

RIDGE

VENTILATION STRATEGY REPORT
VIADUX PLOT 2A AND 2B
SALBOY CENTRAL LTD.

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1. INTRODUCTION

This report has been prepared by Ridge & Partners LLP in support of the planning application for the proposed development of Viadux (Plot's 2a and 2b) at the former Bauer Mullet site in Manchester, adjacent to the Viadux Phase 1 development.

2. DEVELOPMENT PROPOSALS

2.1. Description of Development Site

The Site is located in Manchester city centre. It is bounded by the Manchester Central Conference Complex and Great Northern Warehouse to the north, Albion Street to the east, the Deansgate Castlefield Metrolink station and Deansgate Locks to the south, and the Beetham Tower to the west. It extends to 1.49 ha.

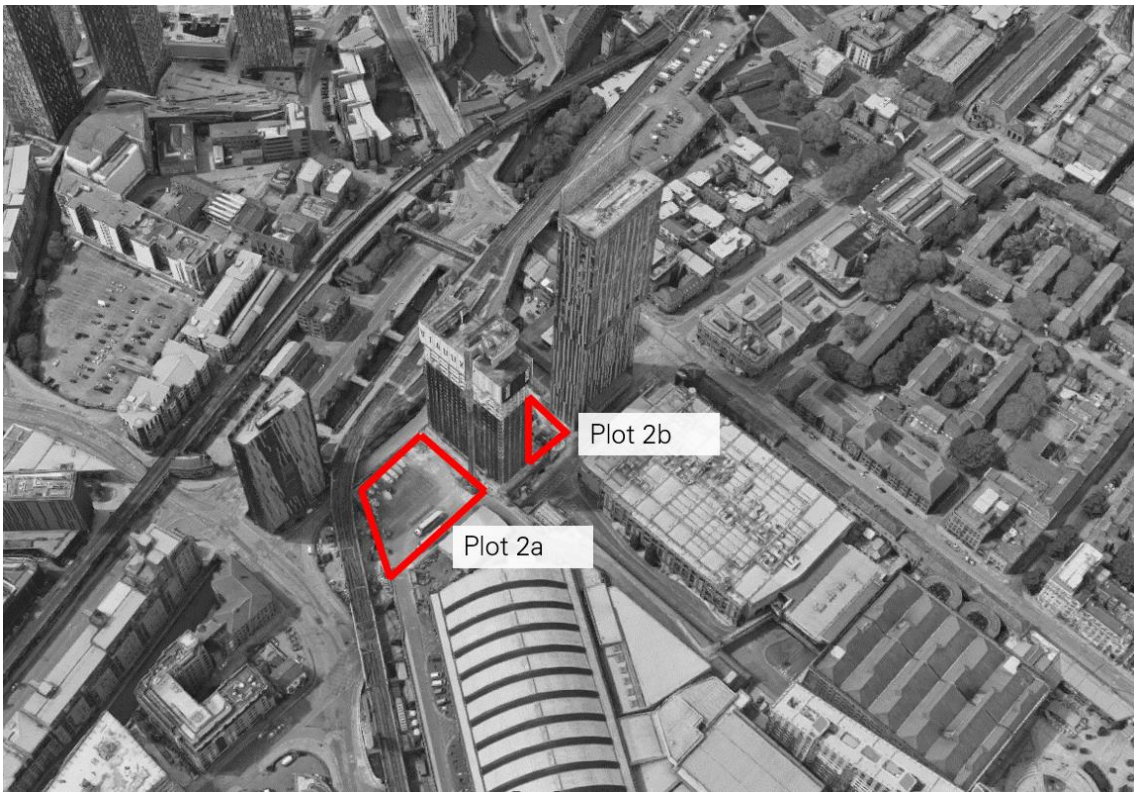
The Proposed Development will be delivered across two plots comprising the following principal uses:

- *Plot A: a hotel with residential apartments above.*
- *Plot B: affordable homes.*

