Bouygues UK

ODOUR ABATEMENT REPORT FOR KITCHEN ODOUR COOKING SMELL EMISSIONS

University College London Hospital

FEBRUARY 2020

CONFIDENTIAL

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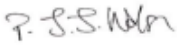
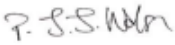
Signature				
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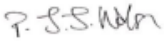
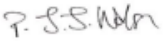
Signature				
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APPENDICES

1 INTRODUCTION

1.1.1. WSP has been appointed by Bouygues UK (BYUK) to undertake a risk assessment of potential odour impacts associated with emissions from the fifth floor kitchen, in the proposed University College London Hospital (UCLH) NHS Trust Phase 4 Development and Proton Beam Therapy (PBT) Cancer Unit on Grafton Way, London.

1.1.2. This assessment was undertaken to discharge planning condition 23 of planning application 2013/8192/P:

"Prior to the installation of any kitchen extract system, a report detailing how odour will be managed shall be submitted to and approved by the local planning authority. Prior to occupation, the approved odour abatement measures shall be installed and remain in place for the lifetime of the development."

1.1.3. The facility is located wholly within the London Borough of Camden (LBC) administrative area and is currently under construction, scheduled to open in 2020, and hereafter referred to in this report as the 'Development' or 'Site'.

1.1.4. The scope of work undertaken for the odour impact assessment is as follows:

- Undertake a site visit to determine the layout, orientation, and proximity of sensitive receptors to the kitchen extract flue.
- Undertake a desk-top assessment of the Odour Risk from the UCLH kitchen based upon the Department for Environment, Food and Rural Affairs' (Defra) Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems risk guidance[1] (Odour Control Guidance).
- Set out appropriate Odour Management and Control Measures where applicable and necessary.

1.1.5. This report presents the findings of the above study.

1.2 CONSULTATION

1.2.1. An initial consultation was undertaken with the Environmental Health Department at the LBC. The above scope of work was provided on 13th December 2019 and a request for confirmation of their approval or feedback whether the approach this assessment was taking was considered appropriate to allow discharge of Condition 23. WSP is yet to receive a response.

1.3 SCHEME PROPOSAL

1.3.1. The location of the scheme kitchen will be at the western end of the fifth floor of the Development. It is understood that the kitchen, and therefore its ventilation system, will be operational between

[1] Defra (2005) *Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems.* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/645289/pb10527-kitchen-exhaust-0105.pdf [Accessed November 2019].

06:00 and 22:00 daily. There is the possibility that the kitchen will be in use outside of these prescribed hours however this is unlikely to be a regular occurrence.

1.3.2. The kitchen will serve an estimated 120 meals per day consisting of breakfast, lunch and dinner. The anticipated duration of each service period is two hours. The kitchen will also serve snacks, teas and coffees mid-morning and mid-afternoon. No central dining area has been proposed, as meals are to be served in patient rooms.

1.3.3. A full menu will be available from the kitchen that will accommodate specialist dietary requirements including, but not limited to, neutropenic diets, diabetic, kosher and halal.

1.3.4. Further details of the scheme proposal are summarised in Appendix A.

1.4 RELEVANT LEGISLATION AND GUIDANCE

1.4.1. A summary of the legislation, planning policy and guidance relevant to odour and this odour abatement report is provided below.

LEGISLATION

1.4.2. Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to this development and odour:

c) "fumes or gases emitted from premises so as to be prejudicial to health or nuisance;

d) any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or nuisance;

e) any accumulation or deposit which is prejudicial to health or nuisance".

1.4.3. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice requiring the owner or operator of the premises involved to abate the odour within a certain timescale. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

1.4.4. Currently in the UK there are no statutory standards for assessing odour nuisance. Even outside the UK, few standards exist owing to the difficulty in defining odour nuisance, in addition to problems associated with the measurement of odour and assessing compliance with any odour nuisance standards that may be applied.

1.4.5. The Building Regulations 2000 was set out to protect the health and safety of people in and around buildings. Relevant to this report is Part F of the Regulations which states the requirement that *"There shall be adequate means of ventilation provided for people in the building."*

1.4.6. Regulation 6 of the Workplace (Health, Safety and Welfare) Regulations 1992[2] set out the following requirements for ventilation:

[2] The National Archives (1992) *The Workplace (Health, Safety and Welfare) Regulations 1992.* [online]. Available at: http://www.legislation.gov.uk/uksi/1992/3004/contents/made [Accessed November 2019].

- "Effective and suitable provision shall be made to ensure that every enclosed workplace is ventilated by a sufficient quantity of fresh or purified air.
- Any plant used for the purpose of complying with paragraph (1) shall include an effective device to give visible or audible warning of any failure of the plant where necessary for reasons of health or safety."

1.4.7. The Health and Safety Executive (HSE) produced the reference sheet 'Ventilation in catering kitchens'[3] to provide guidance on how to assess the adequacy of any existing ventilation equipment, and the ventilation requirements for new build kitchens.

1.4.8. Also relevant to this development are the Food Safety (General Food Hygiene) Regulations 1995 which set out the basic hygiene requirements for commercial kitchens. General requirements of these Regulations are that

- *"there must be suitable and sufficient means of natural or mechanical ventilation. Mechanical air flow from a contaminated area to a clean area must be avoided. Ventilation systems must be so construction as to enable filters and other parts requiring cleaning or replacement to be readily accessible.*
- *"All sanitary conveniences within food premises shall be provided with adequate natural or mechanical ventilation."*

PLANNING POLICY

National Planning Policy

1.4.9. The Government's overall planning policies for England are described in the National Planning Policy Framework. The following paragraphs in the document are relevant to this assessment:

1.4.10. Paragraph 170: *"Planning policies and decisions should contribute to and enhance the natural and local environment by: preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution."*

1.4.11. Paragraph 180: *"Planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."*

[3] Health and Safety Executive (1997) *Ventilation in catering kitchens: HSE information sheet.* [online]. Available at: http://www.hse.gov.uk/pubns/cais10.pdf [Accessed November 2019].

