Air quality guidance note

Food outlets

This guideline deals with air pollution issues. It does not deal with water pollution or noise.

1 Industry description

This guideline deals with restaurants and take-away food outlets, including barbecue chicken and wood-fired pizza take-away premises—all denoted here as ‘food outlets’.

Food outlets vary in size and in the nature of the activities that occur in them. Typically they involve the following types of activities:

- transporting raw materials to the food outlet, and, in some cases, transporting final product from the food outlet
- storing and handling raw materials (e.g. raw chicken)
- preparing food (e.g. de-boning, grinding, mincing, pureeing or cutting foodstuffs)
- cleaning
- cooking food products for sale to the public (e.g. boiling, braising, roasting, frying, barbecuing etc.)
- cooking specific products such as barbecue chickens or wood-fired pizzas
- drying food
- packaging the final product for sale to the public (e.g. take-away food)
- accumulating, storing and disposing of food wastes and food-preparation wastes.

The ultimate aim of this activity is to provide food products for sale to the public, either ‘in-house’ (i.e. at dine-in restaurants) or as take-away products.

The capacity of these businesses to manage air quality depends on their location and size. In very sensitive and adverse locations even the smallest shops have a real challenge to achieve adequate control. Large operations may need to resort to controls beyond the typical level to prevent or minimise unacceptable impacts on their neighbours.

2 Potential emissions to air

The main air pollution problems with food outlets, in priority order, are:

- cooking odours
- greasy fume and fallout
- fine particulate matter as both solid and aerosol material
- volatile organic compounds (VOCs), and
- air toxics.

Definitions of each of these pollutants accompany Table 1 in the Module 3 Summary tables.

Most of these pollutants can have adverse local off-site impacts if they are not properly managed or controlled. VOCs have cumulative impacts for regional photochemical air pollution.

2.1 Odour

Nature of food outlet odours

The main air emission from food outlets is odour, primarily generated from the cooking process. Studies (including analysis of cooking fume emissions) have shown that many odorous hydrocarbons or VOCs (such as alkenes, aromatics, aldehydes and organic acids) are formed in the cooking process as breakdown products of natural fats and oils.

This take away food shop is on the ground floor of a three-storey block of flats; the odours are vented through a high stack above a small courtyard.

Strength of food outlet odours

The strength and offensiveness of the odours varies widely, depending on what is being cooked (e.g which type of meat) and the manner of cooking.

For example, local tests show that emissions from charcoal roasting of chickens are three to ten times more odorous than emissions from gas-heated or electrically-heated roasting of chickens. Tests on typical Sydney establishments showed emissions from 130 to 1300 odour units per bird cooked[1]. While these results should not be applied in any specific situation they do indicate the range in odour potential from food outlets.

[1] *Chicken Shop Odour Study*, DEC & SSROC 2004

An odour sensation is caused by gaseous molecules coming into contact with the olfactory nerve (refer to Module 1 section 3.5). However, aerosols of odorous materials, e.g. tiny organic liquid droplets in cooking fumes, can apparently increase odour strength. This may be due to continued evaporation of the odorous materials from the droplets as they travel from the source to the olfactory nerves of the observer, although other mechanisms are possible. Removing aerosols can halve the effective odour strength.

Odour complaints

Odours generate complaints from adjacent or nearby occupants, particularly from sensitive land uses such as schools, hospitals or residential areas. For example, charcoal chicken shops and other similar take-away outlets are often located at street level in a multi-storey building, or in a single-storey building surrounded by two or three storey buildings with residences on the upper levels. Emissions from these shops can waft up into neighbours' windows—a situation which councils frequently have to deal with.

The FIDOC 'test'

People respond to odours according to an array of factors, sometimes described by the acronym FIDOC. When reviewing complaints about odour from food outlets FIDOC is a useful tool for helping to check that each of the factors has been considered in developing a solution.

The FIDOC factors are fully discussed in Module 1 section 3.5.

Frequency

Does it occur every day, every night, every weekday? Are there seasonal effects, such as prevailing wind during a particular season?

Intensity

Is the odour weak, moderate or strong?

Duration

Does it last a few hours? … all morning or afternoon? … a whole working day until 5 pm? … or 9 pm?

Offensiveness

Is it a pleasant odour like baking, an unpleasant odour like rotting fruit or really foul like sewage?

Circumstances

Is the odour detectable at work, at home, while trying to sleep?