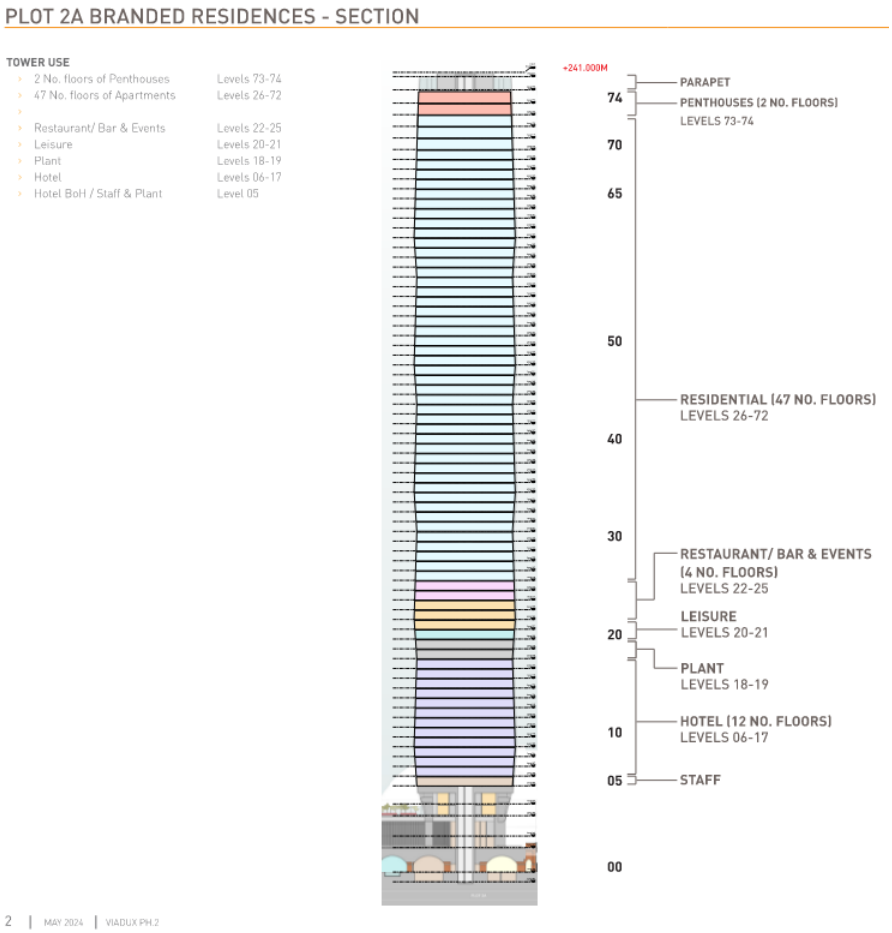
Together with these principal uses, the Proposed Development comprises residential amenities; secure cycle parking; public realm improvements and new green landscaping; and associated works to the public highway.

Plot 2a is located immediately east of the recently completed Phase 1 building, on land partially comprising the grade II listed Castlefield Viaduct. This plot will deliver a 76-storey mixed use tower comprising a hotel (Use Class C1) with associated bar and restaurant and residential units above comprising 1, 2 and 3 bed, and penthouse apartments (Use Class C3) with associated residential amenity spaces. Secure cycle spaces, serving this and the Phase 1 building, are provided at the ground floor level. At viaduct level, a redesigned service yard for the conference centre is enclosed by a new podium structure with residents' external amenity space above. A section of the Great Bridgewater Street bridge (deck) is removed to bring light into the street below.

Plot 2b, located at the western-most section of the Site between the viaduct and Beetham Tower, consists of a 23-storey residential building accommodating affordable 1-, 2- and 3-bed apartments (Use Class C3), secure cycle parking spaces, flexible commercial units (Use Class E) opening onto the viaduct, and public realm enhancements on Great Bridgewater Street.



Aerial view of the Viadux Plot 2a and 2b development



Sectional view of the amenity, hotel and residential floors within Viadux Plot 2a

3. VENTILATION COMPLIANCE

All the ventilation systems shall comply with the following:

- Approved Document B
- Approved Document F
- Approved Document L
- Approved Document O
- CIBSE Guides
- Relevant British Standards

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, promoting good practice ventilation strategies throughout the development.

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

4. DEVELOPMENT AREAS

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

- Amenity including lounges, pre function space and event space
- Back of house facilities
- Bar & Restaurant
- Commercial Kitchen (including kitchen back of house)
- Communal spaces – corridors/lobbies/staircases/toilet facilities
- Gym & spin studios
- Hotel rooms (including Double, Twin, Suites and accessible types of room)
- Meeting rooms
- Plant spaces
- Reception
- Refuse stores
- Residential Habitable rooms (bedrooms and living/ kitchen spaces), including penthouses
- Swimming pool & associated areas including spa and changing rooms

All 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 8 of this report.