Regional Planning Policy

1.4.12. There is no mention of policies regarding odorous emissions from commercial kitchens in the current London Plan[4] nor in the Draft London Plan 2019[5].

Local Planning Policy

1.4.13. The Camden Local Plan[6] was adopted in July 2017 and sets out the Council's planning policies. The Local Plan covers the period from 2016 to 2031. Of relevance to this assessment is Policy A1 'Managing the impact of development' of the Local Plan which states:

"The Council will seek to protect the quality of life of occupiers and neighbours. [The Council] will grant permission for development unless this causes unacceptable harm to amenity."

1.4.14. Under the Policy A1 of the Local Plan, the Council will seek to protect the amenity of communities, occupiers and neighbours to a development and odour will be considered as a factor of amenity.

1.4.15. The Local Plan recognises that odours can be generated from commercial cooking and requires that all *"development likely to generate nuisance odours"* install appropriate extraction equipment and other mitigation measures. Furthermore, extraction equipment and mitigation measures should be incorporated within the building where possible and external extraction equipment and ducting should be sited sensitively.

1.4.16. The Camden Planning Guidance (CPG) on Design[7] was prepared to support policies in the Camden Local Plan 2017 and is an additional material consideration in planning decisions. Key messages within this document, that are relevant to this assessment, are as follows:

- Building services equipment should not harm occupant or neighbour amenity, health and/or wellbeing; and
- Building services equipment should have a minimal impact on the environment.

1.4.17. Paragraph 9.3 of the CPG on Design states that *"the purpose of this guidance is to ensure that necessary building services equipment can be incorporated into development, while having minimal impacts. Impacts that are likely to require minimisation or mitigation include […] odour."*

[4] Mayor of London (2016) *The London Plan: The Spatial Development Strategy for London Consolidated with Alterations Since 2011* [online]. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2016_jan_2017_fix.pdf [Accessed November 2019].
[5] Mayor of London (2019) *The Draft London Plan* [online]. Available at: https://www.london.gov.uk/sites/default/files/draft_london_plan_-_consolidated_changes_version_-_clean_july_2019.pdf [Accessed November 2019].
[6] London Borough of Camden Council (2017) *Camden Local Plan* [online]. Available at: https://www.camden.gov.uk/documents/20142/4820180/Local+Plan.pdf/ce6e992a-91f9-3a60-720c-70290fab78a6 [Accessed November 2019]
[7] London Borough of Camden Council (2019) *Camden Planning Guidance: Design* [online]. Available at: https://www.camden.gov.uk/documents/20142/4823269/Design+March+2019.pdf/ae6cf83c-5077-f930-cf77-846d3f6018eb [Accessed November 2019].

1.4.18. Paragraph 9.13 of this CPG states *"Where mechanical or passive ventilation is required to remove odour emissions, the release point for odours must be located above the roofline of the building and, wherever possible, adjacent buildings."*

GUIDANCE

1.4.19. Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems was issued by Defra to provide information on best practice techniques for the minimisation of odour nuisance from kitchen exhaust systems.

1.4.20. This odour guidance was withdrawn on the 15th September 2017 but remains relevant to this assessment.

1.4.21. Also relevant is the Institute of Air Quality Management's (IAQM) Guidance on the assessment of odour for planning[8]. This document provides guidance on the subjective nature of odour exposure.

[8] IAQM (2018) *Guidance on the assessment of odour for planning*. [online]. Available at: http://www.iaqm.co.uk/text/guidance/odour-guidance-2014.pdf [Accessed December 2019].

2 ODOUR POTENTIAL

2.1 KITCHEN ODOUR RISK ASSESSMENT

2.1.1. According to the IAQM Odour Guidance, *"before an adverse effect can occur, there must be odour exposure"* and for there to be odour exposure all three links must be present in the source-pathway-receptor chain.

SOURCE

2.1.2. An emissions source is a means for the odour to get into the atmosphere. In circumstances where the specific type of food to be cooked is unknown, the installation should be designed to achieve the highest level of odour control to cater for a worst-case scenario. **Table 2-1** below summarises the factors that affect the magnitude of kitchen odour emissions, and details relevant to this scheme

Table 2-1 – Factors that influence magnitude of an odour problem

Criteria	Scheme Details
Number of meals to be served per day.	120 (maximum 132)
Method(s) of preparation and cooking.	10 – 15% dry and chilled food. Traditional cooking with occasional frying.
Types of meal served (e.g. fish and chips, Chinese food, Indian food, pizzas or Italian dishes, etc.	A full menu that accommodates special dietary requirements (equivalent to most pubs, Italian, French, Pizza or steakhouse).
Proposed daily hours of operation of the kitchen.	06:00 to 22:00
Proposed daily hours of operation of the ventilation plant.	06:00 to 22:00

2.1.3. The perception of odour and whether it is found to be acceptable, objectionable or offensive is subjective to the individual. Odour unpleasantness describes the character of an odour at a given concentration or intensity and the greater the concentration the more offensive an odour may become. The Defra Odour Control Guidance sets out in Table 2.2 (reproduced in **Appendix B**) the odour and grease characteristics from a range of commercial kitchen types.