Offensiveness

Some people may not even detect what others regard as 'offensive' odours.

Also, what is regarded as 'offensive' varies widely—some people will think some cooking smells are pleasant, while others think them acrid and unpleasant e.g. odours from charcoal grills. Whether the odour relates to a person's gainful employment might well influence this perception.

Circumstances

The circumstances in which an odour is smelled are also critically important—a normally pleasant food odour can be very annoying if one is trying to sleep.

Combinations of these factors can be important, for example:

- a weak, frequent odour may be far less acceptable than a strong occasional odour (F, I)
- fresh roasted coffee odour is great at certain times, but not all day, every day (F, D, C)
- sensitivities vary significantly among different people—what is offensive to one person may not be to another, especially if it is related to gainful employment or recreation (O).

Complaints from food outlets usually arise because of frequency and duration rather than intensity.

2.2 Particulate matter

Cooking particulates

Particulates are emitted from small-scale food outlets in the form of **smoke and fumes** from roasting, barbecuing, and wood-fired cooking.

Some wood-fired pizza ovens use gas for cooking with a small wood fire to add flavour. The gas fire probably reduces odours but not particles in the woodsmoke. The particles consist of partially burnt fats emitted from the cooking meat and woodsmoke. These are known to contain materials detrimental to health such as polyaromatic hydrocarbons (PAHs) and fine particles ($PM_{2.5}$). Testing of food outlets in California has shown interesting variations with cooking methods and meats as shown in Table 1. The majority of the particulate matter is in the $PM_{2.5}$ range and nearly all in the PM_{10} range[2].

Backyard smokehouses are another source of woodsmoke problems. They may be used only for a couple of weekends in a year, but intensively on those occasions. They have no smoke or odour controls. There is probably no solution for such backyard operations other than stopping them.

Food outlets also emit particulates in the form of **oil and grease mist** from deep frying and wok-type cooking, and from fats released during roasting and barbecuing. This is not only of potential nuisance to adjacent or nearby occupants (particularly sensitive land uses such as schools, hospitals or residential areas), but also has associated odour and fallout issues.

Studies have found that emissions from the cooking process, particularly that associated with barbecue chicken shops, contain particulate matter. Particulate matter has health implications.

[2] Whynot et al. 1999 'Control of fine particulate ($PM_{2.5}$) emissions from restaurant operations' *J air & waste mgt assoc*, Vol 49 Sept pp PM95–99.

Table 1: Emitted particulates and VOCs for different styles of cooking

Food and style of cooking	PM g/kg cooked	VOC g/kg cooked
A 25% fat hamburgers, under-fired char broilers	32.65	3.94
B Whole butter-fried chickens, under-fired char broilers	10.48	1.82
C 24% fat hamburgers, flat griddle	5.08	0.07
D 21% fat hamburgers, uncontrolled chain-driven char broilers	7.42	2.27
E Atlantic salmon fillets, under-fired char broilers	3.3	0.38
F 21% fat hamburgers, chain-driven char boilers with controls	1.29	0.32

(From a Californian study—see footnote 2 above.)

The difference between charcoal cooking and conventional gas-fired cooking is evident by comparing A with C: this is consistent with the Sydney study referred to in footnote 1. The effectiveness of controls is seen by comparing D with F.

Other sources of particulates

Further minor sources of particulate emissions are handling and transport activities (e.g. road generated dust, if the roads are unsealed). Most food outlets will not have the potential to cause this problem. For example, a take-away food shop with public access via tar road and concrete footpath will not generate dust in this way.

Impacts of cooking particulates

Local amenity impacts from particulate fallout could include the fouling of washing hung out to dry, or freshly painted (e.g. house) or washed (e.g. car) surfaces.

2.3 Volatile organic compounds

Other air emissions from food outlets, particularly from barbecue chicken shops, include VOCs—precursors to regional photochemical pollution.

Studies on air emissions generated from barbecuing chickens have revealed many unsaturated hydrocarbons, a form of VOCs that is highly reactive in the photochemical process.

The primary source of these emissions is the cooking process itself, as mentioned above. The control of emissions to overcome local problems can have a regional benefit, albeit a small one. The estimated VOC emissions from a small barbecue chicken shop[3] is roughly equivalent to running a typical car for 20,000 km per year.

Grease particles and aerosols can also be generated from the cooking process, and if not captured near the emission source, can impact on the surrounding environment.

