courtyard or restriction on stack
	Poor	15	Not low level but below eaves, or discharge at below 10 m/s	Not low level but below eaves, or discharge at below 10 m/s
	Moderate	10	Discharging 1m above eaves at 10-15 m/s	Discharging 1m above eaves at 10-15 m/s
	Good	5	Discharging 1m above ridge at 15 m/s	Discharging 1m above ridge at 15 m/s
Proximity of receptors	Close	10	Closest sensitive receptor less than 20m from kitchen discharge	Closest sensitive receptor less than 20m from kitchen discharge
	Medium	5	Closest sensitive receptor between 20 and 100m from kitchen discharge	Closest sensitive receptor between 20 and 100m from kitchen discharge
	Far	1	Closest sensitive receptor more than 100m from kitchen discharge	Closest sensitive receptor more than 100m from kitchen discharge
Size of Kitchen	Large	5	More than 100 covers or large takeaway	More than 100 covers or large takeaway
	Medium	3	Between 30-100 covers or medium takeaway	Between 30-100 covers or medium takeaway
	Small	1	Less than 30 covers or small takeaway	Less than 30 covers or small takeaway
Cooking type (odour and grease loading)	Very high	10	Pub (high level of fried food), fried chicken, burgers or fish and chips	Pub (high level of fried food), fried chicken, burgers or fish and chips, Turkish, Middle Eastern or any premises cooking with solid fuel
	High	7	Kebab, Vietnamese, Thai or Indian	Vietnamese, Thai, Chinese, Steakhouse, Indian, Japanese
	Medium	4	Cantonese, Japanese or Chinese	Cantonese, Italian, French, Pizza (gas fired)
	Low	1	Most pubs, Italian, French, Pizza or Steakhouse	Most pubs (no fried food, mainly reheating and sandwiches etc), Tea rooms

Table 2 Risk Assessment Categories

Impact Risk	Odour Control Requirement	Significance Score
Low to Medium	Low Level Odour Control	Less than 20
High	High Level Odour Control	20-35
Very High	Very High Level Odour Control	More than 35

Table 3 IAQM Source Pathway Receptor (SPR) Approach

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting the source odour potential include: • The magnitude of the odour release • How inherently odorous the compounds are • The unpleasantness of the odour	Factors affecting the odour flux to the receptor are: • Distance from source to receptor • The frequency of winds from source to receptor • The effectiveness of any mitigation in reducing flux to the receptor • The effectiveness of dispersion/dilution in reducing the odour flux to the receptor • Topography and terrain	Use professional judgement based on the expectation of the users at the receptor location.

Table 4 IAQM Guidance Risk Assessment Framework

		Source Odour Potential		
		Small	Medium	Large
Pathway effectiveness	Highly effective	Low risk	Medium risk	High risk
	Moderately effective	Negligible risk	Low risk	Medium risk
	Ineffective	Negligible risk	Negligible risk	Low risk

Table 5 Outcome of Defra Odour Risk Assessment

Criterion	Score	Justification
Dispersion	10 (Moderate)	Discharge 1m above eaves height and at 15 m/s
Proximity of receptors	5 (Medium)	All residential receptors are located more than 20m from the extracts.
Size of kitchen	3 (Large)	30- 100 covers
Cooking type	4-7	Mix of Food Types – burgers, pizza, nachos etc

Table 6 Outcome of IAQM SPR Assessment

Source	Source Odour Potential	Pathway Effectiveness	Receptor	Odour Risk and Justification
Kitchen ventilation at high level.	Mix of cooking types, expected but not high levels of deep fat frying. Odours are released 1m above eaves height and at a high exit velocity. High level of odour control installed. Low levels of odours released. Small odour source potential.	Closest sensitive receptor more than 20m from the source, Odours emitted at height level vertically at 15 m/s. Predominant wind direction takes odours away from main residential areas. Moderate pathway effectiveness for most receptors	Closest residential property around from the source. Residential properties are considered to be sensitive uses.	The odour risk is considered to be negligible. Odours are removed prior to discharge by ESP and UV/Ozone system. Exhaust gases are released at high level and there are few sensitive receptors located near to the site.
Shisha Lounge at high level	Diluted shisha vapours, low concentrations owing to active ventilation. Small odour source potential.	Closest sensitive receptor more than 20m from the source, Odours emitted at height level. Predominant wind direction takes odours away from main residential areas. Moderate pathway effectiveness for most receptors.	Closest residential property around from the source. Residential properties are considered to be sensitive uses.	The odour risk is considered to be negligible. Small odour source released at high level.

