



RIDGE

**VENTILATION STRATEGY
REPORT FOR ROYAL BUILDINGS
CRITERION CAPITAL**

14th June 2023



ROYAL BUILDINGS CRITERION CAPITAL

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1. INTRODUCTION

This report has been prepared by Ridge & Partners LLP in support of the planning application for the proposed renovation of a five story office building to create a hotel and associated ancillary spaces at Royal Buildings, Manchester.

2. DEVELOPMENT PROPOSALS

2.1. Description of Development Site

The site is located in Manchester and is bounded by Market Street to the North and Mosley Street to the East.



Plan of the site and the surrounding area

3. VENTILATION COMPLIANCE

All the ventilation systems shall comply with the following:

- Approved Document Part B
- Approved Document Part F
- Approved Document Part O
- CIBSE Guides
- Relevant British Standards
- DEFRA Guidance Document "Guidance on the Control of odour and Noise for Commercial Exhaust Systems"

Overall, the ventilation strategy shall support the overall "well-being" and safety of the occupants and enhance the environment of the spaces, support low energy and carbon solutions.

Section 5 of this report details the ventilation proposals in accordance with the aforementioned documents.

When deemed appropriate the design shall attract relevant credits for BREEAM and promote good practice ventilation strategies throughout the development.

4. DEVELOPMENT AREAS

The different areas within the development can be split into the following:

- Hotel rooms
- Reception
- Entrance Area
- Communal spaces – corridors/lobbies/staircases

All of these different spaces require differing ventilation strategies in order to meet the requirements and criteria set out in Section 3, in addition to meeting the health and the wellbeing requirements of the occupants. These strategies are summarised in Section 6 of this report.