[3] Averaging 100 kg/day of cooked meat over 300 days per year of operation.

2.4 Air toxics

Barbecuing over charcoal has been shown to generate heavy organic compounds when the fats and greases drop onto the red-hot charcoal. Examples are polycyclic aromatic hydrocarbons (PAHs), benzene and toluene. The Sydney study (footnote 1) revealed both benzene and toluene present in the emissions from cooking, with levels significantly higher for charbroiling. These toxic materials are released as vapours or in sub-micron condensed liquid particles which rise towards the exhaust hood. Some may be absorbed in the fats and grease on the food, some may be collected in the grease filters in the hood, but some may pass through to the stack.

3 Controlling food outlet emissions

3.1 General approach

Controlling emissions from food outlets is usually achieved using a combination of:

- capturing the cooking fumes at source
- removing oil and grease by filtration, impingement or scrubbing
- modifying the method of cooking, where feasible
- dispersing emissions through a stack
- separating the source from receptors
- good housekeeping, to avoid odours typically associated with a build-up of rancid fats and putrefaction of foods and food wastes, and
- regular cleaning and maintenance of filters.

For difficult situations, where a solution cannot be achieved using these basic measures, more advanced control techniques are available, including

- carbon adsorbers
- electrostatic precipitators
- high-energy wet scrubbers
- flameless catalytic oxidisers.

Descriptions of these are set out in Module 3 Part 1, ‘Air pollution control techniques’.

Carbon adsorbers have been used in NSW.

Electrostatic precipitators, high-energy scrubbers and catalytic oxidisers have been applied in some jurisdictions, notably California and Hong Kong. However, they are expensive and also relatively difficult to operate.

These more advanced control techniques can be considered when the straightforward ‘general approach’ described here has been shown to be inadequate.

3.2 Types of emission sources

Emissions may be discharged from:

- **a point source** venting a process, piece of equipment or cooking area—e.g. an exhaust point or stack
- **a fugitive source**—e.g. escaping from doors, windows or other building openings. Fugitive sources include storage areas, particularly where putrescible (rotting) food wastes are kept.

> The objective of efficient control is to make sure the most significant odour sources are captured and treated or dispersed. Odours from waste storage areas are best controlled by keeping surfaces clean and storing wastes in closed containers.

Mechanical ventilation is required in most food shops. It should comply with Clause F4.12 of the *Building Code of Australia* and *Australian Standard AS 1668 Parts 1 & 2*. The business must provide a report certified by a mechanical ventilation engineer indicating compliance. In particular, air capture velocities and air exhaust rates must comply.

3.3 Potential sources

Sources of air emissions from food outlets and their potential control and management options are summarised in Table 2.

Table 2: Sources and management options for food outlet emissions

Nature of source	Control and management options
Handling and storing raw materials	Enclose the activity Cover materials during transport
Cooking (generating smoke, fumes and particulates)	Install: fume extraction and ventilation filtration to remove fumes and particulates carbon adsorption or more intensive techniques to remove odours stack (with correct configuration) to aid proper dispersion of odours Consider wind direction and meteorological factors
Transporting putrescible waste products off site	Store wastes in closed containers away from direct sun Remove wastes promptly from premises Cover wastes during transport
Cleaning	Install fume extraction and ventilation
Drying	Install fume extraction and ventilation Clean filters etc.
Packaging final products	Install fume extraction and ventilation

3.4 Managing odour

Land use planning

Planning the location of new food outlets as part of the development consent process is a fundamentally important aspect of odour management.

> Separation from sensitive receptors and elevated release of emissions (stack height) are the key factors in planning decisions, and they can be used in combination.

Medium to large outlets and restaurants should be required to have an odour assessment performed by a competent consultant, using the DEC *Approved methods and guidance for the modelling and assessment of air pollutants in NSW* (2005) and DEC Draft policy *Assessment and management of odour from stationary sources in NSW* (2001). This is particularly the case if the business is planning to use known odorous processes, such as charbroiling, in substantial volumes and relatively close to sensitive receptors. It is essential that the influence of nearby buildings and large objects is fully incorporated into any assessment.