Figures

Figure 1 Site location

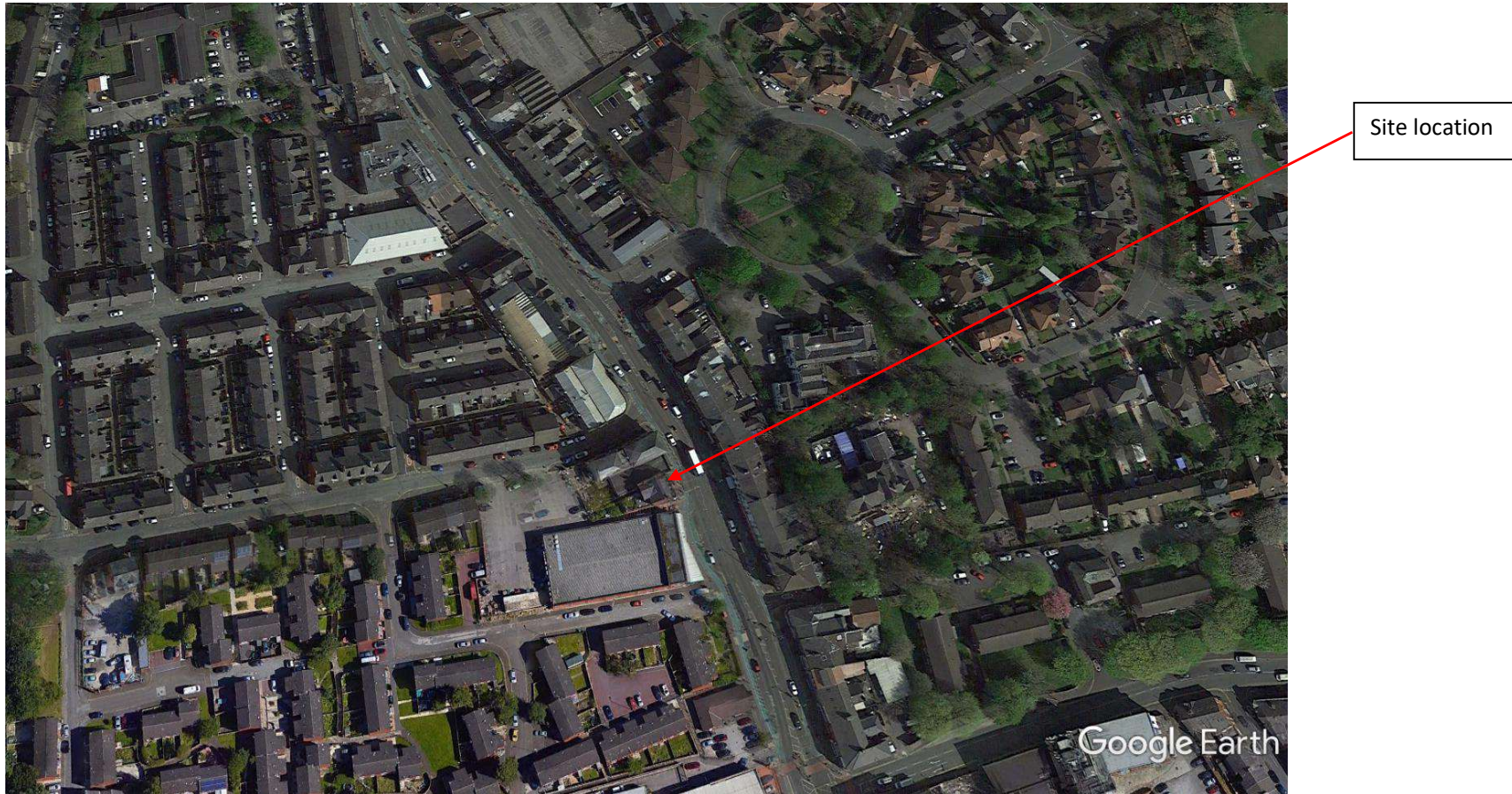




Figure 3 One open side of shisha