2.1.4. According to Table 2.2 in the Defra Odour Control Guidance, the types of meals that are proposed to be prepared in the kitchen are likely to have odour emission concentrations that range from low to high.

PATHWAY

2.1.5. The greater the distance between the odour source and a receptor, as well as anything that increases dilution and dispersion of an odour as it travels from source to receptor, will cause a reduction in exposure.

2.1.6. There is 45 metres of duct work between the kitchen extraction canopy and the flue exhaust located on the roof of the Development (Level 6). The closest existing sensitive receptors to the rooftop kitchen discharge are residential properties in Paramount Court, approximately 14 metres to the

south west, and at Maple House and 30 - 40 Grafton Way approximately 26 and 28 metres to the north respectively.

2.1.7. The prevailing wind direction in the area is from the south west. Wind frequency analysis (see **Appendix E**) of five years of meteorological data taken from London City Airport meteorological station has determined that only a very small proportion of winds from the north and north east (0.3%) will reach speeds greater than 9 m/s and as such are strong enough to result in sufficient dispersal of any odour from the kitchen, over a distance of approximately 14 metres.

2.1.8. Winds from a southerly and south easterly direction are the most infrequent and only a small proportion of these winds (0.6%) will reach speeds greater than 9 m/s and as such are strong enough to result in sufficient dispersal of any odour from the kitchen, over a distance of approximately 26 to 28 metres.

SENSITIVE RECEPTORS

2.1.9. The Development is bounded to the east by Huntley Street beyond which is the University College London (UCL) Cruciform Building which contains centres for Intensive Care Medicine and Bloomsbury Institute of Intensive Care Medicine, Wolfson Institute for Biomedical Research and the Centre for Respiratory Biology[9].

2.1.10. The southern boundary of the Development is bordered by Simmons Bar, the Squire Centre housing the charity Changing Faces and residential properties in Paramount Court. Beyond these properties is University Street and the UCL Rayne Building, UCH Macmillan Cancer Centre, the Medical School Building housing the Faculty of Life Science departments and offices and the Institute of Sport Exercise and Health (ISEH).

2.1.11. More residential properties in Paramount Court boarder most of the western boundary of the Development. Residential properties are located above commercial premises on the ground floor. Tottenham Court Road also runs along the length of the western site boundary beyond Paramount Court.

2.1.12. To the north of the Development is Grafton Way beyond which are residential properties at Maple House, 30 - 40 Grafton Way and the UCLH Elizabeth Garrett Anderson Wing.

2.1.13. Within the Development itself, patient rooms, a staff room, pharmacy, business office and reception will accompany the kitchen on the fifth floor.

2.1.14. The roof top is not accessible to the public and will only be accessed for short, intermittent periods for maintenance purposes.

[9] University College London (2019) *Cruciform Building* [online]. Available at: https://www.ucl.ac.uk/medicine/contact-us/find-us/cruciform-building [Accessed November 2019].

3 ODOUR MANAGEMENT

3.1 KITCHEN ODOUR RISK ASSESSMENT

3.1.1. A methodology to determine odour control requirements has previously been compiled using a simple risk assessment approach in the Defra Odour Control Guidance[1] publication. This simple risk assessment table (Annex C of the Defra Odour Control Guidance) has been replicated in **Appendix B** of this report.

3.1.2. The nearest receptor to the kitchen ventilation exhaust on the roof of the UCLH building, was determined to be the residential receptors at Paramount Court, which are approximately 14 metres to the south west. Consequently, sensitive receptors are considered to be '**close**' to the kitchen discharge point.

3.1.3. The scheme kitchen is expected to serve an estimated 120 meals per day, and the kitchen will serve meals to patients across all of the fifth-floor and patients occupying half of the fourth floor. This comprises a total of 43 beds. Should all beds be occupied and require three meals a day, the kitchen will produce a maximum of 129 covers in a day, as a worst-case scenario. The kitchen is therefore classified as '**large**' under the Defra Odour Control Guidance.

3.1.4. According to Annex C of the Defra Odour Control Guidance, a large kitchen is equivalent to more than 100 covers[10] or a large sized take away.

3.1.5. It is understood that the kitchen will prepare and serve a full menu of food accommodating special dietary requirements (e.g. diabetic, kosher, halal, etc) with occasional frying. This is equivalent to most pubs, Italian, French, Pizza or a steakhouse.

3.1.6. The type of cooking appliances used dictates the level of fat, water droplets and the temperature within the ventilation area. Table 2.3 (Appendix B) in the Defra Odour Control Guidance sets out the grease and moisture characteristics anticipated from a range of kitchen appliances.

3.1.7. Cooking appliances that will be included in the kitchen include a coffee filter machine, dishwasher, vegetable preparation and food processors, electric deep fat fryer, electric grill range with smooth steel plate, salamander support, electric induction range and a stainless-steel pass counter comprising a chilled dole well and hot cupboard with Bain Marie. These cooking appliances have a 'light' to 'medium' grease loading and moisture content.

3.1.8. The impact scores determined for each risk criteria are summarised in **Table 3-1** below.

[10] A cover refers to a diner who eats or a meal that is served.

Table 3-1 – Impact Risk Magnitude

	Dispersion	Proximity of Receptors	Size of Kitchen	Cooking Type (Odour & grease loading)	Significance Score
Criteria	5 (Good)	10 (Close)	5 (Large)	1 (Low)	21
Information on risk criteria was provided by BYUK.					

3.1.9. The impact risk assessment determined that a **high level of odour control** is required to mitigate the high impact risk represented by the kitchen.