Caution should be exercised in requiring smaller outlets to comply with this requirement because the expense is likely to be in the order of $15,000 to $20,000. **Carbon adsorption could be installed for comparable cost with a known positive outcome.**

Management by dispersion

If collected and vented to a suitably configured stack (that is, with appropriate height and discharge velocity) odours can be dispersed to concentrations that are acceptable. If the necessary stack height is too great for this to be a realistic option, then an odour control technology such as activated carbon or catalytic oxidiser can be used to treat the odour before discharge. (Sizing of stacks is discussed in Module 3 Part 1, section 3.2.)

The prevailing wind direction will indicate to shop operators which local areas will be impacted by odours. A common concern for food outlets located near the seaside is the prevailing sea breeze from mid morning to late afternoon (refer to Module 1 section 2.1 for a description of sea breezes). If multi-story residences are located behind the traditional row of shops fronting the beach they are likely to be subject to cooking odours during a long period of the day when food is being prepared.

Changing cooking method

In some cases a change from charcoal-fired cooking to gas-fired cooking, with compensating modifications to the food preparation, may be a possible solution to the problem. It would need to be clearly demonstrated that emissions from the proposed change would be effective—through, for example, trials involving planned odour and visual observations.

In many cases this will not be feasible as the charcoal element in the preparation is one of the selling features of the product.

Odour control equipment

High-energy wet scrubbers and electrostatic precipitators are largely ineffective in removing odours and VOCs. They can remove odorous aerosols from cooking fumes and so may marginally reduce the impact of the odours. They will effectively reduce greasy fallout.

Removing the aerosol of fats and oils from cooking emissions should be practised in all food outlets. A simple mesh filter which relies on an impingement principle is the basic equipment usually installed as a standard in cooking ventilation systems. While this is effective in reducing the nuisance of oily fallout, it will have at best only a marginal impact on odour reduction.

If dispersion is not likely to be effective in the situation—that is, there are tall buildings surrounding the food outlet and a high stack is not feasible—then reducing the odour at source is essential.

Activated carbon adsorbers

Activated carbon adsorbers or 'filters', and the accessories required to adapt this system to a discharge stack, are readily available and are used in a wide range of commercial and industrial applications. The principles of carbon adsorption are described in Module 3 Part 1, section 4.11.

Activated carbon works by adsorbing odorous materials into the pores of the carbon which is usually in a granular form and packed into a filter or bed through which the odorous gas is passed.

Activated carbon filters are effective for a wide range of concentrations and odorous compounds that exist as a gas or vapour.

There **must be a pre-filter** to protect the carbon from excessive dust and grease as these will block the pores and stop the carbon from adsorbing odours. Several stages of progressively finer filtration may be needed to ensure the activated carbon bed does not become clogged by the cooking fumes too quickly.

The capacity of the adsorber is reached when 'breakthrough' occurs—that is, when the odour can be detected on the discharge side of the filter. By that time a new filter should be installed and the old filter discarded as an industrial waste. It may only be disposed of to landfills licensed to accept such wastes. Refer to Module 3 Part 1, section 4.11.

Removal of other gaseous emissions such as VOCs and air toxics, like benzene and toluene, can be achieved by carbon adsorption for odour control.

Flameless catalytic oxidisers

Flameless catalytic oxidisers have not yet been used in Australia. However, they may be effective in particularly difficult situations where more conventional approaches have failed.

In the Californian South Coast Air Quality Management District, chain-driven char broilers are required to be fitted with flameless catalytic oxidisers to reduce emissions of odour, VOCs and particulates.

The catalyst bed consists of a porous ceramic disc (approximately 600 mm in diameter by 90 mm deep) coated with a metallic catalyst. It requires an entry temperature of above 320^0C. Volatile organic matter from the cooking is adequate to maintain the oxidation on the catalyst without secondary gas fuel. The principle of thermal oxidisers is discussed in Module 3 Part 1, section 4.14.

Electrostatic precipitators

Electrostatic precipitators can be effective in removing oily aerosols from cooking fumes. They are generally suitable for larger establishments. They will not remove odours as such, but do remove odorous aerosol materials. They are also effective in removing particulates formed in smoke.

They require regular cleaning to remove the greasy particulate build-up which adheres to the electrode collector plates. The principle of precipitators is discussed in Module 3 Part 1, section 4.10.

Wet scrubbers

Water scrubbers are found in some cooking facilities. They do not remove odours because most odorous compounds from cooking processes are relatively insoluble in water. Medium to high-energy scrubbers can remove aerosols and particulate matter from cooking fumes, with intermediate effectiveness.