lounge blocked by local wall

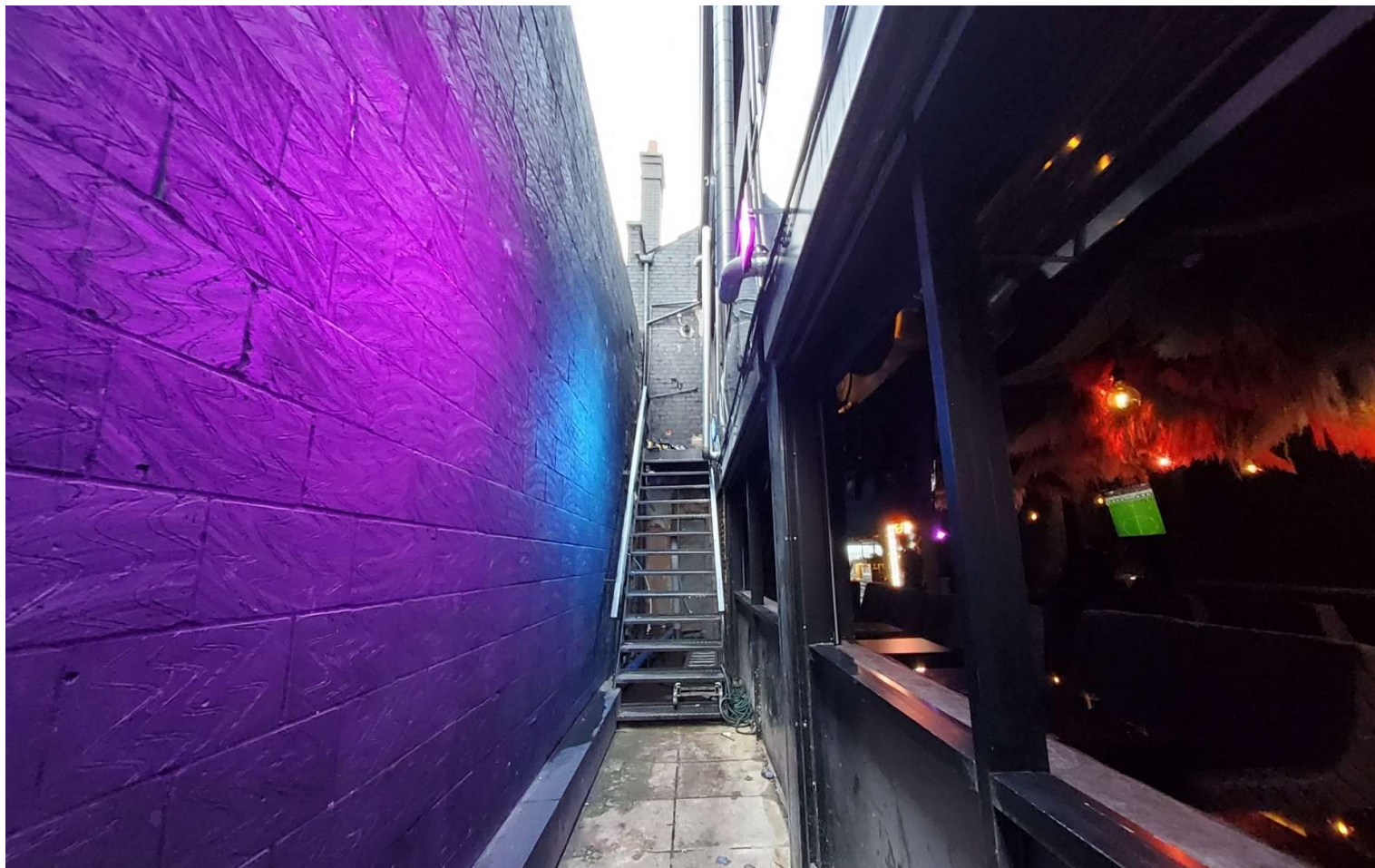
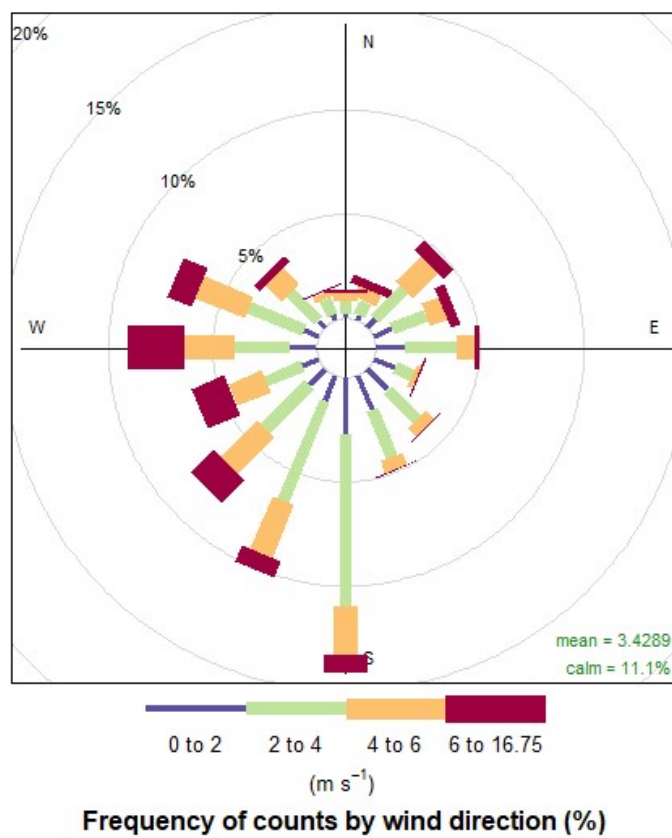


