

Odour Control Assessment
For
McDonald's Restaurant
Coopers Lane, Knowsley
Rev C

Client:
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Revisions

Reference	Revision	Date
A	Amended to EHO comments with residential above the nearby pub and office buildings designated as sensitive receptors.	15 Aug 23
B	Superseded text deleted.	15 Aug 23

1 Introduction

This report provides an odour risk assessment for the new proposed McDonald's restaurant at Coopers Lane Knowsley. The assessment follows the approach described in the EMAQ+, Ricardo-AEA Technology/NETCEN Guidance on the 'Control of Odour and Noise from Commercial Exhaust Systems' (2018) to identify the recommended equipment and techniques to minimise the impact of restaurant kitchen extract system.

The EMAQ+ Guide was published in 2018 to supersede the original DEFRA (2005) document which was officially withdrawn in September 2017.

References in this report to 'The Guides' can be taken as referring to either or both guide documents.

2 Policy Context

The Department for Environment, Food and Rural Affairs (DEFRA) is the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the UK and Northern Ireland. It provides air quality standards and objectives to reduce concentrations of key pollutants, which are designed to protect health, economic and environmental impacts. Local authorities have a legal responsibility to review and assess the odour and noise control aspects of the planning application. The DEFRA (2005) Guidance on the 'Control of Odour and Noise from Commercial Exhaust System' provided a framework to carry out an odour control risk assessment with the level of information required to support Planning Applications.

An updated report by Ricardo-AEA Technology/NETCEN (EMAQ+) has been published to supersede the original DEFRA (2005) document which was officially withdrawn in September 2017.

The formal status of the new Ricardo-AEA EMAQ+ report is currently ambiguous, as it does not carry the DEFRA accreditation, however it is widely regarded by Planning Authorities as an acceptable updated alternative to the original withdrawn document.

3 Regulation Governing Design and Performance of Ventilation Systems

There is no legislation directly governing the design and performance of commercial kitchen ventilation systems. However other regulations do exist protecting the health and safety of the employees, food safety, and local amenity. There are numerous sources of guidance and industry standards available relating to design and performance of ventilation systems.

Building Regulation Part F provides the requirements for ventilation systems. For commercial kitchens, Part F refers to CIBSE Guide B section 3.6 which sets out the requirements for ventilation system in commercial kitchens.

4 Site Location

The proposed development is located on a recently developed petrol filling station and restaurant development adjacent to the A580 dual carriageway junction with the A5208.

Residential property above the nearby pub and offices associated with the nearby factory have been designated sensitive receptors.



5 Assessment Criteria

The following score methodology derived from defined standardised risk levels is suggested in the original DEFRA report and is unchanged in the new EMAQ+ version as a means of determining odour control requirements using a simple risk assessment approach.

The total 'significance score' is used to determine the recommended odour control measures and techniques to be applied according to the severity of risk.

The risk schedule carries the following sub-note:

'Note 1: 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 kitchen and/or its location.'

Table 1: Odour Risk Severity Assessment

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

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

The Defra and EMAQ+ Guides on the 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems' contain an assessment procedure for identifying the potential risk of odour impacts from commercial kitchen operations. The results of this risk assessment can be used to determine a suitable level of odour abatement to be installed into a commercial kitchen.

The risk assessment for odours is split into the following four parts:

- Dispersion.
- Proximity to receptors.
- Size of kitchen.
- Cooking type and grease loading.

Each part is given a risk rating score and the total risk rating denotes the level of odour abatement which is likely to be required to prevent the kitchen from causing odour impacts. The following sections of this report outline each part of the risk assessment in relation to the proposed McDonald's Restaurant.

6 Odour Control Assessment

6.1 Dispersion

The risk rating for dispersion relates to the conditions under which kitchen extraction emissions are discharged. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- VERY POOR (20) – Low level discharge, discharge into courtyard, or restriction on stack.
- POOR (15) – Discharge not low level, but below eaves, or discharge rate below 10m/s.
- MODERATE (10) – Discharging 1m above eaves at a rate of 10-15m/s.
- GOOD (5) – Discharging 1m above ridge at a rate of 15m/s or more.

Air extracted from the kitchen at this restaurant will be discharged vertically via a single high velocity terminal located at least 1m above the flat roof 'eaves' level. The risk rating for dispersion at the proposed restaurant is therefore described as 'moderate'.

6.1 Proximity to Receptors

The risk rating for proximity to receptors relates to the distance between the point of discharge of kitchen emissions and the nearest sensitive receptor locations. Sensitive receptor locations may be residential properties, commercial premises or frequently used public open spaces. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- CLOSE (10) – Closest sensitive receptor is less than 20m from kitchen discharge.
- MEDIUM (5) – Closest sensitive receptor is between 20 and 100m from kitchen discharge.
- FAR (1) – Closest sensitive receptor is more than 100m from kitchen discharge.

The nearby pub and nearby factory offices are between 20m and 100m from the exhaust discharge point which results in a 'medium' rating under the guide classifications when these are considered as sensitive receptors.

6.3 Size of Kitchen

The risk rating for size of kitchen relates to the volume of food prepared by the kitchen and is described in terms of the capacity of the restaurant or take-away. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- LARGE (5) – More than 100 covers or a large-sized take-away.
- MEDIUM (3) – Between 30 and 100 covers or a medium-sized take-away.
- SMALL (1) – Less than 30 covers or a small take-away.

The number of meals served at this restaurant classifies it as a 'large' sized kitchen.

6.4 Cooking Type and Grease Loading

The risk rating for cooking type and grease loading relates to the type of cooking methods employed in the kitchen and the type of food prepared. The relevant risk ratings described in the guidance are shown below. The risk score is shown in parentheses.

- VERY HIGH (10) – Pubs (those serving a high level of fried food), fried chicken, burgers or fish and chips.
- HIGH (7) – Kebab, Vietnamese, Thai or Indian.
- MEDIUM (4) – Cantonese, Japanese or Chinese.
- LOW (1) – Most pubs, Italian, French, Pizza or Steakhouse.

Under the current guidance McDonald's Restaurant's would be classified with a score of 10.

The Defra/EMAQ+ Guides state:

'Odour control must be designed to prevent odour nuisance in a given situation. The following score methodology is suggested as a means of determining odour control requirements using a simple risk assessment approach. The odour control requirements considered here are consistent with the performance requirements listed in this report.'

Table 2: McDonalds Restaurant Kitchen Odour Risk Assessment Summary

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 size 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 and chips.
	High	7	Kebab, Vietnamese, Thai or Indian.
	Medium	4	Cantonese, Japanese or Chinese.
	Low	1	Most pubs, Italian, French, Pizza or steakhouse.
TOTAL		30	

The scoring system results in an overall odour risk rating of 'high', with a recommended high level of odour control as defined by The Guides to minimise the risk of odour impacts.

7.0 Guide Odour Abatement Measures

The Guides define a number of recognised odour abatement measures, to be used individually or in combinations to achieve levels of abatement rated 'None', 'High' or 'Very High', depending on configuration and on sizing and selection.

Table 3: EMAQ+ Guide Abatement Classifications

Abatement Type	Level of Odour Abatement
Panel and Bag	None
Panel, Bag and HEPA	None
Pre, Fine and Carbon Filter	High
Panel, Bag, HEPA and Carbon Filter. (Note: 'Very High' is the minimum level recommended for fried foods and concentrated cooking of burgers).	High - 0.1 to 0.2 Seconds dwell Very High - 0.2 to 0.4 Seconds dwell Extreme - 0.3 to 0.8 Seconds dwell
Panel, Bag, HEPA and Carbon Filter (As above)	High to Very High (As above)
ESP and Carbon Filter (As above)	High to Very High (As above)
ESP and Counteractant	Medium to High
ESP and UV/Ozone	High

In addition to the above, whilst the exhaust location is factored into the point scoring assessment method, the guidance additionally states that the discharge should:

1. Discharge the extracted air not less than 1m above the roof ridge of any building within 20m of the building housing the commercial kitchen.
2. If 1 cannot be complied with for planning reasons, then the extracted air shall be discharged not less than 1m above the roof eaves or dormer window of the building housing the commercial kitchen. Additional odour control measures may be required.
3. If 1 or 2 cannot be complied with for planning reasons, then an exceptionally high level of odour control will be required.

Thus, if the flue cannot be extended to a height of 1m above the tallest building within 20m, then additional odour abatement may be required.

8.0 Proposed Odour & Grease Abatement Measures

8.1 Context

This section of the report describes the proposed odour control measures for this restaurant with the particular site specific odour risk factors, using the assessment and control techniques from the Guides, to minimise the risk of odour impacts giving cause for complaint at surrounding properties.

Based on the recommendations and approaches identified in section 6 and following discussions with McDonald's Restaurants Limited and their construction development team, the following combination of odour abatement measures have been selected as the most appropriate solution for this situation.

The kitchen extract schematic shows the arrangement of proposed grease and odour control system.

8.2 General

'High Level' classification grease control and odour abatement will be provided with the use of Hikatch Canopy impingement grease baffle filters, electrostatic precipitation (ESP) filters followed by ozone injection and activation dwell duct.

8.3 System Description

Canopy Filtration

Each item of cooking equipment (fryers and grilles) has local fume extraction by means of a low level extract canopy containing McDonald's standard built-in 'Hikatch' stainless steel, removable and cleanable grease filters, which remove 98% of airborne grease at source.

Extract air volumes are controlled to within the effective grease removal range of the filters established by tests carried out at McDonald's testing facility in Rugby.

Ductwork Cleaning

Kitchen extract ductwork access doors are provided at sufficient frequency to access all internal duct surfaces for audit and cleaning purposes and not less than 1.2m intervals.

Internal ductwork cleanliness is maintained to McDonald's standardised cleaning standards, based on BESA (Building Engineering Services Association) Specification: Fire Risk Management of Grease accumulation in Kitchen Extraction Systems - TR19 – Grease 2019.

Frequency of duct cleans or audits is based on a scale related to restaurant production levels designed to meet TR19 requirements for internal duct cleanliness with a minimum of 2 cleans or audits per year.

Ventilation Rates

Kitchen ventilation rates are typically in excess of 30 air changes per hour, with full fresh air make-up.

The system is designed and automatically controlled to maximise ambient fresh air free cooling and minimise supply air heating and cooling energy use.

Electrostatic Precipitator

1No. Purified Air ESP3000 electrostatic filter serves as 'fine filtration' for further removal of airborne grease particles which further reduces grease contamination, with only yet smaller grease particles passing through and these very much reduced particles are more effectively oxidised by the subsequent ozone treatment stage than would otherwise be the case.

Ozone Injection

Ozone injection will be provided with 1No. Purified Air UV-O1000 ozone generator unit, with ozone laden air discharged into the exhaust ductwork immediately after the electrostatic precipitator. The UV-O1000 ozone generator is rated for a maximum air volume flowrate of 2.0m³/s. The UV-O will be fitted with 1No. 6 lamp modules giving 12 lamps per unit. The units are each capable of accepting 1 or 2 6 lamp modules.

Monitoring & Alarm

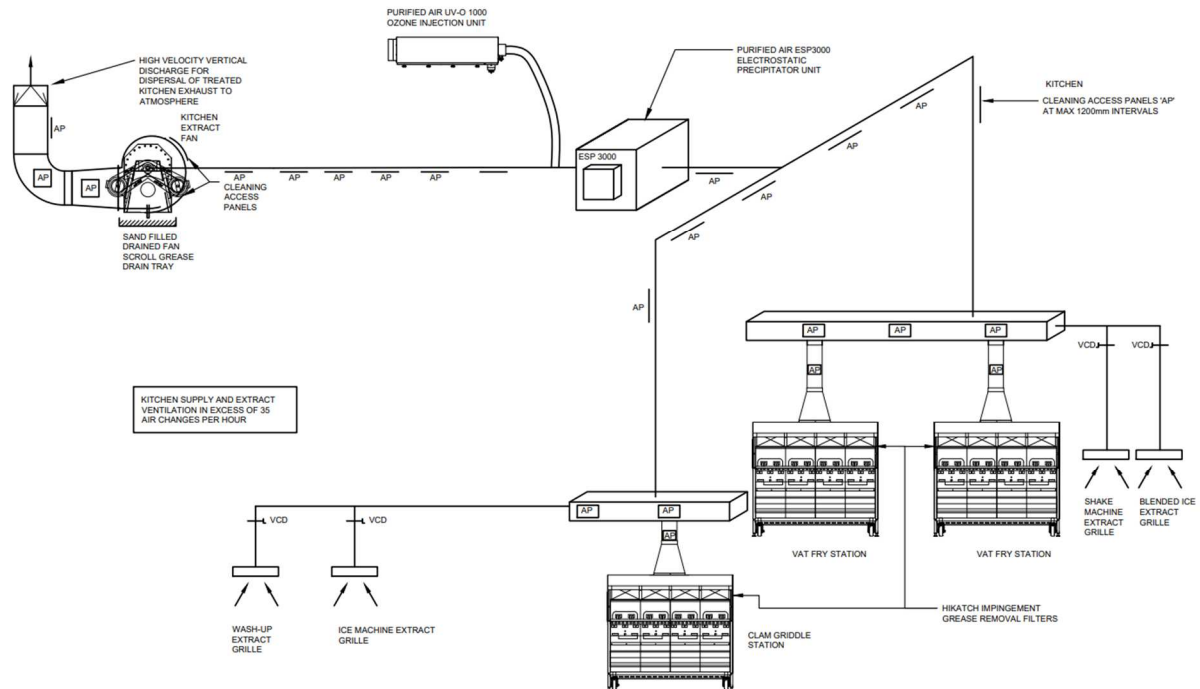
The ESP and UV units will include the manufacturer's remote status indication reporting to the Trend building management system in order to alert the store operator by automatic email in the event of failure of operation.

Discharge Arrangement

A common ducted extraction system is connected to a backward curved centrifugal extract fan which discharges to atmosphere via an un-restricted vertical high velocity discharge at 15 m/s at nominal design air volume flowrate, to provide effective dispersal of the exhaust air.

The discharge point will be in excess of 1m above eaves level and level with, but at a distance from, the top of the roof screening to achieve good dispersion without being impacted by any wind generated high velocity surface boundary layer effects whilst keeping the discharge duct below the level sightline.

8.4 Kitchen Extract Schematic



9.0 Maintenance

McDonald's Standard arrangement for maintenance is for quarterly changing of supply air system filters and six-monthly servicing.

Kitchen extract duct cleaning is carried out in accordance with Building & Engineering Services Association Guide To Good Practice – Internal Cleanliness of Ventilation Systems TR19.

Access doors are provided in the extract ductwork at minimum 1200mm intervals for cleaning purposes.

Ozone generators are serviced annually.

Electrostatic precipitator filters are serviced every two to three months.

Intervals for filter changing and duct cleaning may be increased or decreased depending on the particular store characteristics when they are apparent.

10.0 Conclusion

An assessment has been carried out using the EMAQ+ (Formerly DEFRA) style Odour Risk Assessment method and concluded that whilst the size of restaurant and nature of cooking dictate a high level of odour control, in this particular situation there are no sensitive receptors likely to experience nuisance from the kitchen extract discharge and a pragmatic approach maximising dispersal to atmosphere is recommended.

Appropriate odour mitigation can be achieved to protect the amenity of nearby receptors

The proposed grease and odour control measures meet the requirements of the 'High' classification control band, with active control systems selected within their recommended operating capacity ranges.