

Technical Note

Project Title	Grand Parade Undercroft, Bath		
Subject	Ventilation strategy statement in support of planning application	Date	29/10/13
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This note describes the ventilation strategy for the proposed restaurants and the measures proposed to maintain air quality in the vicinity of the restaurants.

Catering kitchens

Mechanical supply and extract systems will be required in order to ventilate the restaurant kitchens and this will form part of the Tenant fit-out.

Under normal circumstances, air extracted from a commercial kitchen would typically be discharged at high level above a building's roofline in order to allow smoke particles and smells to dissipate, away from occupied areas.

However, there is no suitable route to discharge at high level without resorting to installing exposed ductwork on the facades of the sensitive listed buildings above the proposed restaurant units. Instead it is proposed that a high level of odour control equipment will be installed on the kitchen extract systems and that discharge of exhaust air will be at low level. The proposed discharge locations are shown on the drawings and are via the new lift/staircase beacon for the Southern restaurant and via the colonnade for the Northern restaurant.

It is therefore proposed that as part of their tenancy agreement, tenants will be required to fit out and operate their restaurants with a very high level of odour control with an approved filtration and odour control system.

The recommended approach to achieving this standard is to install an array of UV lamps within the kitchen extract canopies in order to break down grease at source before it enters the ductwork (and hence prevent this building up and releasing odour into the exhaust air).

This is then combined with a series of filters (panel filter, bag filter, HEPA filter) and an activated charcoal filter at the extract air handling unit in order to remove any remaining particulates and any ozone produced by the UV oxidation process.

The kitchen extract system will therefore comprise (for each restaurant):

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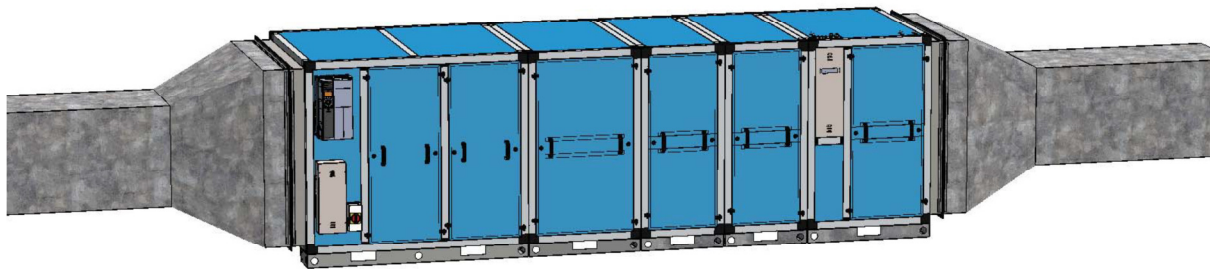
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- Canopies/hoods with primary grease filters and UV oxidation system
- Secondary filters (grade G4)
- HEPA filter
- Activated charcoal filter with 0.2 – 0.4s residence time
- Extract fan
- Silencer
- High velocity discharge



UV grease breakdown system within a kitchen canopy



Extract air handling unit showing compartments for multiple grades of filter, including activated charcoal filters)

This system will provide a very high level of odour control. The high velocity vertical discharge from the beacon on Grand Parade will be unrestricted by a cap or similar and this is the best way to dissipate the exhausted air in accordance with best practice.

Although this level of filtration and UV treatment will necessarily add to the energy consumption of the kitchen ventilation systems, this can be significantly mitigated by adding infra-red demand sensors in the hoods in order to vary the output of the UV lamps and speed of the fans to match the cooking activities taking place.

A demand sensing control system will also be included as a condition within the tenancy agreements.

The exact ventilation rates required (and hence plant size) will depend on the type of cooking equipment being installed and the kitchen layout.

However, an initial assessment of the likely maximum rates has been carried out using HVCA DW172 ("Specification for Kitchen Ventilation Systems" – the industry standard for commercial kitchens) which gives a recommended extract rate of about 3.6 m³/s per kitchen with 2.9 m³/s of mechanically supplied make-up air.

This has been reviewed with a specialist manufacturer and they have confirmed that this is likely to be a sensible design ventilation rate for restaurants with a range of cooking appliances, such as high end restaurants and bistros.

Restaurant Dining Areas

The dining areas in the both restaurants will be naturally ventilated in order to minimise energy consumption and the requirement for plant space.

Initial calculations have been carried out using CIBSE AM10 in order to ensure that suitable openable areas are available to facilitate this strategy.

High level openings along the river façade will allow for a comfortable level of background ventilation throughout the year without creating excessive cold draughts at low level. The current intention

As the colonnade façade is relatively limited in the Northern (vaulted) restaurant, these high level openings will be supplemented by a passive ventilation stack running to street level via a duct through the Northern beacon to increase ventilation rates

When boosted ventilation rates are desirable (e.g. during summer or to allow the purge of smells etc.), this can be achieved by opening the large doors at low level.

Plant Space for HVAC Equipment

Based on the kitchen ventilation rates and filtration strategy above, the extract air handling units for each kitchen are likely to be in the order of about 4m long x 1.5m wide x 1.5m deep.

Supply air handling units are likely to be somewhat shorter (perhaps 2-3m long) but will have similar cross sectional dimensions, due to the volume of air handled.

All AHUs are likely to require silencers on both sides in order to achieve suitable noise levels and bend attenuators will be employed to make best use of the available space.

Ductwork between the air handling units and kitchen hoods is likely to be in the order of about 800mm x 800mm in section.

The above sizes have been used to develop the ventilation plant space provision on the current layouts.

Essentially:

- Within the Empire undercroft, plant can be laid out side-by-side and located on a mezzanine deck above the back of house areas near the southern beacon. Intake will be via a louvre into the colonnade and exhaust ductwork will rise to street level to discharge via the South beacon.
- Within the vaulted restaurant, there is insufficient height to mount the kitchen ventilation plant on a mezzanine deck, hence the units will need to be stacked vertically within one of the vaults. Ductwork will then run to the kitchen hood(s) via openings through the vaults at low level, concealed within a false wall.
- Intake ductwork will run to a high level louvred opening on Boatstall Lane and exhaust ductwork will run to a high level termination into the colonnade.

The final design for the restaurant ventilation will be developed by the tenant.

Space for External Condensing Units

It is likely that tenants will want to cool (and probably heat) the restaurant areas by means of reversible air-source heat pumps. A possible space has therefore been identified for the external condensing units for these systems, concealed within the services zone at the back of the vaulted area.

This will be ventilated to the light-well via an acoustic louvre in order to allow external air to circulate and prevent the local build-up of heat (or “coolth” in winter) whilst maintaining and acoustic screen between the plant and the Empire hotel.