Wet scrubbers have been used extensively in food outlets in Hong Kong, but they frequently create noise problems, due to air movement associated with the high pressure drop. They also create a liquid waste which has to be disposed of. The principle of wet scrubbers is discussed in Module 3 Part 1, section 4.4.

3.5 Controlling particulate matter

Cooking processes

Particulate matter from cooking processes can be controlled by using the odour treatment technique as described above—that is, by **installing a filter in the ventilation system**.

> However, for processes generating considerable smoke (such as charcoal cooking), a more rigid checking and maintenance program is required to make sure the particulate filtration system is performing satisfactorily. Cleaning and replacement need to be done at regular intervals, e.g. cleaning or replacing a grit arrestor.

Transport and vehicle movements

For sealed roads and yards, regular sweeping should be adequate to avoid particulate emissions.

For unsealed roads and yards, watering techniques as described in Module 3 Part 1 section 4.16 can be considered where there are likely to be impacts on sensitive receptors. Where heavy traffic is involved sealing may be warranted.

4 Assessment process

The process of assessing a food outlet involves a number of key inspections:

- a **visual inspection** of the food outlet's operations and activities, including the housekeeping practices
- inspection of on-site **management practices** and **management of processes**
- inspection of the on-site **management of waste handling**, e.g. how food refuse and any air emissions from these activities are managed.

4.1 Initial visual inspection

Before going on site for an inspection or assessment the following should be checked:

– the consent conditions for the premises or the activity, and

– any previous reports on file including diagrams, photographs, maps, etc.

This is extremely important, not only to determine the nature of the activities and housekeeping practices at the food outlet, but also the level of management and control of emissions.

Housekeeping

Housekeeping is important, both inside and outside the food outlet, because accumulated dust can cause a nuisance not only to residences in the immediate vicinity, but also to workers within the premises.

Airborne dust may carry odours associated with the material that becomes airborne.

Questions to ask about housekeeping

- Is there a housekeeping protocol or program in place at the food outlet, and is it sufficiently detailed?
- Does the housekeeping program include appropriate actions to be undertaken by personnel at the food outlet?

Examples of actions include regular checking and cleaning of dust and accumulated rubbish or waste, and correct disposal of these wastes.

The housekeeping protocol should specify these actions as tasks to be carried out by the person acting in a particular role, to make sure they are carried out regardless of changes in personnel. They can't be left to one person.

4.2 Management of practices

The movement of vehicles in, out, and around the food outlet can generate dust emissions. At many of the smaller food outlets this may not be an issue (as determined during the initial visual assessment). However, at larger food outlets dust generation may be more prominent and therefore more likely to generate complaints.

For example, trucks may be entering the site's unloading and loading areas and on-site forklifts may be helping with activities to deliver raw materials or to pick up final products. Airborne dust may be generated, particularly if the areas are unsealed.

Questions to ask about practices

- Is on-site management taking steps to reduce emissions from these practices? For example, sealing these areas with concrete or bitumen, or are water sprays being used on unsealed areas?
- Are some access doorways on buildings always left open during certain activities, and so increasing the likelihood of air emissions escaping to the outside environment? For example, larger doorways to service forklifts and trucks.

4.3 Management of processes

Cooking emissions are the major sources of emissions at a food outlet, particularly odour emissions.

Questions to ask about processes

- Are problem sources of odour being appropriately managed? For example, by adequate dispersion and dilution of gases—adequate stack height and correct stack configuration—and so on.
- Is wind direction, time of day and proximity to residences taken into account when cooking is taking place?
- Are dust and grease particles being extracted via collection systems and treated? For example, by using a simple grit arrestor or grease trap? Is there a maintenance program for these systems?

Simple emission test

If **odours associated with the processes** can be clearly discerned downwind at the boundary (for example, on the footpath outside or at the shop entrance) it is likely that operations at the premises could cause nuisance impacts, and odour control at source is required, or improved dispersion of odours, or both.

Similarly, standing downwind at the property boundary on a dry and still day is the best way to determine whether a potential problem exists with respect to **particulates (dust) or grease particle emissions** from point sources. They will tend to fall out in the immediate area under such conditions if the controls or dispersion are inadequate. **Oily fallout** will sometimes be evident around the stack top or on surrounding roofs.

Material Safety Data Sheets

If chemicals are used on site (e.g. solvents), the operator should be able to provide Material Safety Data Sheets (MSDS) on the chemicals they use. If the materials are potentially toxic or odorous, workplace air exposure levels may need to be checked and appropriately managed. Odour emissions from these chemicals should be managed as described above.