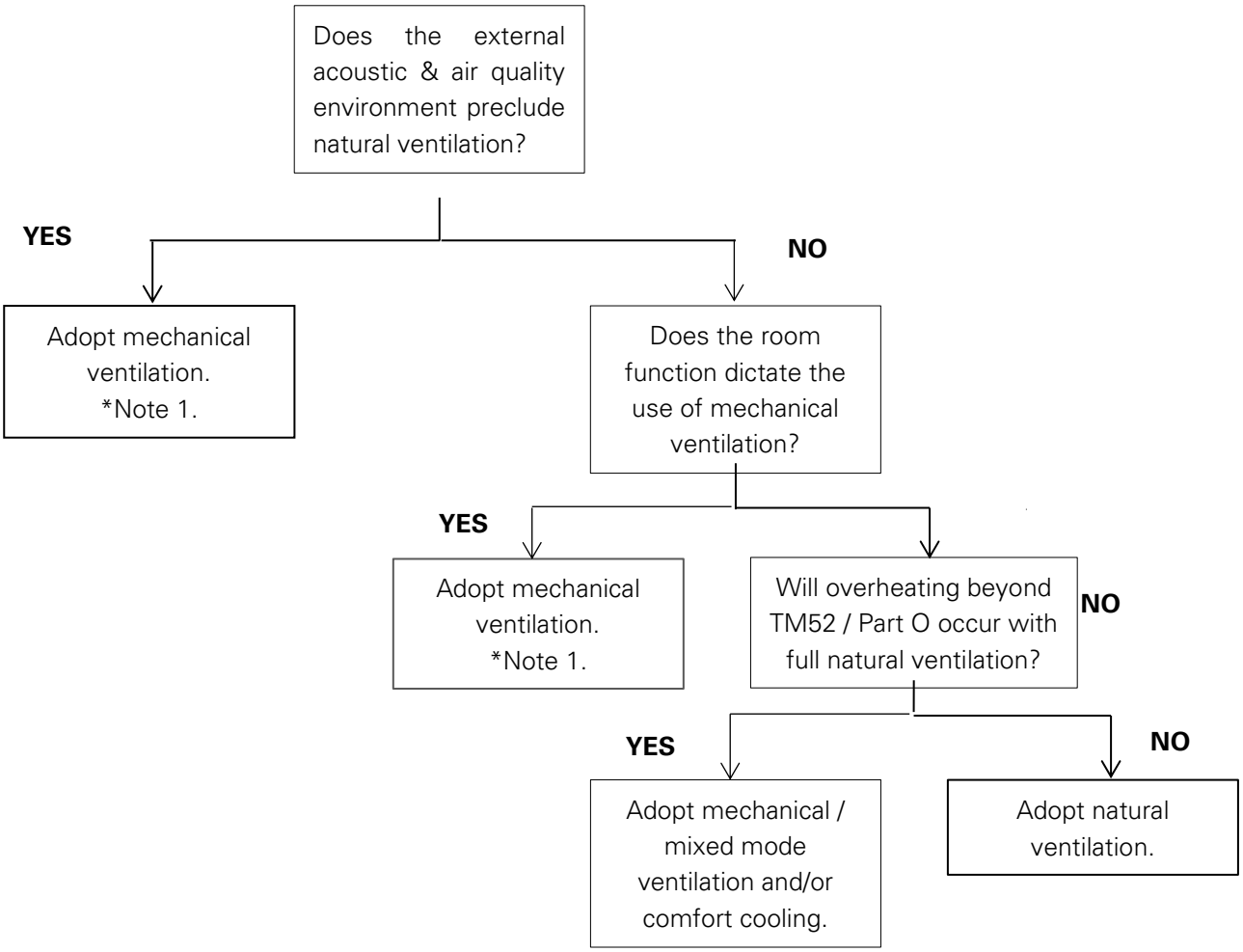
5. VENTILATION STRATEGIC DESIGN APPROACH

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.

However, mechanical ventilation is needed to the spaces that have high internal heat gains, in addition to reducing or negating external noise from traffic or other sources in accordance with the acoustic report.