5. VENTILATION PROPOSALS

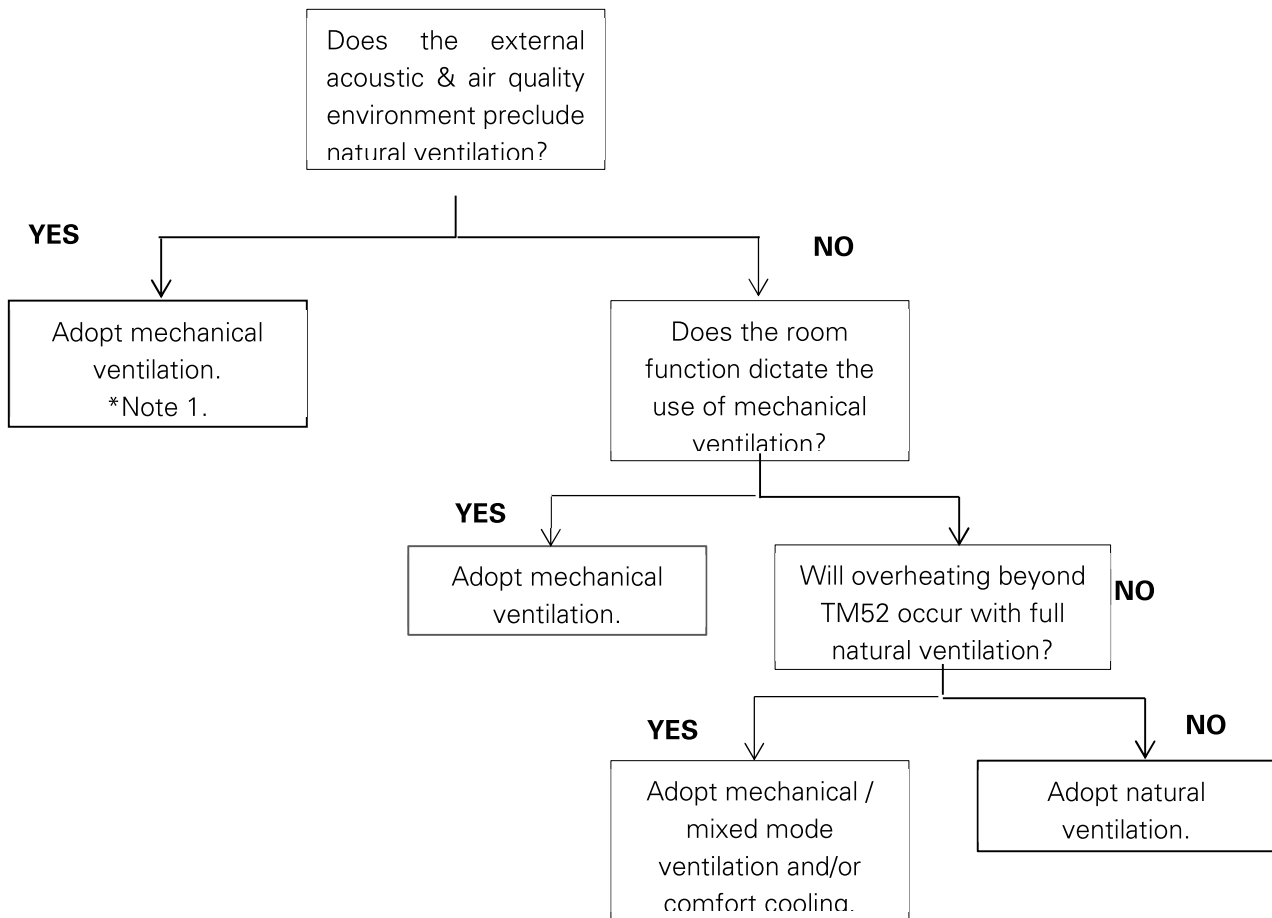
5.1. Ventilation Strategy

Whilst the principal function of the ventilation strategy is to provide sufficient fresh air and to exhaust odours, the correct ventilation strategy is crucial to minimise the energy consumed by the building – mechanical ventilation is a significant contributor of the building's electrical energy and therefore a strategy with natural ventilation is preferred.

Due to the layout of the proposed building it is not possible to naturally ventilate a large number of the occupied spaces (hotel rooms) directly as they have no external walls. It may be possible to natural ventilate those spaces and rooms that do have an external wall however, mechanical ventilation will be needed to the spaces that have high internal heat gains, in addition to reducing or negating external noise from traffic or other sources. Due to the developments location in Manchester City Centre it is likely that external noise will be an issue at all times of the day.

The design methodology taken to establish the ventilation type has followed a strategic route:

STRATEGIC DESIGN APPROACH



*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation systems.

5.2. Natural Ventilation / Mixed Mode

The adoption of natural ventilation systems such as openable windows, atria and ventilation stacks reduce the dependency on mechanical system. It is important to note though that the performance of natural ventilation is dependent on nature.

Tall rooms and atria can take advantage of the 'stack effect' which is where warm air rises within the building and escapes via high level windows. Fresh, cooler air is drawn in at lower level windows or doors.

Double sided and shallow plan rooms can take advantage of cross ventilation from window to window, taking advantage of the forces of the wind. This is the most effective arrangement for providing ventilation (in winter) and cooling in summer.

Single sided room ventilation can also prove effective for rooms with a depth of circa 2.5 times the height of the room – giving a maximum depth of 7.5m for a 3.0m high space.

However, natural ventilation alone is often not sufficient to meet the ventilation needs all the time and therefore mixed mode ventilation should be adopted, which combines elements of both natural and mechanical ventilation. Mixed mode has three modes of operations:

- Supplementary- when natural ventilation is no longer sufficient, mechanical ventilation via a low energy fan is applied to meet the ventilation need.
- Complementary – both natural and mechanical ventilation work together to meet the ventilation requirements.

- Alternate – both natural and mechanical ventilation systems are included separately within the system. The system used is dependent on both the ventilation requirement and the climate conditions.

Although the Ground Floor (and part First Floor) retail / commercial spaces do not form part of this hotel application (and are therefore not currently part of the ventilation strategy), provision has been made within the design to allow for risers and rooftop plant space within the building to allow for existing and future tenants to service these units appropriately.

5.3. Heat Recovery Mechanical Ventilation (AHU)

An air handling unit (AHU) containing thermal wheel heat recovery will provide mechanical ventilation to the development, heat recovery passes the warm exhaust air through a heat exchanger, in this case a thermal wheel, where some of the thermal energy is transferred to the colder incoming 'supply' air. This reduces the amount of heat needed to be added to the supply air and can at times lead to no additional heat required, thus minimising the CO₂ emissions.

For the redevelopment of Royal Building, Manchester this heat recovery ventilation system has been proposed throughout the hotel rooms, entrance area and reception.

It may be possible to provide openable windows to the communal spaces and a number of the hotel rooms to allow natural ventilation to be used wherever possible, thus reducing the energy demand, however these spaces will still be provided with a mechanical ventilation system for use in the winter.

Natural ventilation can be used to good effect in spring and summer, however in winter the use of natural ventilation in the form of openable windows can lead to an increase in heat loss and therefore higher heating demand. Using a mixed mode system, where mechanical ventilation is used in the winter, minimises heat losses to the environment and despite the additional electrical energy requirements, an overall reduction in CO₂ emissions can be achieved.

The mechanical ventilation air handling plant will be located at roof level with the ductwork dropping down the bedroom risers. From the risers, horizontal ductwork will serve each room with supply & extract ventilation.