(MSDS are available from the chemical suppliers.)

Other safety aspects

Other safety aspects of the collection devices, where oil mists are generated or where fats may accumulate, should also be checked and cleaned regularly, e.g. electrical equipment or dust ignition proof (DIP) devices on fans, etc.

4.4 Management of waste products

Waste generated by food processing activities (e.g. waste from de-boning or cutting foodstuffs) can also generate air emissions. Transporting these waste materials can also generate dust emissions (road-generated dust).

Questions to ask about waste management

- Does the management take adequate steps to cover loads of waste?
- Has the management considered reuse and recycling options for material wastes? For example, anaerobic digestion, composting, vermiculture, piggeries, etc.

4.5 Staff training

Workforce training to increase awareness of air emissions can be carried out at all levels—shop assistants, maintenance workers, managers. The training would include issues such as considering the timing of activities and prevailing wind direction, especially for operations such as barbecuing chickens.

4.6 Consultation

Consultation with and notification of affected parties is an option that should be considered by the food outlet's management.

4.7 Improving emission performance

Management options include:

- improving the manner in which the site is operated and maintained—e.g. training operators to minimise odours when preparing and cooking food
- taking steps to minimise waste—e.g. recycling or reusing waste.

Cooking operations should be also checked for generation of fugitive air emissions, such as odour emissions that can escape through doorways or windows.

Questions to ask

- Is the management taking steps to contain or reduce emissions such as odours?
- Is the exhaust hood fully effective?
- Are some cooking operations being done without an exhaust hood, or outside the effective range of a hood?

5 Legislative and regulatory context

Restaurants and take-away food outlets are not scheduled under the POEO Act, and therefore do not require licensing by DECC.

Food outlets are therefore regulated by local councils. The environmental management and resolution of any air pollution-based nuisance or off-site impacts caused by particulates or odour from such premises is primarily the responsibility of the site operator.

> Local government officers have an important role in managing the compliance process for food outlets and enforcing positive environmental outcomes via the use of statutory notices, orders and directions. (Refer to Module 2 of the Toolkit.)

6 Considerations for consent conditions

Other conditions may be necessary to control environmental impacts other than air pollution:

6.1 Standards to be met

- In cases where odour modelling and testing is to be undertaken, odours from the premises to comply with the requirements of DEC draft policy *Assessment and management of odour from stationary sources in NSW* (2001).
- Solid particle emissions to comply with POEO (Clean Air) Regulation 2002 for any stack discharges on the site:
  - 400 mg/m^3 for plant installed before 1 Aug 1997 (not for a new development consent)
  - 250 mg/m^3 for plant installed between 1 Aug 1997 and 1 Sept 2005 (not for a new development consent)
  - 100 mg/m^3 for plant installed after 1 Sept 2005
- Need for compliance testing to be considered in each situation, balancing expense to the operator against likely sensitivity and the extent of likely impact.
- A typical compliance test condition would require:
  - tests to be carried out in accordance with the DEC publication *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (2005) by an accredited testing body (NATA or equivalent) within a reasonable time of commissioning (typically three months)
  - results to be reported to council within a specified time (typically one month from the testing), and
  - interpretation and commentary on the test results to be provided to council.
- Smoke to comply with Ringelmann 1 or 20% opacity.
- Dust emissions constituting environmental nuisance not to impact on neighbours.
- Plant to be operated and maintained in a proper and efficient manner which does not cause air pollution, in accordance with s. 124 and 125 of the POEO Act.
- Materials to be handled in a proper and efficient manner which does not cause air pollution, in accordance with s. 126 of the POEO Act.