Figure 4 Wind rose for Manchester Airport 2016-2020



Appendix A – Typical Odour Control Equipment Specifications



Electrostatic Precipitation (ESP) Filter Unit



Technical and Operations Manual

For Models: ESP 1500EI
ESP 3000EI
ESP 4500EI
ESP 6000EI



Electrostatic Precipitator (ESP) Filter Unit

1.6 Modifications

Modification of the Unit is not permitted.

1.7 Users

Installation or maintenance of the Unit is exclusively reserved for authorised, trained and qualified users.

Temporary personnel and trainees should only access the Unit under the supervision and responsibility of the authorised, trained and qualified users.

1.8 Technical Specifications

There are currently four models in the range:

- ESP 1500EI, which contains a single ESP Collector Cell.
- ESP 3000EI, which contains two ESP Collector Cells.
- ESP 4500EI, which contains three ESP Collector Cells.
- ESP 6000EI, which contains four ESP Collector Cells.

The specification of each model is detailed below:

	ESP 1500EI	ESP 3000EI	ESP 4500EI	ESP 6000EI
Power consumption	20 Watts	30 Watts	40 Watts	50 Watts
Maximum air handling capacity	Up to 0.7m ³ /sec	Up to 1.4m ³ /sec	Up to 2.1m ³ /sec	Up to 2.8m ³ /sec
Dimensions	W 450mm H 630mm D 640mm	W 900mm H 630mm D 640mm	W 1350mm H 630mm D 640mm	W 1800mm H 630mm D 640mm
Weight	55kg	85kg	118kg	153kg
Power supply	220/240V 50Hz 1ph	220/240V 50Hz 1ph	220/240V 50Hz 1ph	220/240V 50Hz 1ph
Filter efficiency	Up to 98%	Up to 98%	Up to 98%	Up to 98%
Housing	Epoxy-coated galvanised steel	Epoxy-coated galvanised steel	Epoxy-coated galvanised steel	Epoxy-coated galvanised steel

UV-O Range

Unlike other UV-C systems, our UV-O units are located outside of the kitchen extract duct and are connected via a spigot and spiral ducting.



KEY FEATURES

- Easy to install
- Can be retro-fitted into existing duct
- Virtually no pressure loss
- No monthly maintenance needed

Our UV-O range includes:-

- UV-O 500 which handles up to 1 m³/sec of air flow
- UV-O 1000 which handles up to 2 m³/sec of air flow

The UV-O 500 has been designed for smaller capacity commercial kitchens.

The UV-O range uses UV-C technology to produce ozone and hydroxyl free radicals to oxidise cooking odours through a process of ozonolysis.

Unlike other UV-C systems, our UV-O units are located outside of the kitchen extract duct and are connected via a spigot and small diameter ducting.

Although it is widely accepted that the best way to apply UV-C light is directly in-line with the air stream itself, performance will be impacted as the lamps get dirty.

With our UV-O units the air flow does not come from the exhaust duct but from the ambient air around the unit, which is filtered on entry. This means that it is able to provide a uniform supply of ozone and hydroxyl free radicals into the extract system with an extremely low pressure loss.

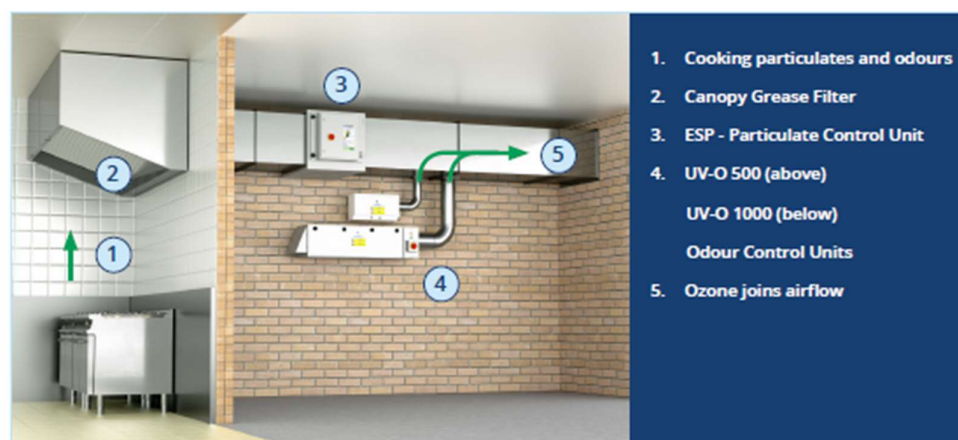
For optimum performance we would recommend between 2 & 6 seconds of dwell time to allow the ozone to work effectively upon the malodorous gasses within the duct.



UV-O 500 Unit



UV-O 1000 Unit



1. Cooking particulates and odours
2. Canopy Grease Filter
3. ESP - Particulate Control Unit
4. UV-O 500 (above)
UV-O 1000 (below)
Odour Control Units
5. Ozone joins airflow

Technical Specification

	UV-O 500	UV-O 1000
Electrical Supply	220/240V 50Hz	220/240V 50Hz
Power Consumption	140 Watts	700 Watts
Max Air Volume	up to 1m ³ /sec	up to 2m ³ /sec
Dimensions	W 605mm H 300mm D 200mm	W 1568mm H 350mm D 363mm
Weight	10.5Kg	50Kg

This unit's tried and tested UV-C technology allows for the siting of commercial kitchens in locations such as residential areas and shopping centres, where previously planning permission may not have been granted. After extensive research and development Purified Air are able to devise the best combination of lamps to provide the most effective odour control.

Safety

Ultra-Violet band C light is the most powerful of the three bands, it is a very strong oxidant and as such exposure to UV-C light is dangerous. To ensure safety the UV-C lamps are secured behind locked panels and the system has been engineered to shut down automatically when these panels are unlocked. However, since the lamps typically have a minimum life of twelve months and with the system able to operate at optimum efficiency even if one lamp fails it is unlikely that, apart from routine servicing by experienced engineers, that the system will ever need to be opened.



Purified Air Limited, Lyon House, Lyon Rd, Romford, Essex RM1 2BG England
T: 01708 755 414 | F: 01708 721 488
enq@purifiedair.com | www.purifiedair.com