3.2 POTENTIAL ODOUR CONTROL MEASURES

3.2.1. There are many different types of odour abatement available and not all types are suitable for cooking methods. Control measures included in the proposed kitchen design are as follows:

- Routinely kitchen windows will be unopened.
- It is proposed that the cooker extraction canopy will be ceiling mounted over appliances including, but not limited to the electric deep fat fryer, electric griddle, pot rack, infill bench, services distribution unit, infill bench, electric salamander, induction range and waste filter as the area likely to contain the most concentrated cooking odour. The dimensions of the canopy will exceed the dimensions of the catering equipment by >200 mm on each free side and >300 mm at the front and rear (unless restricted by walls).
- The cooker extraction canopy will be 2,100 mm above the finished floor level.
- The actual extraction flow rate of the cooker extraction canopy is 1.37 m^3/s which is greater than the total emission rate of the appliances it will encompass (1.01 m^3/s) multiplied by a canopy factor of 1.35[11].
- Grease filters will be installed in the extraction canopy.
- The distance between cooker hood and the ventilation exhaust on the roof will be 42 metres.
- No other systems will be connected to the kitchen extract system.
- Provision will be made for carbon filtration should complaints regarding odour emissions arise.

GENERAL MAINTENANCE MEASURES

- A visual inspection of the ventilation system will be carried out at least once a week. All metal surfaces will be checked to ensure that there is no accumulation of grease or dirt and that there is no surface damage.
- Cooker hoods and grease filters will be cleaned daily.

[11] A canopy factor is applied to account for the additional extract air required to resist the cross-drafts that would otherwise carry the 'plume' away from the canopy. The plume is the radiant and convected heat produced by cooking processes which, in the absence of cross-draughts, rises vertically in a thermal up-draught.

- Periodical deep hygiene cleaning will be undertaken by a specialist contractor. All accessible main ductwork runs and branches, including fitted equipment should be inspected and cleaned on a six-monthly basis.

Appendix A

SCHEME PROPOSAL

Criteria	Details
Hours of kitchen operation:	06:00 – 22:00 daily. There is a possibility that the kitchen could be in use outside of these hours although this isn't likely to be a regular occurrence.
Hours of ventilation operation:	06:00 – 22:00 daily. There is a possibility that the kitchen could be in use outside of these hours although this isn't likely to be a regular occurrence.
Meal types to be prepared in the kitchen:	Full menu accommodating special dietary requirements including neutropenic diet, diabetic, halal, kosher, etc.
Method(s) of preparation and cooking:	10 – 15% dry and chilled food. Traditional cooking with occasional frying.
The number of meals produced per day:	The kitchen will serve breakfast, lunch and dinner. Estimated 120 meals per day.
Location of kitchen exhaust:	On level 6 (roof top).
Length of duct work between the kitchen cooker hood and roof-top exhaust:	45 metres.
Cooker extraction canopy model:	Shine Food Machinery Model Island Canopy.
Cooker extraction canopy extract rate:	1.37 m^3/s
Cooker extraction canopy supply rate:	1.16 m^3/s
Cooker extraction canopy opening dimensions:	3050 x 2925 x 500 mm
Length of cooker extraction canopy overhang:	665 mm and 325 mm at the front (wall mounted).
Height of extraction canopy:	2100 mm above the finished floor level.
Volume of the kitchen:	133 m^3

Appendix B

RISK ASSESSMENT FOR ODOUR

Table 2.2 Odour and grease characteristics arising from a range of commercial kitchens.

Catering establishment	Description	Odour concentration				Grease content			
		Low	Moderate	High	Very High	Low	Moderate	High	Very High
Tea shop		X				X			
Pizza restaurant	Herb		X				X		
Steakhouses	Fat		X				X		
French	Herbs/garlic		X				X		
Italian	Herbs/garlic		X				X		
Most pubs	Fat		X				X		
Chinese	Ginger, spices, oil		X					X	
Japanese	Spices, oil		X					X	
Cantonese	Spices, oil		X					X	
Indian	Spices, oil			X				X	
Thai	Spices, oil			X				X	
Vietnamese	Spices, oil			X				X	
Kebab houses	Fat, cooking meat			X				X	
Fried chicken	Oil, cooking meat				X				X
Pubs (large turnover of deep-fried food)	Oil, cooking meat				X				X
Fish and chips	Oil				X				X
Fast food/burger	Oil, cooking meat				X				X

Table 2.3 Moisture and grease/smoke characteristics of various cooking appliances.

	Grease/smoke loading			Moisture content		
	Light	Medium	Heavy	Light	Medium	Heavy
Cooking pots	X					X
Bains Marie'	X					X
Steam ovens	X					X
Pizza ovens		X			X	
Bratt pans		X				X
Oven ranges		X			X	
Flat top grills		X			X	
Chip fryers		X			X	
Salamanders		X			X	
Charcoal			X		X	
Gas fired open grills			X		X	
Char broilers			X		X	
Chinese wok ranges			X			X

The following score methodology, set out in Annex C: Risk Assessment for Odour, is suggested as a means of determining odour control requirements using a simple risk assessment approach.

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
*Based on the sum of contributions from dispersion, proximity of receptors, size of kitchen and cooking type.		