6.2 Operational and control requirements

- Odours from the premises not to be detectable at the nearest sensitive land use.
- Odour sources such as cooking areas (particularly for barbecuing chickens) to be suitably ventilated. Cooking emissions to be captured and discharged at a suitable height so as to not cause an odour nuisance.
- Odorous exhaust gases to be treated by activated carbon adsorbers, before exhaust gases are discharged to atmosphere. Ventilation system to be equipped with efficient filtration equipment to remove particles and aerosols from the cooking exhaust before it enters the activated carbon adsorbers.
- Activated carbon adsorbers to be checked regularly for odour 'breakthrough' (and the filter changed once breakthrough has been reached).
- Spent activated carbon to be disposed of to landfills which are licensed and approved to accept this type of waste material.
- Exhaust stacks to be vented at a height clear of downwash effects from the building in which the activity is located and adjacent buildings and a minimum of 3 m above the highest point of the building roof ridge line or above that of any higher adjacent building within 50 m.
- Exhaust stack gases to be vented with a design exit velocity of at least 10 m/s without any impediment to vertical discharge.
- The particulate filtration system installed (for example, a filter or grit arrestor in the cooking ventilation system) to be maintained in efficient working order at all times.
- The ventilation system used for collection of emissions (e.g. fume hood) to be maintained in efficient working order at all times. Material accumulated on the inside of the hood and ductwork (e.g. fats from cooking) to be checked and removed periodically.
- Grease traps installed in the cooking systems to be maintained in efficient working order at all times.
- No visible particulate emissions to be discharged from an exhaust stack.
- Roads and access pathways to be watered or sealed, if the particulate fallout from that emission source is determined to present an environmental nuisance.
- Waste materials, including grease or fats removed from the grease trap system (if in place) to be packaged and labelled in the correct fashion, removed from the site and transported to an approved disposal site.
- Materials to enter and leave the site in enclosed containers. Open loads to be covered.
- Monitoring of control equipment to be assessed based on
  - extent of emissions
  - toxicity or odorous potential of emissions, and
  - sensitivity of the activity.
- Appropriate monitoring devices to be used, as specified in Table 6 in the Module 3 Summary tables.
- All activities, including housekeeping, to be carried out according to industry best practice.
- Hours of operation to be restricted where appropriate to ensure there are no impacts on sensitive receptors

Food outlets: air quality management checklist

This checklist has been designed for:

- assessment officers—to help identify potential air pollution issues early in the assessment process and devise consent conditions which will prevent or minimise air pollution problems.
- compliance officers—to help with routine inspections, as part of an audit program or as part of a complaint investigation.
- owners and operators—as part of a set of educational materials and to help identify and manage potential air quality issues.

Company
Address
Site location

Contact	Permit assessment
	Complaint response
Phone	Compliance inspection
Fax	Time & date of inspection
Email	Inspector's name

A Site location and context

What are nearby sensitive land uses (e.g. schools, hospitals etc.)

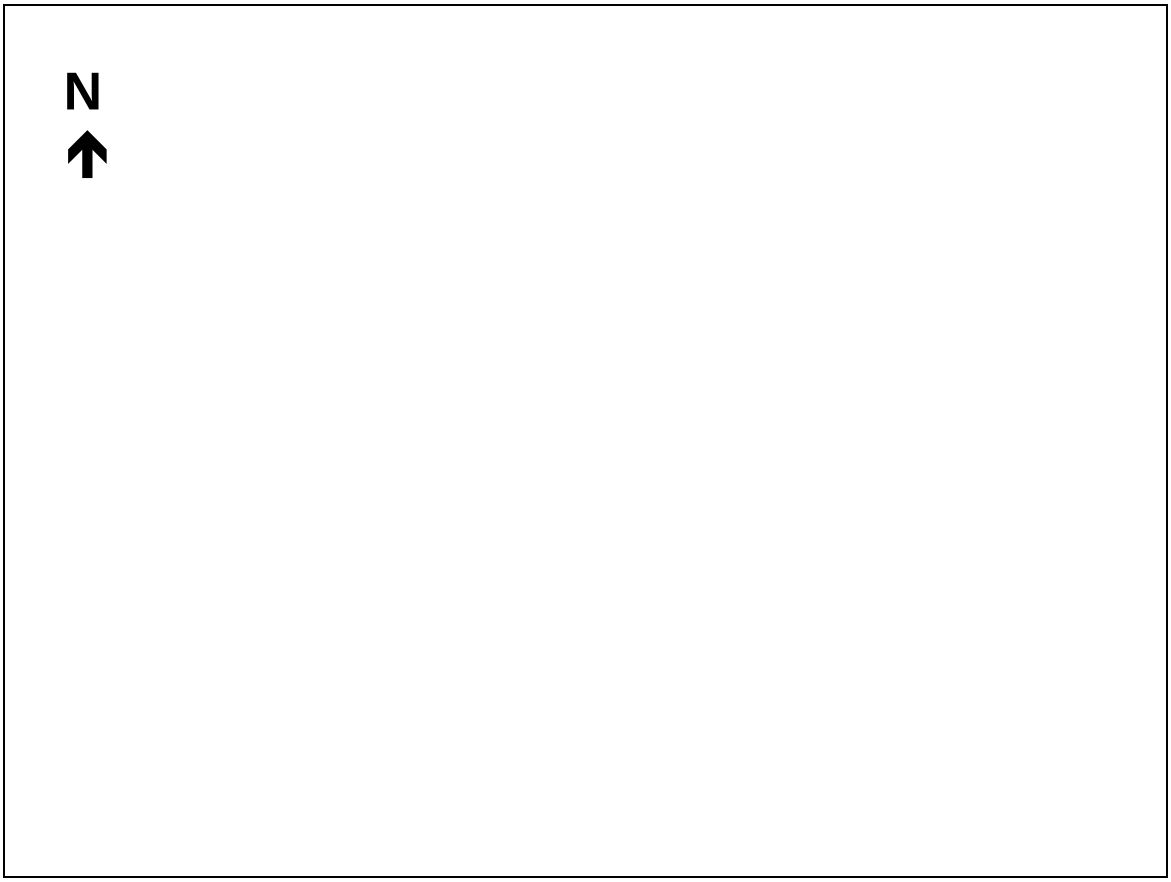
	Land use	Distance	Comments
North			
South			
East			
West			