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

STRATEGIC DESIGN APPROACH (GENERIC)



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

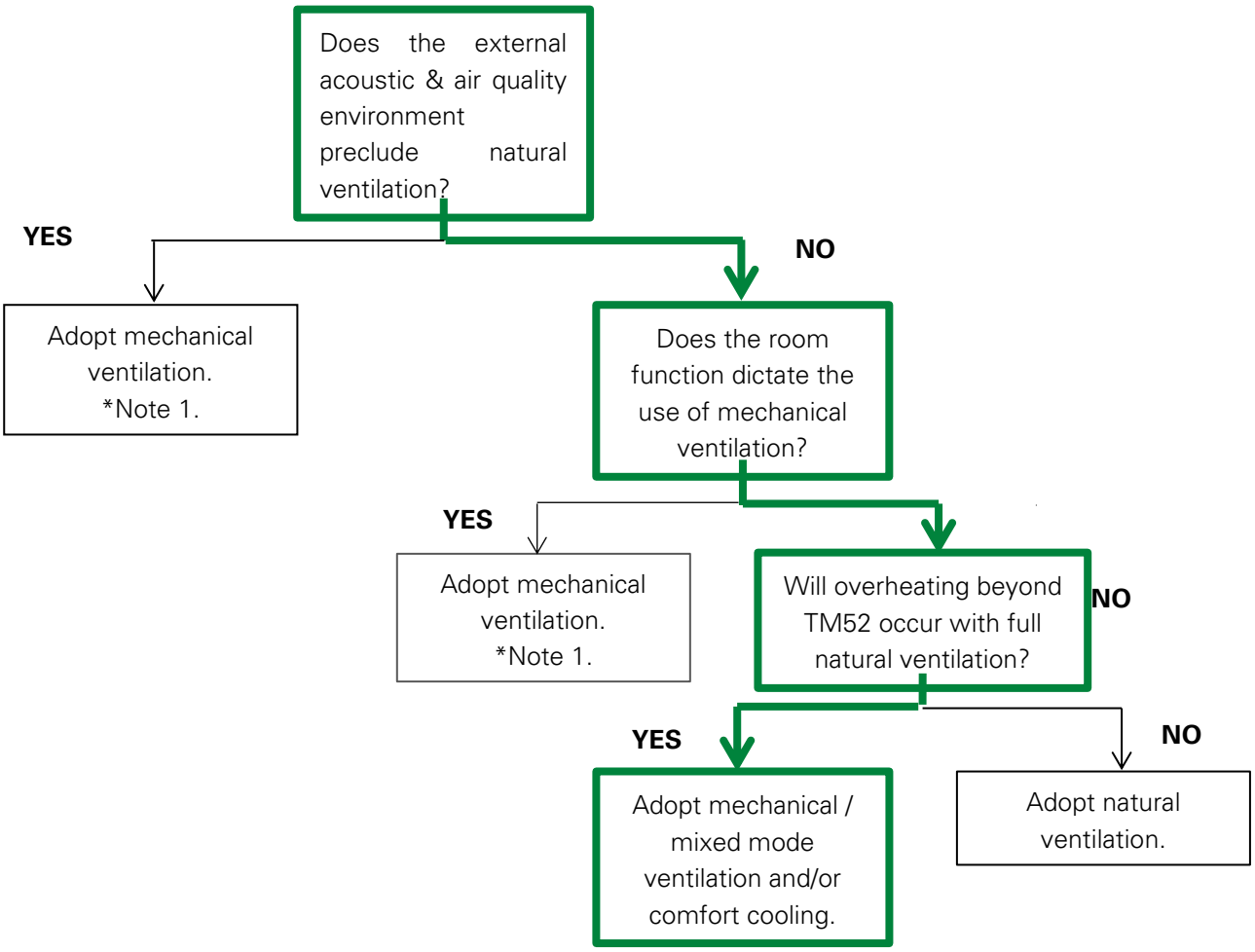
6. VENTILATION PROPOSALS

6.1. Amenity (Lounges, Pre-function space and Event space)

Although the amenity spaces alone do not dictate the use of mechanical ventilation, the extent of internal heat gains dictate the requirements for comfort cooling and therefore the inclusion of mechanical ventilation.

The mechanical ventilation will be delivered via local Mechanical Ventilation with Heat Recovery (MVHR) with high level strip louvers allowed for. The fresh air intake and exhaust louvres will be coordinated to mitigate cross contamination.