Criteria	Score	Score	Details
Dispersion	Very poor	20	Low level discharge, discharge into courtyard or restriction on stack.
	Poor	15	Not low level but below eaves, or discharge at below 10m/s.
	Moderate	10	Discharging 1m above eaves at 10 – 15m/s.
	Good	5	Discharging 1m above ridge at 15m/s.
Proximity of receptors	Close	10	Closest sensitive receptor less than 20m from kitchen discharge.
	Medium	5	Closest sensitive receptor between 20 and 100m from kitchen discharge.
	Far	1	Closest sensitive receptor more than 100m from kitchen discharge.
Size of kitchen	Large	5	More than 100 covers or large sized take away.
	Medium	3	Between 30 and 100 covers or medium sized take away.
	Small	1	Less than 30 covers or small take away.
Cooking type (odour and grease loading)	Very high	10	Pub (high level of fried food), fried chicken, burgers or fish & chips.
	High	7	Kebab, Vietnamese, Thai or Indian.
	Medium	4	Cantonese, Japanese or Chinese.
	Low	1	Most pubs, Italian, French, Pizza or steakhouse.

Appendix C

EMISSIONS CHARACTERISTICS OF THE KITCHEN

Item No.	Description	Width (m)	Depth (m)	Coefficient	Flow Rate (m^3/s)
35	Services Distribution Unit	2.50	0.30	0.03	0.02
37	Infill Bench	0.30	0.85	0.03	0.01
38	Pot Rack	0.40	0.80	0.03	0.01
39	Electric Deep Fat Fryer	0.50	0.85	0.45	0.19
40	Electric Griddle	0.8	0.85	0.25	0.17
41	Infill Bench	0.90	0.85	0.03	0.02
43	Undercounter Refrigerator	0.60	0.65	0.05	0.02
44	Electric Salamander	0.57	0.55	0.55	0.17
45	10 Grid Combi Oven	0.85	0.78	0.32	0.21
46	Infill Bench	0.40	0.85	0.03	0.01
47	Induction Range	0.80	0.85	0.25	0.17
49	Waste filter	0.64	0.45	0.03	0.01
	Total				**1.01**
36	**Canopy Factor**				**1.35**
36	**Extract**				**1.37**
36	**Supply**				**1.16**

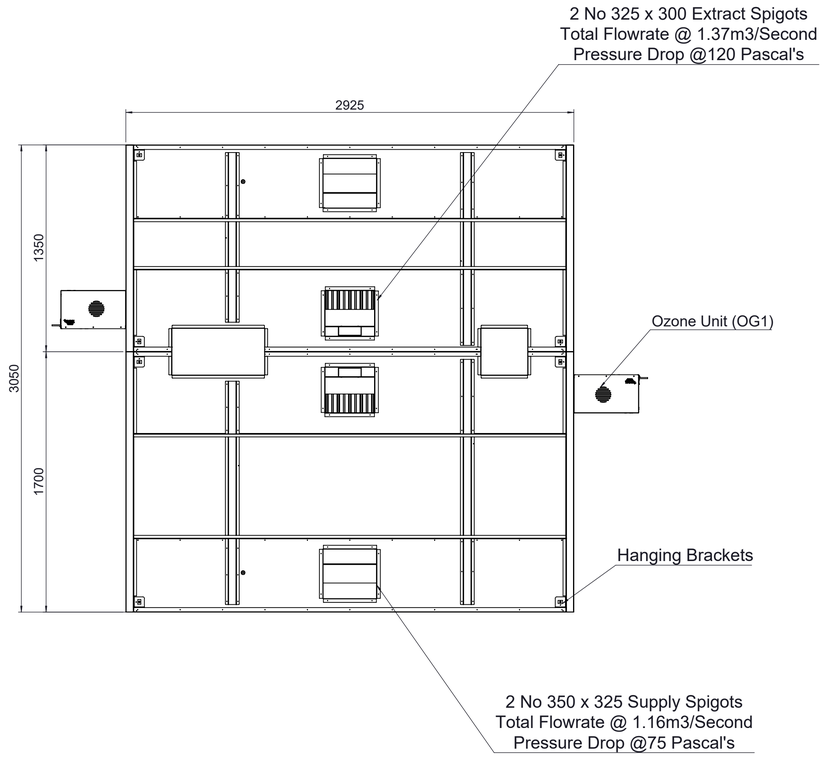
Data was obtained from the Shine Food Machinery Initial Canopy Evaluation Sheet (Ref: P4PBT-SHN-ALL-05-CAL-4.12-000001 – Canopy VFR Calculation Form).