What are the characteristics of the site that will effect the dispersion of air pollution?

Topography	
Winds	
Other	

B Sketch plan of the site

Draw a sketch plan of the site showing the surrounding land uses, nearby buildings and local topography.



Note particularly:

- nearby sensitive land uses (schools, homes, other affected premises, etc.)
- locations of any complainants
- locations and heights of nearby buildings or trees
- locations and heights of stacks on premises
- wind directions during times of complaint (night and day)
- any other relevant features.

Comments:

C Results of odour survey

Date	**Time**	**Location** [1]	**Wind speed** [2] **(estimate)**	**Wind direction**	**Temperature** [3]	**Weather:** cloudy sunny	**Odour type**	**Odour strength:** weak medium strong	**Comment**

1 Make observations upwind and downwind of source premises.

2 Estimate in metres per second, or knots, or by the Beaufort scale, or failing that, descriptively, e.g. still, light breeze, moderate wind, strong wind and so on.

3 If the temperature is not known or can not be measured at the time of the survey, then find and record it later.

D Activities

Tick yes if the activity is carried out on the premises, and add comments as appropriate

Activity	Yes	Comments
Transporting raw materials to the food outlet		
Storing and handling raw materials (e.g. raw chickens)		
Food preparation (e.g. de-boning, grinding, mincing, pureeing or cutting of foodstuffs)		
Cleaning		
Cooking food products for sale to the public, including take-away items		
Cooking method used: gas-fired barbecue gas-fired hotplate wood-fired barbecue chain-fed wood-fired barbecue woof-fired pizza charcoal grill deep frying pans other		
Drying		
Using chemicals		
Packaging		
Selling food products to the public		
Transporting products from the food outlet (by the public or delivery vehicles)		
Transporting wastes from the food outlet		

E Standard of housekeeping on the premises

Indicate: satisfactory (✓), unsatisfactory (x) or NA and any action required.

Activity		Comments
Storage area		
Cleaning area		
Preparation area		
Cooking area		
Drying area		
Packaging area		
Product public sale area		
Waste disposal and removal area		
Traffic movement area (for incoming raw materials and outgoing products)		
Traffic movement area for public access, including car parking		

General comments on housekeeping:

F Management of emissions to air

Tick if yes and add comments as appropriate

Odours

Question	Yes	Comments
Can odours be detected off site?		
Do odours cause offence to any neighbours?		
Are odours being controlled? How?		
Are more controls needed?		

Particulates—grease and aerosols

Question	Yes	Comments
Are particulate emissions (including grease) visible from any activity?		
Is particulate fallout detectable outside the site?		
Are any filter-type systems used to control dusts on site?		
If yes, what type? (e.g. grit arrestors)		
Are collected dusts handled or recycled?		
If yes, how? (e.g. removed as rubbish)		
Are access pathways sealed?		
Are access pathways watered down to control dust?		

Safety issues

Question	Yes	Comments
Do the collection hood systems have safety items?		
Are fire protection measures appropriate?		
Are all chemicals used on site stored and handled appropriately?		

List any attachments here: