Odour Assessment

1 High Street and 2 Vine Street, Uxbridge, UB8 1BP

For Kingsbridge Estates

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Quality Management

Prepared by	Fiona Prismall MSc, BSc (Hons), CEnv, FIAQM, MIEnvSc	Technical Director	
Reviewed & checked by	Kathryn Barker MSc, BSc (Hons), MIAQM, AMIEnvSc	Principal Air Quality Consultant	
Authorised by	Fiona Prismall MSc, BSc (Hons), CEnv, FIAQM, MIEnvSc	Technical Director	
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1 Introduction

1.1 This report details the odour assessment undertaken for the development of the site at the corner of Vine Street and the High Street within Uxbridge town centre. The report is submitted in support of planning application 16894/APP/2021/2955, which is pending consideration by the London Borough of Hillingdon.

1.2 The building comprises a Class E ground floor banking unit, accessed off the junction of the High St and Vine St. The upper four floors are Class E offices, all accessed from Vine St. In 2018, the Royal Bank of Scotland, which had the lease for the ground and first floor, vacated the building. This application proposes to change the ground floor unit into a restaurant. Several alterations are proposed, which will create a better street presence for the restaurant along the High Street. These alterations include changes to the main entrance and windows to facilitate restaurant use of the former bank and the installation of air extraction plant and ducting to the rear of building and on the roof. The restaurant kitchen ventilation will be routed to the existing plant position on the roof via the ground floor car park and up the inside of the building's rear courtyard.

1.3 This odour assessment has been carried out in response to a request from the Noise Officer at the London Borough of Hillingdon. The main issue for this assessment is to determine the potential for any odours from the restaurant element of the scheme to impact on the amenity of surrounding land users and to identify the appropriate requirements for odour control.

1.4 This assessment has been undertaken in accordance with guidance published by EMAQ on behalf of the Department of the Environment, Food and Rural Affairs (Defra) and the Institute of Air Quality Management (IAQM). The report begins by setting out the legislative and policy context for odour impacts before describing the development site and its environs. The methods employed in this odour assessment are described. Results of the qualitative odour risk assessments are presented and the appropriate requirements for odour control are identified. A conclusion has then been drawn on the significance of odour effects on sensitive receptors.

2 Regulatory and Policy Framework for Odour

2.1 There are three main aspects to the regulatory framework affecting odour: the planning process determines whether and where a potentially odorous development can be located; building regulations control the design and construction of developments; and once built, the Environmental Permitting Regulations or nuisance provisions control pollution. The main framework of pollution regulation, planning policy and relevant guidance is summarised below.

Ambient Air Quality Legislation and National Policy

Air Quality Standards Regulations

2.2 The Air Quality Standards Regulations 2010 [1] sets limit values for ambient air concentrations for the main air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene, certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs). These limit values are legally binding on the Secretary of State. The Government and devolved administrations operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

2.3 No limit values are set for odour concentrations in ambient air.

UK Air Quality Strategy

2.4 The Environment Act 1995 established the requirement for the Government and the devolved administrations to produce a National Air Quality Strategy (AQS) for improving ambient air quality, the first being published in 1997 and having been revised several times since, with the latest published in 2007 [2]. The Strategy sets UK air quality standards[♦] and objectives[#] for the pollutants in the Air Quality Standards Regulations plus 1,3-butadiene and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the Air Quality Standards Regulations.

2.5 The 1995 Environment Act also established the UK system of Local Air Quality Management (LAQM), that requires local authorities to go through a process of review and assessment of air

♦ Standards are concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Standards, as the benchmarks for setting objectives, are set purely with regard to scientific evidence and medical evidence on the effects of the particular pollutant on health, or on the wider environment, as minimum or zero risk levels.

Objectives are policy targets expressed as a concentration that should be achieved, all the time or for a percentage of time, by a certain date.

quality in their areas, identifying places where objectives are not likely to be met, then declaring Air Quality Management Areas (AQMAs) and putting in place Air Quality Action Plans to improve air quality.

2.6 No AQS objective values are set for odour concentrations in ambient air.

Nuisance Provisions

2.7 Part III of the Environmental Protection Act 1990 defines several statutory nuisances and includes: *"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*". The Act places a duty on local authorities to investigate the likely occurrence of statutory nuisance and to take reasonable steps to investigate local complaints. Where a local authority is satisfied of the existence or recurrence of statutory nuisance it must generally serve an abatement notice requiring the execution of such works and other steps necessary to rectify the nuisance. If ignored, this can result in proceedings in the Magistrates Court and imposition of an order to prevent the nuisance and a fine. The Act provides a defence for the operator to demonstrate that the Best Practicable Means (BPM) have been used to control potential nuisance. For a nuisance action to succeed the offence also has to be a cause of material harm or to be persistent or likely to recur.

2.8 The above statutory nuisance controls apply mainly to odour from premises not regulated under other specific environmental regulations: a local authority requires the consent of the Secretary of State to institute statutory nuisance proceedings arising from operation of a "regulated facility" (including a waste operation, a Part A(1), Part A(2) or Part B installation, mobile plant or mining operation); or an "exempt waste operation". This is designed to avoid the operators of such regulated facilities or exempt waste operations being exposed to action by both the Environment Agency and the local authority for the same incident (i.e. to avoid "double jeopardy") [3].

2.9 It is important to note that there is no numerical odour concentration limit that can indicate unequivocally whether a statutory (or other) nuisance is being caused and it is ultimately only the Court that can decide at what point it becomes "prejudicial to health or a nuisance" and whether a statutory nuisance is occurring.

Building Regulations

2.10 The main purpose of the Building Regulations 2010 (in response to the Building Act 1984) is to protect the Health and Safety of people in and around buildings. It is necessary to gain approval under the Building Regulations for any new building, or any change to an existing building that involves changes to the building structure. The Regulations are split into ten parts and six schedules; Part F of Schedule 1 relates to the ventilation of buildings relevant to this assessment.

Control of Odour and Noise from Commercial Kitchen Exhaust Systems

2.11 The EMAQ '*Control of Odour and Noise from Commercial Kitchen Exhaust Systems*' [4] document published on behalf of Defra and the IAQM is designed to provide non-statutory guidance for regulators. It provides information on best-practice techniques for the minimisation of odour and noise nuisance from kitchen exhaust systems.

National Planning Policy Framework

2.12 The National Planning Policy Framework (NPPF) [5] is a material consideration for local planning authorities and decision-takers in determining applications. At the heart of the NPPF, is a presumption in favour of sustainable development, subject to caveats where a plan or project affects a habitats site. For determining planning applications, this means approving development proposals if they accord with an up-to-date local development plan, unless material considerations indicate otherwise. If the development plan does not contain relevant policies, or the policies are out of date, then planning permission should be granted unless the application of policies in the NPPF that protect areas or assets of particular importance provides a clear reason for refusing the development, or any adverse impacts would significantly outweigh the benefits.

2.13 The NPPF sets out three overarching objectives to achieve sustainable development. The relevant objective in the context of this air quality assessment is:

> *"**an environmental objective** – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution and mitigating and adapting to climate change, including moving to a low carbon economy*" (Paragraph 8c)

2.14 Under the heading 'Conserving and enhancing the natural environment', the NPPF states:

> *"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 or land instability…" (Paragraph 174)*

2.15 Under the heading 'Ground Conditions and Pollution', the NPPF states:

> *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will*

operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities." (Paragraph 188)

National Planning Practice Guidance

2.16 The National Planning Practice Guidance (NPPG) was issued on-line on 6 March 2014 and is updated periodically by government as a live document. The last major update was on 1 November 2019. The Air Quality section of the NPPG describes the circumstances when air quality, odour and dust can be a planning concern, requiring assessment.

2.17 Relevant to this assessment it states that *"Odour and dust can also be a planning concern, for example, because of the effect on local amenity." The NPPG advises that "Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific."*

Local Planning Policy

2.18 The London Borough of Hillingdon Local Plan, Part 2, Development Management Policies was adopted in January 2020. It sets out the council's detailed policies that form the basis of the council's decisions on individual planning applications. The key policy relevant to this assessment is *Policy DMTC 4: Amenity and Town Centre Uses* which states that:

"Proposals for restaurants and hot food takeaways, drinking establishments, betting shops, night clubs, casinos, amusement centres, minicab offices and other similar uses will only be supported provided that they:

i) would not result in adverse cumulative impacts due to an unacceptable concentration of such uses in one area;

ii) would not cause unacceptable disturbance or loss of amenity to nearby properties by reason of noise, odour, emissions, safety and security, refuse, parking or traffic congestion; and

iii) would not detrimentally affect the character or function of an area by virtue of the proposed use or visual impact."

3 The Development Site and the Surrounding Area

3.1 The site is positioned on the corner of Vine Street and the High Street within Uxbridge town centre. The building currently comprises a class E ground floor banking unit, accessed off the junction of the High Street and Vine Street. The upper four floors are offices, accessed off Vine Street. Recently, the Royal Bank of Scotland, who have the lease for the ground and first floor, vacated the building. Figure 3.1 shows the site plan and the flue. Figure 3.2 shows the view from the High Street.

Figure 3.1 Existing Site Plan and Flue

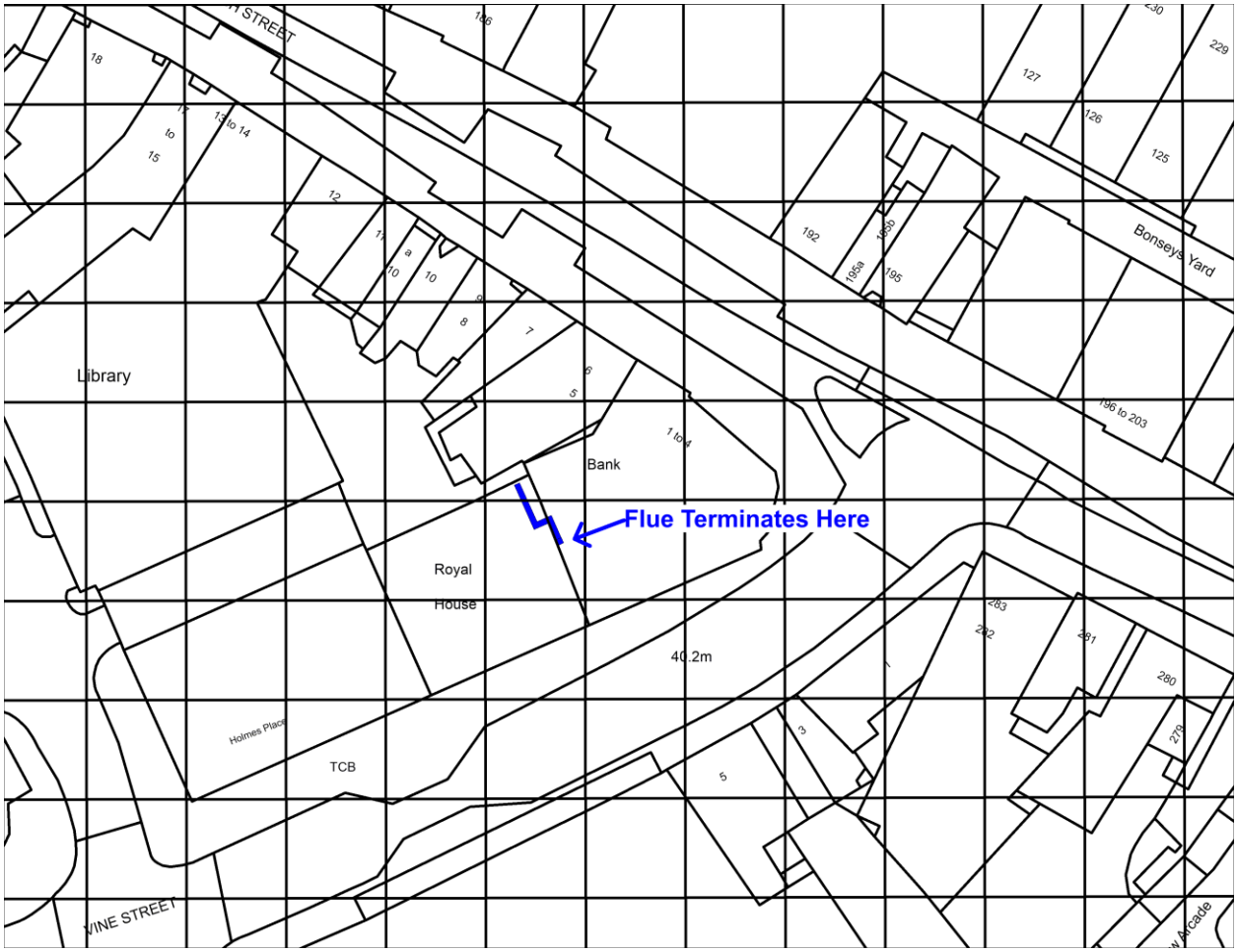


Figure 3.2 View from the High Street

Google Maps

3.2 The nearest land users are 5, 6 and 7 on the High Street to the north of the site. These units include residential and commercial uses (offices and shops). Figure 3.2 shows the British Heart Foundation on the ground floor of unit 6, Directions Recruitment at 6a and Coffee Break at 7 High Street. Holmes Place health club is to the west on Vine Street. All these land-users are within 20 m of the flue.

3.3 There are no other buildings within 20 m of the flue. The High Street is to the east and Vine Street is to the south.

4 Assessment Methodology

Background

4.1 Neither the NPPF nor the NPPG is prescriptive on the methodology for assessing air quality effects or describing significance; practitioners continue to use guidance provided by Defra and non-governmental organisations, including Environmental Protection UK and the Institute of Air Quality Management (IAQM). However, the NPPG does advise that *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific."*

4.2 Air quality guidance advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Fellow and Member of the Institute of Air Quality Management and Chartered Environmentalist and have the required academic qualifications for these professional bodies. In addition, the Director responsible for authorising all deliverables has over 17 years' experience.

Characteristics of Odour

4.3 Most odours are mixtures of many chemicals that interact to produce what we detect as a smell. Odour-free air contains no odorous chemicals, whilst fresh air is usually perceived as being air that contains no chemicals or contaminants that are unpleasant (i.e. air that smells 'clean'). Fresh air may contain odorous chemicals, but these odours will usually be pleasant in character, such as freshly-mown grass or sea spray. Perceptions of an odour - whether we find it acceptable, objectionable or offensive - are partly innate and hard-wired, and partly determined through life experiences and hence can be subjective to the individual.

4.4 Before disamenity, annoyance or nuisance can occur, there must be odour exposure. For odour exposure to occur all three links in the source-pathway-receptor chain must be present.

a. an emission **source** - a means for the odour to get into the atmosphere.
b. a **pathway** - for the odour to travel through the air to locations off site, noting that:

– anything that increases dilution and dispersion of an odorous pollutant plume as it travels from source to receptor will reduce the concentration at the receptor, and hence reduce exposure.

– dilution and dispersion increase as the length of the pathway increases.

– increasing the length of the pathway (e.g. by releasing the emissions from a high stack) will – all other things being equal – increase the dilution and dispersion.

c. the presence of **receptors** (people) that could experience an adverse effect, noting that different people vary in their sensitivities to odour.

4.5 By convention, we restrict the term odour impact to the negative appraisal by a human receptor of the odour exposure. This appraisal, occurring over a matter of seconds or minutes, involves many complex psychological and socio-economic factors. Once exposure to odour has occurred, the process can lead to disamenity, annoyance, nuisance and possibly complaints.

4.6 Both, or either, annoyance and nuisance can lead to complaint action. However, a lack of complaints does not necessarily prove there is no disamenity, annoyance or nuisance. On the other hand, there needs to be an underlying level of annoyance before complaints are generated. The responses of disamenity, annoyance and nuisance can change over time.

4.7 For odour assessments, current best practice is usually to use a multi-tool approach where practicable. This is mainly due to:

- the partly subjective nature of odour and the wide differences that exist in population response; and
- the fact that there is no “silver bullet” assessment tool that on its own provides an unequivocal answer - results from each of the different techniques tend to give information only on some limited aspect of the odour impact or effect.

4.8 Fortunately, these different assessment tools are not mutually exclusive and using them in combination can minimise the individual limitations and increase confidence in the overall conclusion.

4.9 The scope in this case was limited to predictive methods; no observational methods (e.g. monitoring) were used because the proposed development is not yet operational. Two methods have been used as part of the assessment of the odour impact at the new development:

(i) Firstly, a Kitchen Odour Risk Assessment was carried out in accordance with the EMAQ *‘Control of Odour and Noise from Commercial Kitchen Exhaust Systems’* document [4]

(ii) Secondly, a qualitative predictive assessment was made of the potential for odour impact, using the source-pathway-receptor concept. This approach considers the emission source, the presence of odour controls (both engineering controls and odour management procedures and with the assumption that regulators will properly and effectively enforce these), the prevailing wind direction relative to the locations and distances of the proposed receptors, and their sensitivity to the type of odour in question. This qualitative assessment

follows the method in the IAQM *Guidance on the Assessment of Odour for Planning* (2018) [6].

EMAQ Kitchen Odour Risk Assessment

4.10 The EMAQ *'Control of Odour and Noise from Commercial Kitchen Exhaust Systems'* document [4] enables the odour risk to be assessed taking into account the stack/exhaust height, the size of the food establishment (e.g. number of covers), the type of kitchen/food and proximity to sensitive receptors, as detailed below. The guidance can be used in the following ways:

- to calculate the effective height for an exhaust vent to give adequate dispersal of odorous emissions, providing the necessary project-specific information for the above calculation is available from the developer;
- if the necessary project-specific information is not available at this stage of the scheme design, then as a fall-back it is possible to estimate the ventilation stack height based on the minimum recommended requirements and specified limits; or
- if design constraints limit the ventilation stack height, then the level of odour mitigation/control and other general design features can be identified that is appropriate for the design ventilation release height and the characteristics of the food establishment.

Odour risk factors

4.11 The EMAQ guidance on the control of odour from kitchen exhausts enables the odour risk to be assessed from a consideration of the following variables:

- **Dispersion:** the discharge stack height relative to the roof ridge affects the degree of dilution and dispersion that will occur;
- **Proximity of receptors:** dilution and dispersion increase with distance, reducing the exposure of the receptor to odour;
- **Size of the kitchen:** this influences the intensity of the odour and volume of ventilation air to be handled; and
- **Cooking type:** this affects the chemical constituents within the ventilation air.

4.12 The above factors were scored in accordance with the EMAQ guidance, as shown in Table 4.1.

Table 4.1 Scoring of Odour Risk Factors

Criteria	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 10 m/s
	Moderate = 10	Discharging at 1 m above eaves at 10 – 15 m/s
	Good = 5	Discharging 1 m above ridge at 15 m/s
Proximity of receptors	Close = 10	Closest sensitive receptors less than 20 m from kitchen discharge
	Medium = 5	Closest sensitive receptors between 20 and 100 m from kitchen discharge
	Far = 1	Closest sensitive receptors more than 100 m 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. Turkish, Middle Eastern or any premises cooking with solid fuel.
	High = 7	Vietnamese, Thai, Indian, Japanese, Chinese, Steakhouse
	Medium = 4	Cantonese, Italian, French, Pizza (gas fired)
	Low = 1	Most pubs (no fried food, mainly re-heating and sandwiches etc), Tea rooms

*A planner may take a pragmatic view when assessing whether certain low risk kitchens require any odour abatement to be fitted. In reaching this decision, the planner may consider the nature of the food being cooked and/or the size of the kitchen and/or its location.

Assessment of odour risk level

4.13 The risk scores were summed to establish the overall odour impact risk rating, as summarised in Table 4.2.

Table 4.2 Overall Odour Risk Rating

Impact Risk	Odour Control Requirement	Total 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

Requirements for odour control

4.14 Once the level of odour risk had been determined, the appropriate level of odour control to minimise odour disamenity effects was identified from the EMAQ guidance (summarised in Table 4.3 below).

Table 4.3 Defra Minimum Requirements for Odour Control

Objectives

- for new premises or premises covered by planning conditions restricting the impact of odour the system shall be designed to prevent harm to the amenity.
- for existing premises not covered by planning conditions restricting the impact of odour, the system shall be designed to avoid statutory nuisance and shall comply with the principles of Best Practical Means.

To achieve these objectives the odour control system shall include an adequate level of:

1. odour control; and
2. stack dispersion.

The overall performance of the odour abatement system will represent a balance of 1 and 2.

Discharge stack

The discharge stack shall:

1. Discharge the extracted air not less than 1 m above the roof ridge of any building within 15 m of the vent serving the commercial kitchen. Additional odour control measures may still be required depending on the cooking type and frequency.
2. If 1 cannot be complied with for planning reasons, then the extracted air shall be discharged not less than 1 m above the roof eaves or dormer window of the building housing the commercial kitchen. A higher level of odour control measures than those required in part 1 may be required.
3. If 1 or 2 cannot be complied with for planning reasons, then higher level of odour control measures than those required in part 1 or 2 may be required.

Odour arrestment plant performance

Low to medium level control may include:

1. Fine filtration or ESP (electrostatic precipitator) 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:

1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.2 - 0.4 second residence time).
2. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.

Very high level odour control may include:

1. Fine filtration or ESP followed by carbon filtration (carbon filters rated with a 0.4 – 0.8 second residence time).
2. Fine filtration or ESP followed by carbon filtration and by counteractant/neutralising system to achieve the same level of control as 1.
3. Fine filtration or ESP followed by UV ozone system to achieve the same level of control as 1.

In some instances where very high levels of control are required combinations or sacrificial levels of filtration may be employed.

Maintenance must be carried out to ensure these performance levels are always achieved.

IAQM Qualitative Odour Impact Assessment

4.15 A qualitative risk-based assessment of the odour impact of releases from the food-cooking ventilation exhausts on sensitive receptors on and around the development site has been carried

out using the method in the IAQM *Guidance on the Assessment of Odour for Planning* Appendix 1, which provides examples of risk factors for odour source potential, pathway effectiveness and receptor sensitivity (see Table 4.4).

4.16 The first step of this qualitative assessment is to estimate the odour-generating potential of the site activities, termed the "Source Odour Potential". This considers three factors:

i. The scale (magnitude) of the release from the odour source, considering the effectiveness of any odour control or mitigation measures that are already in place. This involves judging the relative size of the release rate after mitigation and taking account of any pattern of release (e.g. intermittency). The assumption has been made, as required by the NPPF, that the relevant pollution-control regimes applying to the site will operate effectively and that the appropriate Best Available Techniques (BAT)/BPM standards of odour control will be enforced.

ii. How inherently odorous the emission is. In some cases, it may be known whether the release has a low, medium or high odour detection threshold (ODT); this is the concentration at which an odour becomes detectable to the human nose. In most instances the odours released by a source will be a complex mixture of compounds and the detectability will not be known. However, for some industrial processes the odour will be due to one or a small number of known compounds and the detection thresholds will be a good indication of whether the release is highly odorous or mildly odorous.

iii. The relative pleasantness/unpleasantness* of the odour. Lists of relative pleasantness of different substances are given in the Environment Agency guidance H4 *Odour Management* [7].

4.17 Using the example risk ranking in Table 4.5, the Source Odour Potential can be categorised as small, medium or large.

* This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.

Table 4.4 Examples of Risk Factors for Odour Source, Pathway and Receptor

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting the source odour potential include: • the magnitude of the odour release (taking into account odour-control measures) • 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 the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind) • the effectiveness of any mitigation/control in reducing flux to the receptor • the effectiveness of dispersion/ dilution in reducing the odour flux to the receptor • topography and terrain	For the sensitivity of people to odour, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:
Large Source Odour Potential Magnitude - Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^2. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known. Unpleasantness - processes classed as " Most offensive" in H4; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score. Mitigation/control - open air operation with no containment, reliance solely on good management techniques and best practice.	**Highly Effective Pathway for Odour Flux to Receptor** Distance - receptor is adjacent to the source/site; distance well below any official set-back distances. Direction - high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind). Effectiveness of dispersion/dilution - open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.	**High Sensitivity Receptor** surrounding land where: • users can reasonably expect enjoyment of a high level of amenity; and • the people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium Source Odour Potential Magnitude - smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m^3 per year; area sources of hundreds of m^2. The compounds involved are moderately odorous. Unpleasantness - processes classed in H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score. Mitigation/control - some mitigation measures in place, but significant residual odour remains.	**Moderately Effective Pathway for Odour Flux to Receptor** Distance - receptor is local to the source. Where mitigation relies on dispersion/dilution - releases are elevated, but compromised by building effects.	**Medium Sensitivity Receptor** surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Small Source Odour Potential Magnitude - falls below Part B threshold; materials usage hundreds of tonnes/m^3 per year; area sources of tens m^2. The compounds involved are only mildly odorous, having relatively high ODTs where known. Unpleasantness - processes classed as "Less offensive" in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score. Mitigation/control - effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.	**Ineffective Pathway for Odour Flux to Receptor** Distance - receptor is remote from the source; distance exceeds any official set-back distances. Direction - low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/ dilution - releases are from high level (e.g. stacks, or roof vents > 3 m above ridge height) and are not compromised by surrounding buildings	**Low Sensitivity Receptor** surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial, farms, footpaths and roads.

Table 4.5 Environment Agency H4 Classification of Offensiveness of Odour Emission Sources

Offensiveness	Odour Emission Sources – Indicative Examples
Most Offensive	Processes involving decaying animal or fish remains Processes involving septic effluent or sludge Biological landfill odours
Moderately Offensive	Intensive livestock rearing Fat frying (food processing) Sugar beet processing Well aerated green waste composting
Less Offensive	Brewery Confectionary Coffee roasting Bakery

4.18 Next, the effectiveness of the pollutant pathway as the transport mechanism for odour through the air to the receptor, versus the dilution/dispersion in the atmosphere, needs to be estimated. Anything that increases dilution and dispersion of the odorous pollutant plume as it travels from source (e.g. processes and plant) to receptor will reduce the concentration at the receptor, and hence reduce exposure. Important factors to consider here are:

i. The distance of sensitive receptors from the odour source.

ii. Whether these receptors are downwind (with respect to the predominant prevailing wind direction). Odour episodes often tend to occur during stable atmospheric conditions with low wind speed, which gives poor dispersion and dilution; receptors close to the source in all directions around it can be affected under these conditions. When conditions are not calm, it will be the downwind receptors that are affected. Overall, therefore, receptors that are downwind with respect to the prevailing wind direction tend to be at higher risk of odour impact.

iii. The effectiveness of the point of release in promoting good dispersion, e.g. releasing the emissions from a high stack will - all other things being equal - increase the pathway, dilution and dispersion.

iv. The topography and terrain between the source and the receptor. The presence of topographical features such as hills and valleys, or urban terrain features such as buildings can affect air flow and therefore increase, or inhibit dispersion and dilution.

4.19 Using the example risk ranking in Table 4.4, the pollutant pathway from source to receptor can be categorised as ineffective, moderately effective, or highly effective.

4.20 In the third step, the estimates of Source Odour Potential and the Pathway Effectiveness are considered together to predict the risk of odour exposure (impact) at the receptor location, as shown by the example matrix in Table 4.6.

Table 4.6 Risk of Odour Exposure (Impact) at the Specific Receptor Location

Pathway Effectiveness	Source Odour Potential		
	Small	**Medium**	**Large**
Highly effective	Low	Medium	High
Moderately effective	Negligible	Low	Medium
Ineffective	Negligible	Negligible	Low

4.21 The next step is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, as shown by the example matrix in Table 4.7. The odour effects may range from negligible, through slight adverse and moderate adverse, up to substantial adverse.

Table 4.7 Likely Magnitude of Odour Effect at the Specific Receptor Location

Risk of Odour Exposure	Receptor Sensitivity		
	Low	**Medium**	**High**
High	Slight Adverse	Moderate Adverse	Substantial Adverse
Medium	Negligible	Slight Adverse	Moderate Adverse
Low	Negligible	Negligible	Slight Adverse
Negligible	Negligible	Negligible	Negligible

4.22 This procedure results in a prediction of the likely odour effect at each sensitive receptor. The next step is to estimate the overall odour effect on the surrounding area, taking into account the different magnitude of effects at different receptors, and the number of receptors that experience these different effects*. This requires the competent and suitably experienced Air Quality Practitioner to apply professional judgement.

* Unless there is only a small number of local receptors, then a representative selection of receptors will have been used in the assessment. This final stage of considering the overall effect needs to take into account how many receptors these selected ones represent.

5 Assessment of Effects

EMAQ Kitchen Odour Risk Assessment

Odour Risk Factors

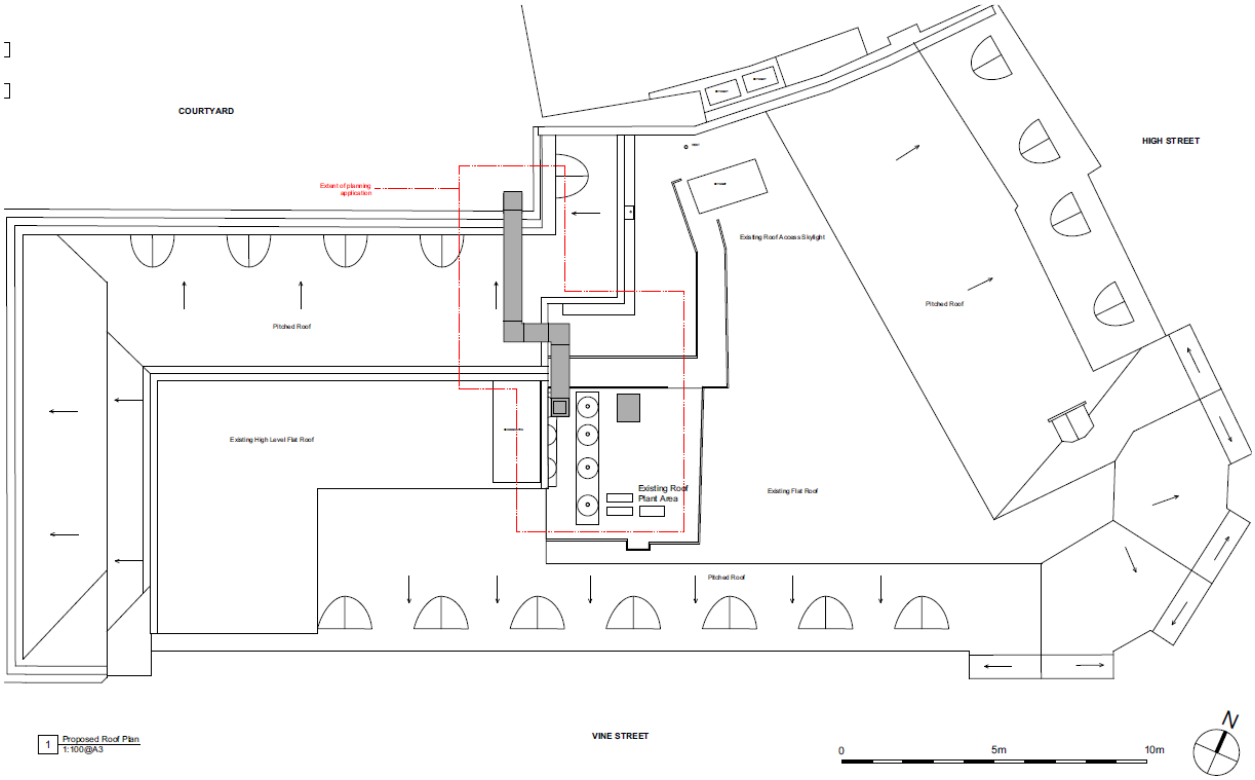
5.1 The risk factors for the restaurant exhaust have been informed by the following details.

Proximity of sensitive receptors to potential odour sources

5.2 Figure 3.1 showed the location of the flue termination relative to surrounding land users.

5.3 The restaurant kitchen ventilation will be routed to the existing plant position via the ground floor car park and up the inside of the building's rear courtyard. Figure 5.2 shows the roof plan for the proposed development. The plant area is shown within the red box.

Figure 5.1 Proposed Roof Plan



5.4 There are residential and commercial receptors within 20 m of the extract. This falls into the EMAQ "Close" proximity category ("Closest sensitive receptors less than 20 m from kitchen discharge") and scores 10.

Description of ventilation exhaust system and release point

5.5 The restaurant kitchen ventilation will be routed to the existing plant position on the roof via the ground floor car park and up the inside of the building's rear courtyard. The flue terminates 1.1 m above the pitch of the roof and the velocity of emissions is between 10 and 15 m/s. The top of the cowl is 22.8 m above the ground. This falls into the EMAQ "Moderate" dispersion category and scores 10.

Description of food, cooking type and quantities/size of kitchen

5.6 The EMAQ guidance quantifies the magnitude of the kitchen by the number of covers it serves. The restaurant has a large eating area (more than 100 covers). This falls into the EMAQ "Large" size of kitchen category and scores 5.

5.7 The cooking type would be characterised as pubs, Italian, French, pizza or steak house. This falls into the EMAQ category of "Medium" odour and grease loading and scores 4.

Assessment of Odour Risk

5.8 The level of odour risk for the restaurant extract exhaust has been estimated based on the factors in Table 4.1 and Table 4.2, and is summarised in Table 5.2.

Table 5.2 Predicted Odour Risk

Criteria	Score
Dispersion	10
Proximity of Receptors	10
Size of Kitchen	5
Cooking type	4
TOTAL	**29**

5.9 The total score is 29 and the restaurant exhaust currently falls into the "High" odour impact risk. The EMAQ guidance recommends a 'High Level' of odour control, which is described in more detail below.

Recommended Odour Controls

5.10 The minimum requirements for the different risk levels, as given in the EMAQ guidance, were summarised earlier in Table 4.3.

5.11 The level of control that would be expected as best practice for a 'High' level of odour control may include:

1. Fine filtration or ESP (electrostatic precipitator), followed by carbon filtration (carbon filters rated with a 0.2 - 0.4 second residence time); or

2. Fine filtration or ESP, followed by UV ozone system to achieve the same level of control as 1.

5.12 Providing filters meet the above standard, the odour impact at the sensitive receptors should be adequately controlled.

Recommended Maintenance of Exhaust Ventilation System

5.13 Carbon filters have a high efficiency of up to 95% for mitigating odour, but their efficiency decreases with use. They will, therefore, require regular changes (every 4 to 6 months), and constant and detailed maintenance as they are sensitive to high moisture, above 75% Relative Humidity (RH) and temperature above 40^0C.

5.14 Regular maintenance of the kitchen equipment should be carried out to ensure the system remains as efficient as possible and also to ensure that the ventilation/ extract system remains in good condition. Table 5.3 provides the EMAQ recommended minimum performance requirements of a kitchen ventilation system.

Table 5.3 EMAQ Minimum Performance Requirements of General Maintenance of a Kitchen Ventilation System

The ideal criteria for the debris accumulation within a ventilation system are as follows:		
	Surface Contaminant Limits	**Test Method**
Extract	6 g/m^2 180 µm	Dust Vacuum Test (VT) Deposit thickness test (DTT)
Recirculation	1 g/m^2 60 µm	Dust Vacuum Test (VT) Deposit thickness test (DTT)
Supply	1 g/m^2 60 µm	Dust Vacuum Test (VT) Deposit thickness test (DTT)
The maximum allowable debris accumulation within a ventilation system are as follows:		
Wet Film Thickness Test Measurement		**Recommended Action**
200 µm as a mean across the system		Complete cleaning required
Any single measurement above 500 µm		Urgent local cleaning required

5.15 To achieve these limits, EMAQ recommends that:

- a visual inspection of the ventilation system be carried out at least once a week. All metal surfaces should 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 should be cleaned on a daily basis;
- baffle type self-draining filters and collection drawers should be cleaned weekly as a minimum. The cleaning period for mesh filters should be at least twice a week;
- cleaning period for extract ductwork are used as follows:

Grease Loading	Daily Usage	Cleaning Interval
Heavy Use – Heavy/continuous grease production	6 - 12 hours per day	3 – 6 months
	12 - 16 hours per day	2 -3 months
Moderate Use – moderate grease production	6 - 12 hours per day	6 -12 months
	12 - 16 hours per day	3 – 4 months
Light Use – no significant grease production	6 - 12 hours per day	12 months
	12 - 16 hours per day	6 months

- periodic 'deep hygiene cleaning' be undertaken by a specialist contractor. All accessible main ductwork runs and branches, including fitted equipment should be inspected and cleaned. [Note: periodic will be defined by the use of equipment];
- all fans are maintained on a regular basis as recommended by the fan manufacturer; and
- ventilation grilles, where fitted have easily removable cores to facilitate cleaning.

IAQM Qualitative Assessment of Odour Impacts

Source Odour Potential

5.16 The EMAQ categorisation of kitchen size is "Large" and the food/cooking type is categorised as "Medium" in terms of grease loading, as detailed earlier. The odour is "moderately offensive" using the H4 classification. However, with the EMAQ good practice controls applied (as described in the preceding section), the residual source odour potential would fall into the "small" end of the spectrum in the IAQM examples in Table 4.4.

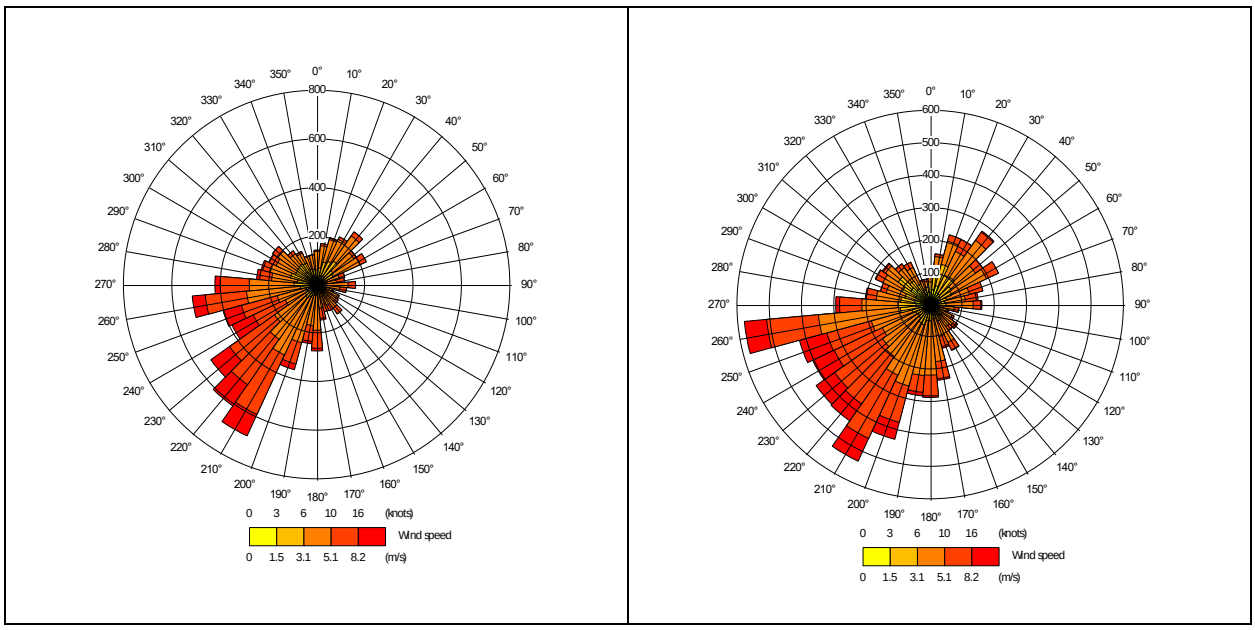
Pathway Effectiveness

5.17 The odour flux from the odour sources is dependent on the effectiveness of odour transport to the receptors, versus the mitigating effect of dilution/dispersion in the atmosphere.

5.18 The restaurant kitchen ventilation will be routed to the existing plant position on the roof via the ground floor car park and up the inside of the building's rear courtyard. The flue terminates 1.1 m above the pitch of the roof and the velocity of emissions is between 10 and 15 m/s.

5.19 The wind roses illustrated in Figure 5.1 shows the wind direction and speed measured at London Heathrow in 2015 and then in 2020. The wind rose shows that the prevailing wind direction is south-westerly.

Figure 5.1 Wind Direction and Speed Measured at London Heathrow in 2015 and 2020



5.20 This indicates that the wind would carry odours towards the High Street.

5.21 The nearest land users are 5, 6 and 7 on the High Street to the north of the site. These units include residential and commercial uses (offices and shops). Holmes Place health club is to the west on Vine Street. All these land-users are within 20 m of the flue and these receptors can be affected by odours regardless of the wind direction. The impacts at 5, 6 and 7 on the High Street and at Holmes Place health club on Vine Street are likely to be worse than at other receptors in the area.

5.22 The nearest receptors have therefore been categorised as follows for their pathway effectiveness:

Table 5.4 Pathway Effectiveness to Nearest Receptors

Distance and direction	Proportion of time downwind	Pathway effectiveness category
Receptor is local to source (within 20 m) and mitigation relies on dispersion/dilution. The release is elevated but may be compromised by building effects.	N/A (due to very close proximity)	Moderately effective

Receptor Sensitivity

5.23 Based on the IAQM example classification, residential receptors would be categorised as having a 'high' sensitivity to odour. The commercial receptors (offices, shops and the health club) would be categorised as having a 'medium' sensitivity to odour.

Assessment of Odour Effects

5.24 The results of the odour assessment for the closest receptors are summarised in Table 5.5.

Table 5.5 Likely Odour Effects at Sensitive Receptors

Receptor	Source Odour Potential	Pathway Effectiveness	Risk of Odour Exposure	Receptor Sensitivity	Likely Odour Effect
Residential	Small	Moderately effective	Negligible	High	Negligible
Shops, offices and health club	Small	Moderately effective	Negligible	Medium	Negligible

5.25 The likely odour effect from the odour extract on the roof of the building is classed as 'negligible'.

5.26 The IAQM odour guidance states that "*where the overall effect is greater than "slight adverse", the effect is likely to be considered significant.*" The overall effect in this case is considered to be "not significant".

6 Summary

6.1 This report details the odour assessment undertaken for the development of the site at the corner of Vine Street and the High Street within Uxbridge town centre.

6.2 This odour assessment has been carried out in response to a request from the Noise Officer at the London Borough of Hillingdon. The main issue for this assessment is to determine the potential for any odours from the restaurant element of the scheme to impact on the amenity of surrounding land users and to identify the appropriate requirements for odour control.

6.3 The Odour Risk Assessment of the odour extract exhaust was carried out in accordance with the EMAQ *Control of Odour and Noise from Commercial Kitchen Exhaust Systems* document. It has also been included in a qualitative assessment of odour impacts using the IAQM *Guidance on the Assessment of Odour for Planning* (2018).

6.4 The extract exhaust falls into the "High" odour impact risk. This report sets out the EMAQ recommended levels of odour control, commensurate with the risk.

6.5 With the odour controls effectively implemented, applying the IAQM guidance method of odour impact assessment showed the likely odour effect is classed as 'negligible' at the nearest receptors. The IAQM odour guidance states that "*where the overall effect is greater than "slight adverse", the effect is likely to be considered significant.*" The overall effect in this case is considered to be "not significant".

References

1 Defra, 2010, The Air Quality Standards Regulations.

2 Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 2.

3 Defra (2011) Environmental Permitting Guidance – Statutory Nuisance s79(10) Environmental Protection Act 1990 – for the Environmental Permitting (England and Wales) Regulations 2010.

4 EMAQ (2018) Control of Odour and Noise from Commercial Kitchen Exhaust Systems.

5 Communities and Local Government, July 2021, National Planning Policy Framework

6 IAQM (2018) Guidance on the Assessment of Odour for Planning.

7 Environment Agency (2011) H4 Odour Management, How to comply with your environmental permit.