STRATEGIC DESIGN APPROACH – AMENITY (LOUNGES, PRE-FUNCTION SPACE AND EVENT SPACE)



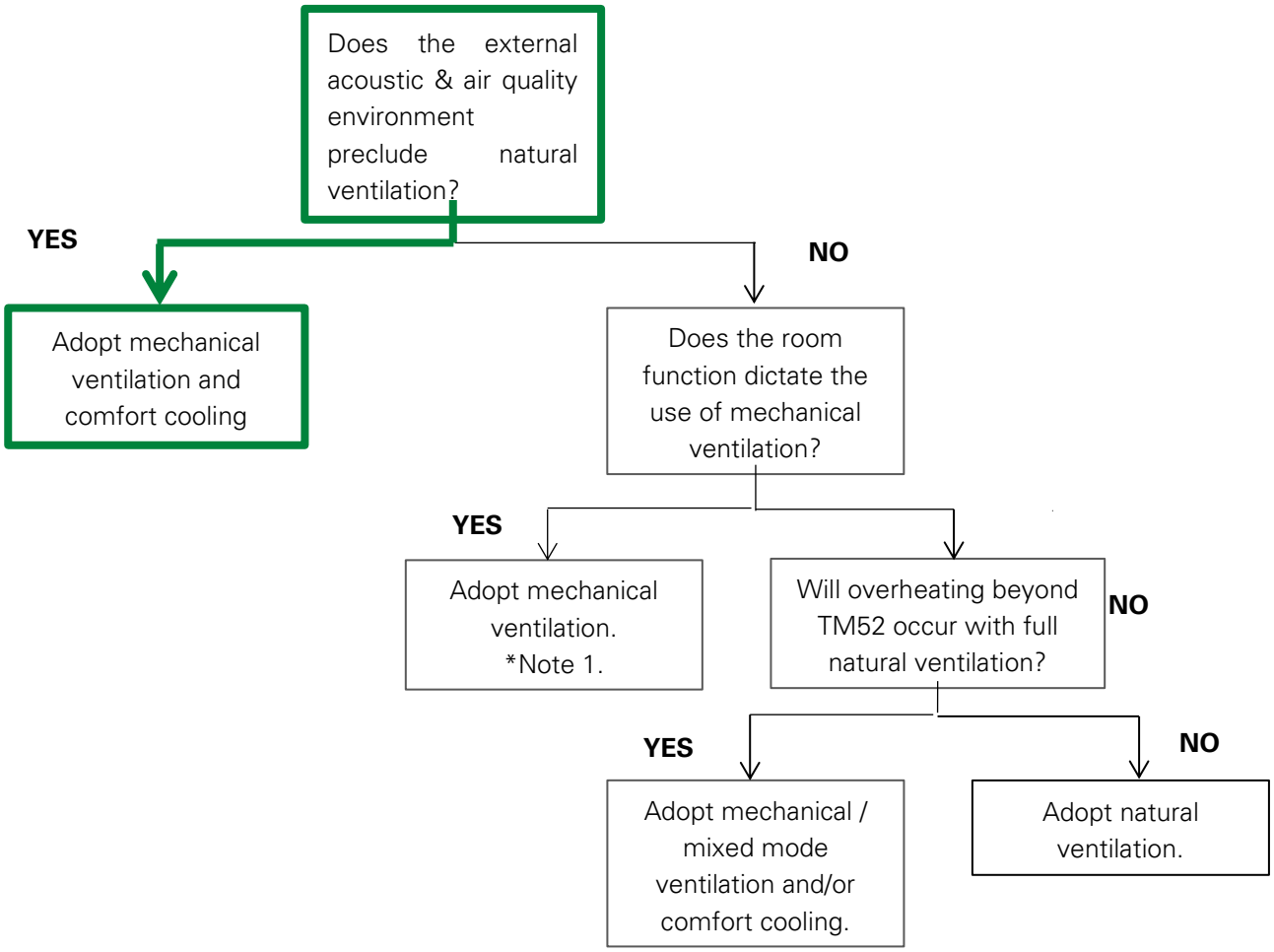
*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation systems

6.2. Main Reception

The main reception area within the ground floor entrance on Plot 2a will be ventilated via Mechanical Ventilation with Heat Recovery (MVHR) with high level strip louvers allowed for. Supply ductwork from the MVHR units will drop in a common location to serve the ventilated floor void in the reception area.

Fresh air intake and exhaust louvres will be coordinated to mitigate cross contamination.