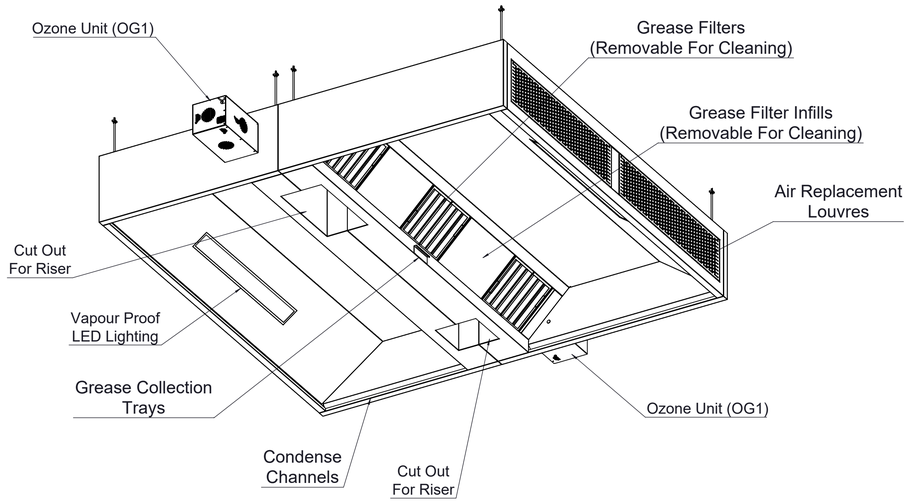
Appendix D

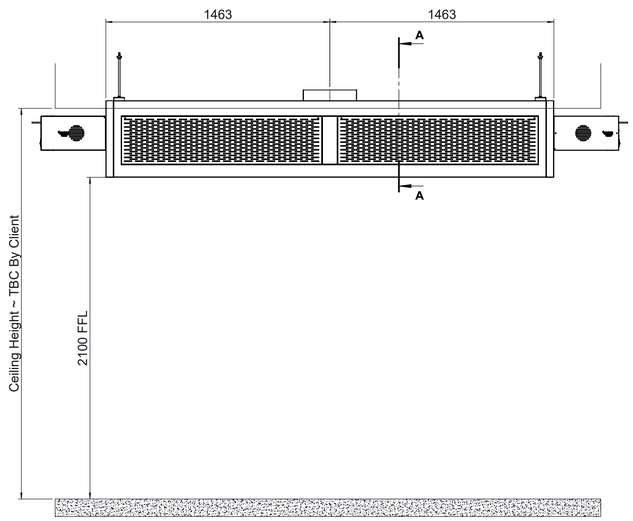
PROPOSED EXTRACT VENTILATION AND CANOPY SPECIFICATION APPLIANCES

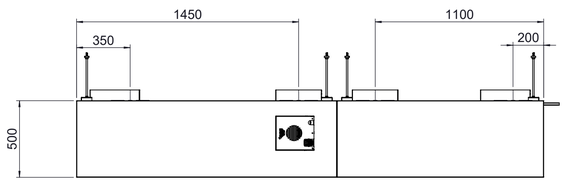
Canopy Weight 325 Kg (Approx)

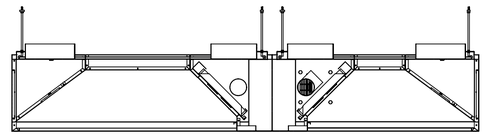
M + E BY OTHERS. LIGHTING VIA
ROOM LIGHTING CIRCUIT
CONNECTION TO THE LIGHTING TO BE VIA A
PRE-WIRED 4m FLEX WITH A "KLICK" PIN PLUG



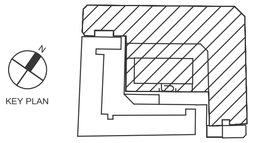








SECTION A-A



REFERENCE INFORMATION SCHEDULE

1. Constructed from 1mm 304 grade s/steel fully welded and polished construction satin finish
2. Fixing method: Unistrut to be fixed via girder clamps to RSJ.
   If concrete ceiling then M8 anchor bolts to be used to secure Unistrut
3. Final connections to spigots by main contractor
4. Canopy dimensions and volume flowrates are calculated in accordance with DW172 to suit the equipment on layout P4PBT-SHN-ALL-05-M3-4.12-000000-P02

REVISION	DATE	DESCRIPTION	DRW	CHK	APP
A	19.03.2019	Drawing For Approval/Comment	NAT		

Main Contractor - Bouygues UK
Becket House
1 Lambeth Palace Rd
Lambeth, London SE1 7EU
Tel: 020 7401 0020

University College London Hospitals NHS
NHS Foundation Trust

ORIGINATOR
SHINE catering systems
NEW QUAY ROAD, STEPHENSON St. Ind. EST.
NEWPORT, GWENT, NP19 4PL

DRAWING TITLE

HCA - UCLH
Item 36 Air Replacement Canopy

SCALE @A1	CADFILE NAME - REVISION
1:20	P4PBT-SHN-ALL-05-DET-4.12-000200-A

FIRST ISSUE DATE	PROPOSED STATUS	RIBA/BSRIA STAGE
21.03.19	S4 - Issue For Stage Approval	S4

PROJECT	ISSUER	AREA	LEVEL	TYPE	TRADE	SEQUENCE	REVISION
P4PBT	SHN	ALL	05	DET	4.12	000200	A

Appendix E

WIND DIRECTION FREQUENCY ANALYSIS

3.2.2. The nearest Met Office observing station to the Development is located at London City Airport approximately 12 kilometres to the east. Data from this station was obtained for the five-year period from 2013 to 2017.

3.2.3. **Table 3-2** below shows the results of a wind direction frequency analysis that has been undertaking for five years of meteorological data (2013 – 2017).

3.2.4. **Figure E-1** below, shows the five-year windrose generated for the five years of meteorological data. The windrose illustrates that the predominant wind direction in the area is from the south west. Windroses for each individual year of meteorological data are shown in **Figure E-2** to **Figure E-6**.