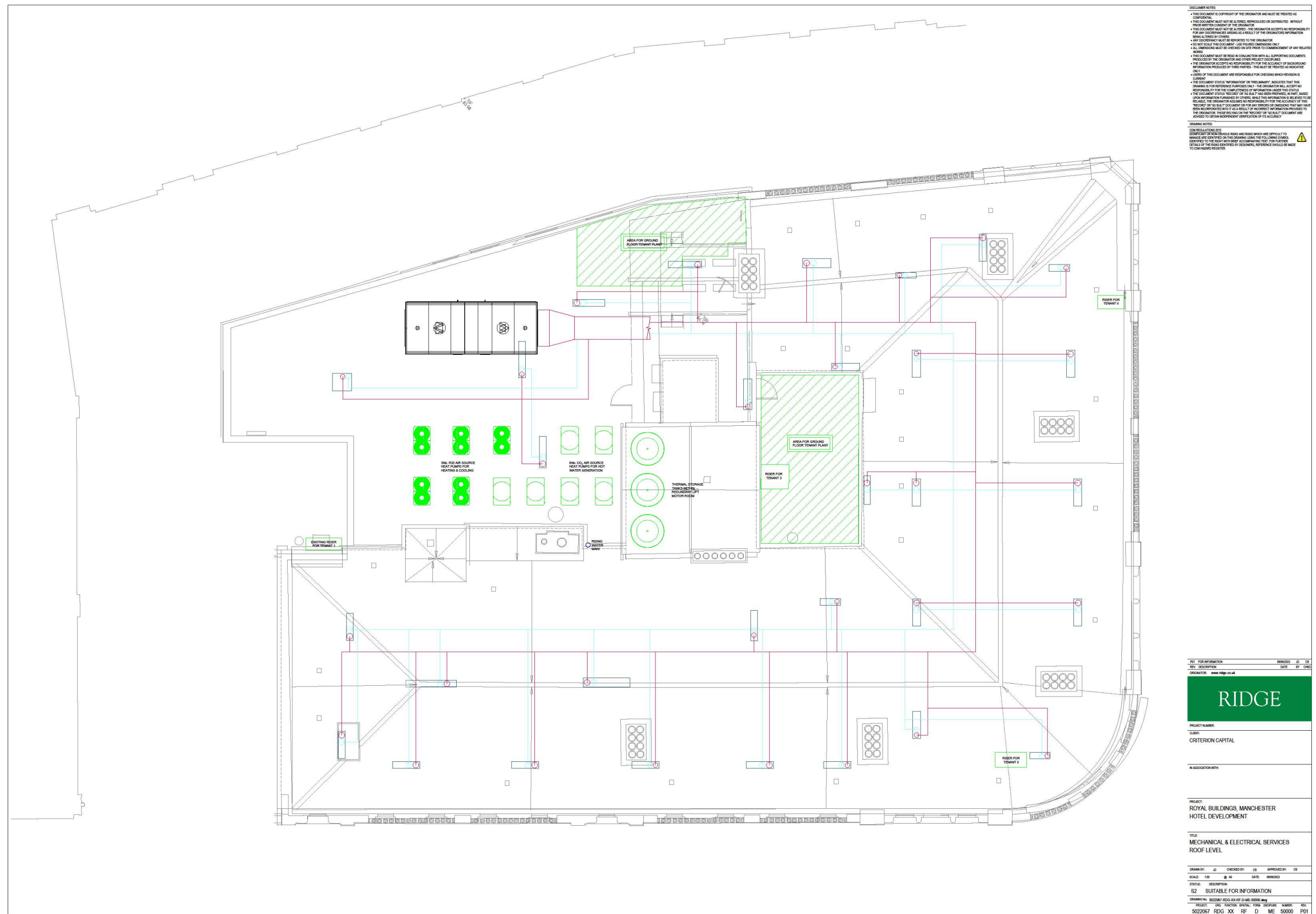
6. SUMMARY OF STRATEGIES

A strategic approach has been adopted to ascertain the most appropriate ventilation strategy for each type of space. This has taken account of environmental factors; energy efficiency and risk of overheating and the outcomes are summarised in the table below.

ROOM FUNCTION	PROPOSED VENTILATION STRATEGY
Communal spaces corridors/lobbies/staircases	Mixed mode ventilation
Retail space (Shell & Core)	Supply and extract w/ Heat Recovery*
Hotel rooms	AHU Supply and Extract w/ Heat Recovery
Reception & Entrance Areas	AHU Supply and Extract w/ Heat Recovery
Tenanted food and beverage area (Shell & Core)	Supply and extract w/ Heat Recovery*

*Space allowance made but not within scope of services.

7. APPENDICES





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