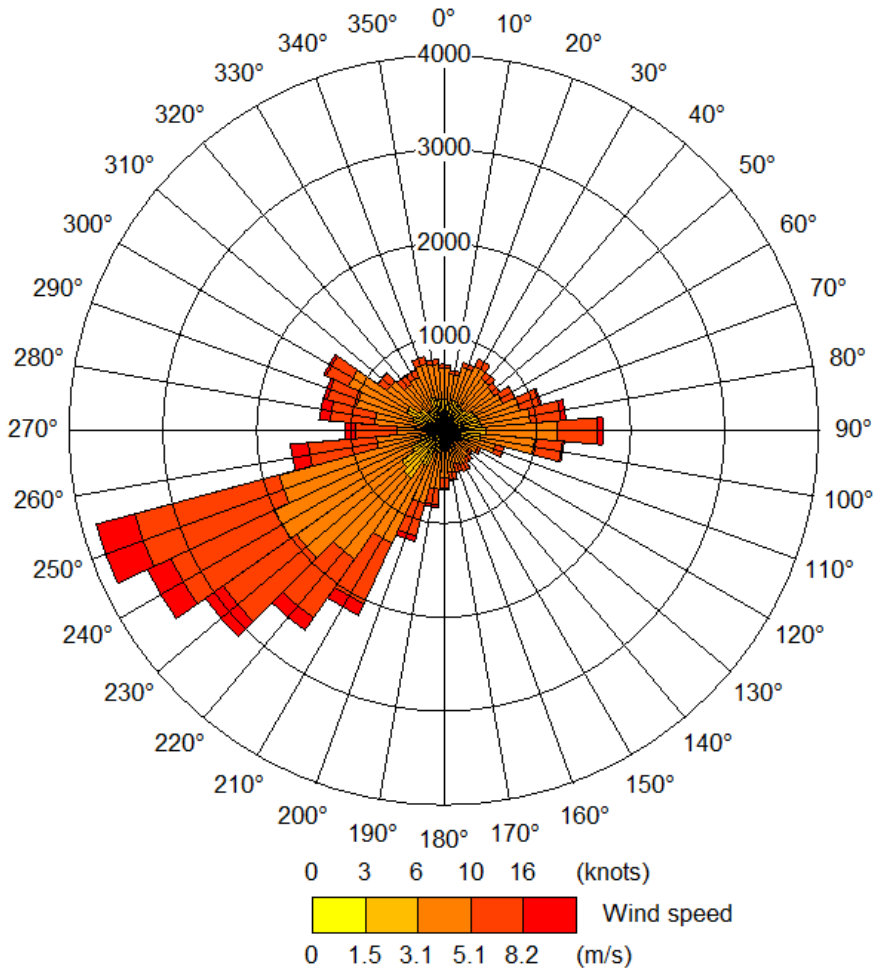


Figure E-1 - Five-year windrose (2013 - 2017), London City Airport

Table 3-2 – Wind direction frequency analysis.

Wind Speed (m/s)	Wind direction (°)											
	N	NE		E	SE		S	SW		W	NW	
	346 - 015	016 - 045	046 - 075	076 - 105	106 - 135	136 - 165	166 - 195	196 - 225	226 - 255	256 - 285	286 - 315	316 - 345
0.5 – 2	1.1%	1.0%	1.1%	0.9%	0.5%	0.3%	0.4%	0.7%	0.7%	0.5%	1.1%	0.9%
2 – 3	1.1%	1.2%	1.4%	2.0%	1.0%	0.7%	0.9%	2.4%	2.1%	0.8%	1.5%	1.1%
3 – 4	1.3%	1.4%	1.3%	2.0%	0.8%	0.8%	1.1%	2.5%	4.0%	1.1%	1.8%	1.2%
4 - 5	0.9%	1.2%	1.0%	1.7%	0.6%	0.7%	1.1%	2.4%	4.8%	1.5%	1.7%	1.0%
5 – 7	0.4%	0.7%	1.1%	2.4%	0.5%	0.7%	1.0%	3.9%	7.8%	3.3%	1.7%	0.8%
7 – 9	0.0%	0.1%	0.2%	0.8%	0.1%	0.1%	0.3%	1.7%	3.6%	1.5%	0.5%	0.2%
≥ 9	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%	0.6%	1.5%	0.7%	0.1%	0.0%
All	4.9%	5.6%	6.2%	10.1%	3.5%	3.3%	4.7%	14.2%	24.4%	9.4%	8.4%	5.3%
Wind direction is reported by the direction from which it originates.												

3.2.5. The wind direction frequency analysis shows that the prevailing wind direction in the area is from the south west for approximately 39% of the year. Winds from a southerly and south easterly direction are the most infrequent.

3.2.6. The wind directions of greatest influence in dispersing any odour from the kitchen on the fifth floor of the Development towards Paramount Court will be from the north and north east which occur on average 16.7% of the time. However, only a very small proportion of these winds (0.3%) will reach speeds greater than 9 m/s and as such are strong enough to result in sufficient dispersal of any odour from the kitchen, over a distance of approximately 14 metres.

3.2.7. The wind directions of greatest influence in dispersing any odour from the kitchen towards 30 – 40 Grafton Way will be from the south and south east which occur on average 11.5% of the time. Winds from a southerly and south easterly direction are the most infrequent and only a small proportion of these winds (0.6%) will reach speeds greater than 9 m/s and as such are strong enough to result in sufficient dispersal of any odour from the kitchen, over a distance of approximately 28 metres.

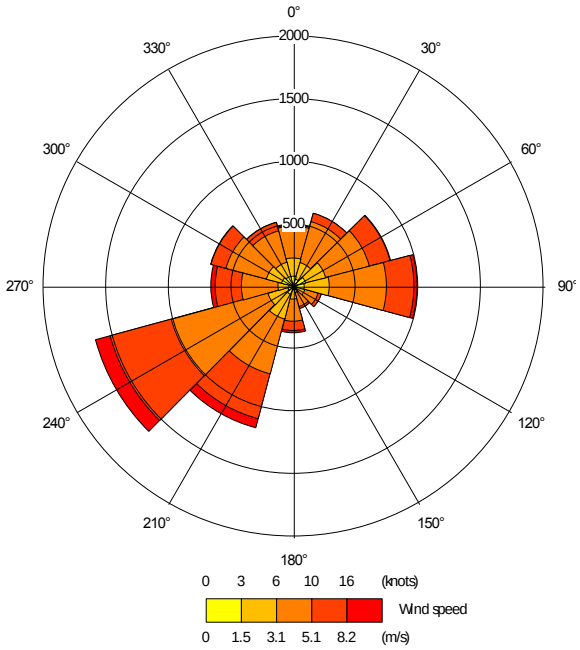


Figure E-2 - London City Airport - 2013

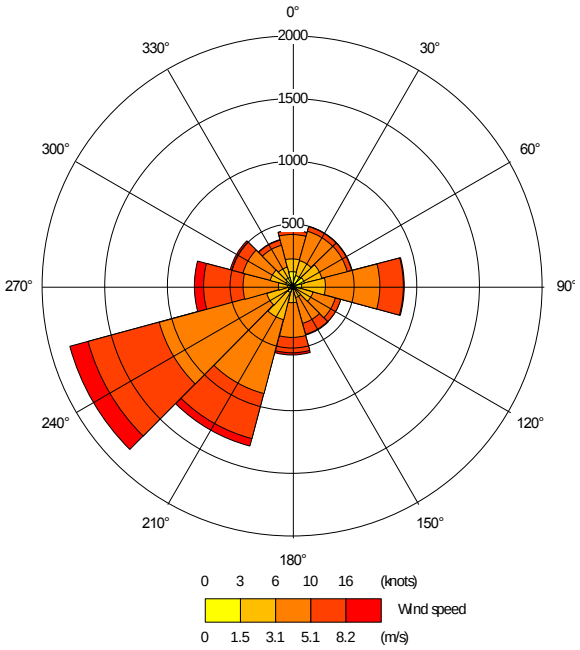


Figure E-3 - London City Airport - 2014

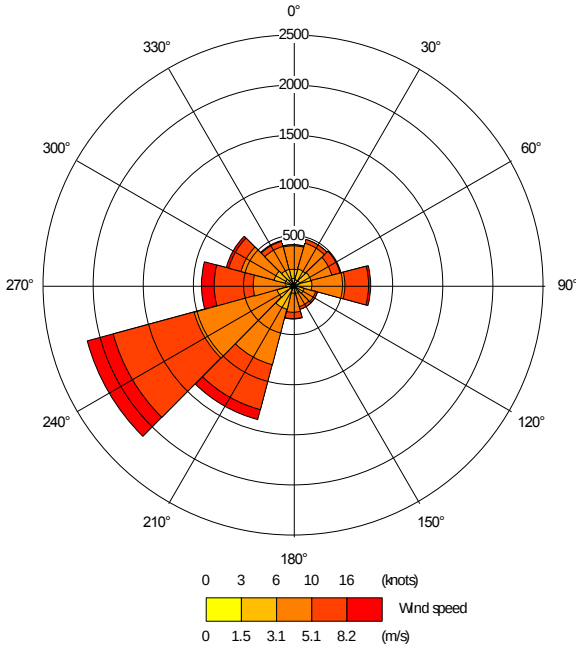


Figure E-4 - London City Airport - 2015

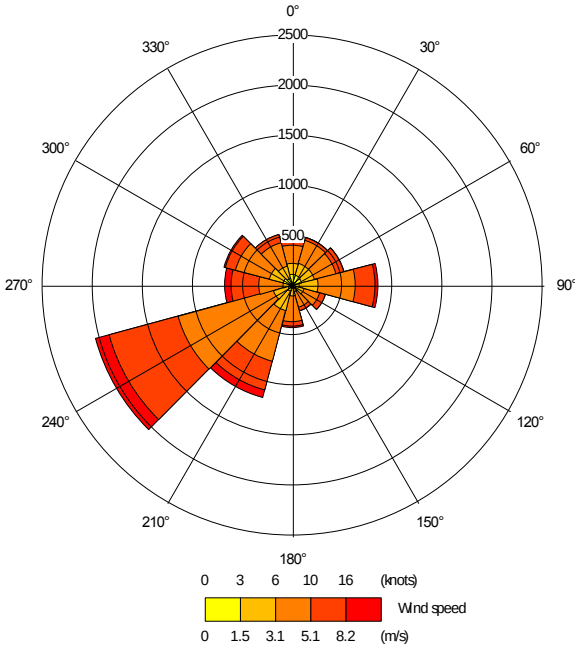


Figure E-5 - London City Airport - 2016

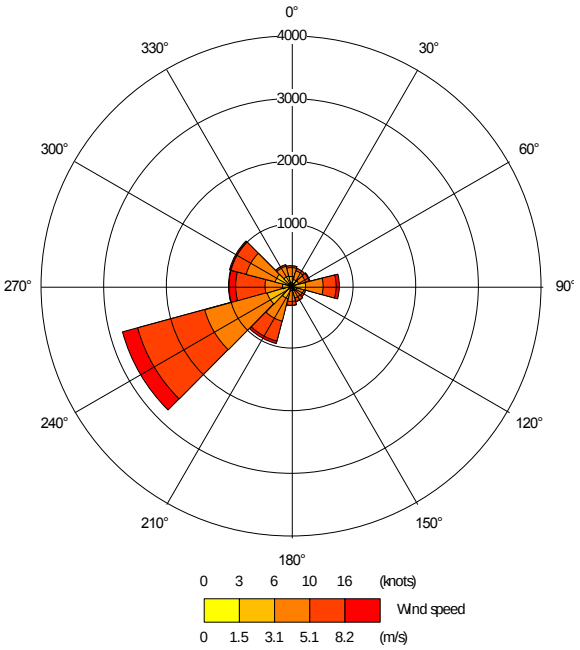


Figure E-6 - London City Airport - 2017

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