STRATEGIC DESIGN APPROACH – MAIN RECEPTION

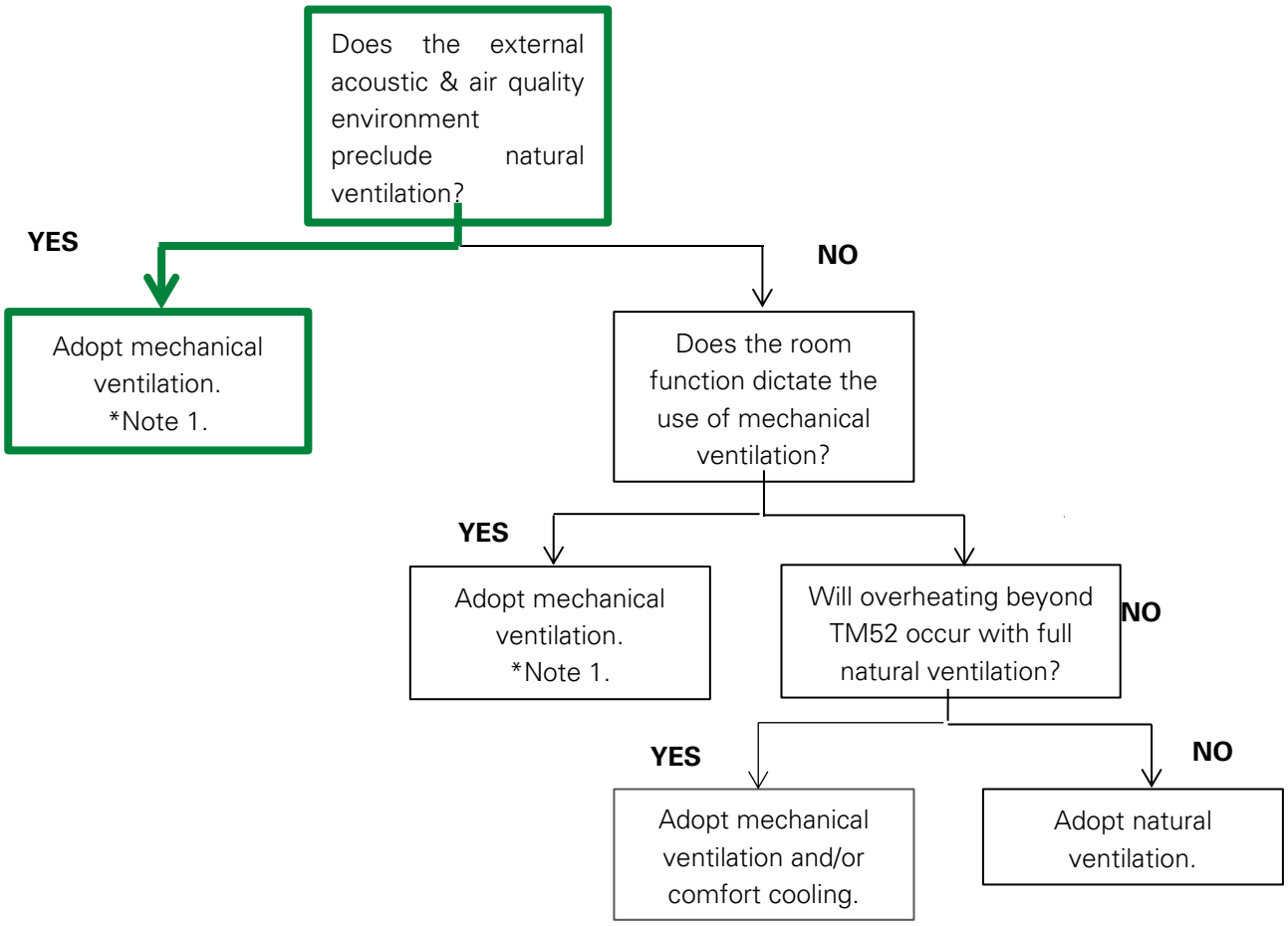


6.3. Swimming Pool, Sauna and Spa

The mechanical ventilation to the swimming pool, sauna, spa and associated areas such as the changing rooms is to be undertaken by a specialist.

There is dedicated space on the roof for the pool area Air Handling Unit (AHU).

STRATEGIC DESIGN APPROACH – SWIMMING POOL, SAUNA AND SPA



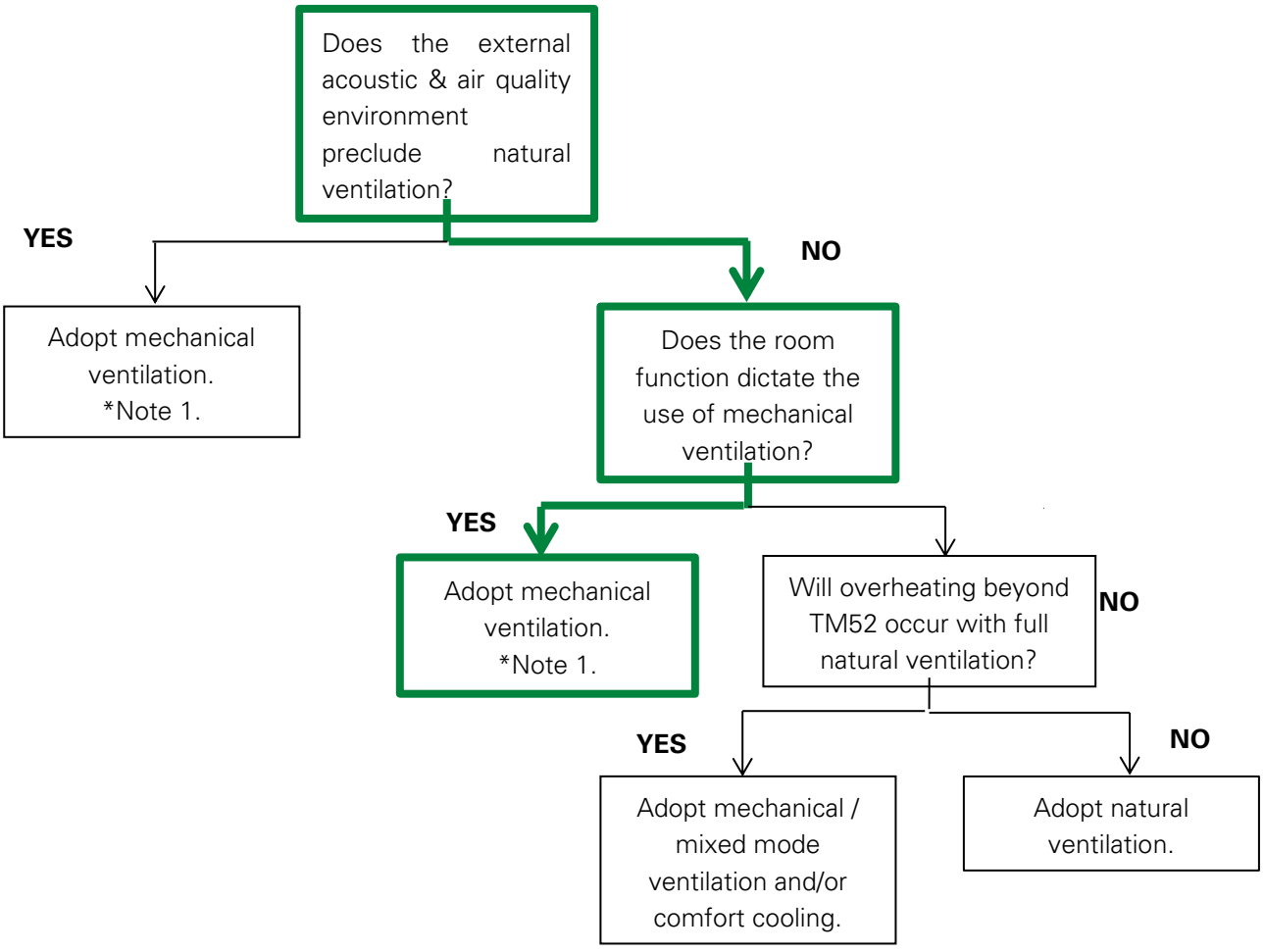
*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation systems

6.4. Gym and Spin studios

Due to the extent of internal heat gains, the functional requirements of the gym do not lend themselves to natural ventilation but instead to mechanical ventilation and comfort cooling.

The amenity spaces will be ventilated via Mechanical Ventilation with Heat Recovery (MVHR) with high level strip louvers allowed for. Fresh air intake and exhaust louvres will be coordinated to mitigate cross contamination.

STRATEGIC DESIGN APPROACH – GYM AND SPIN STUDIOS



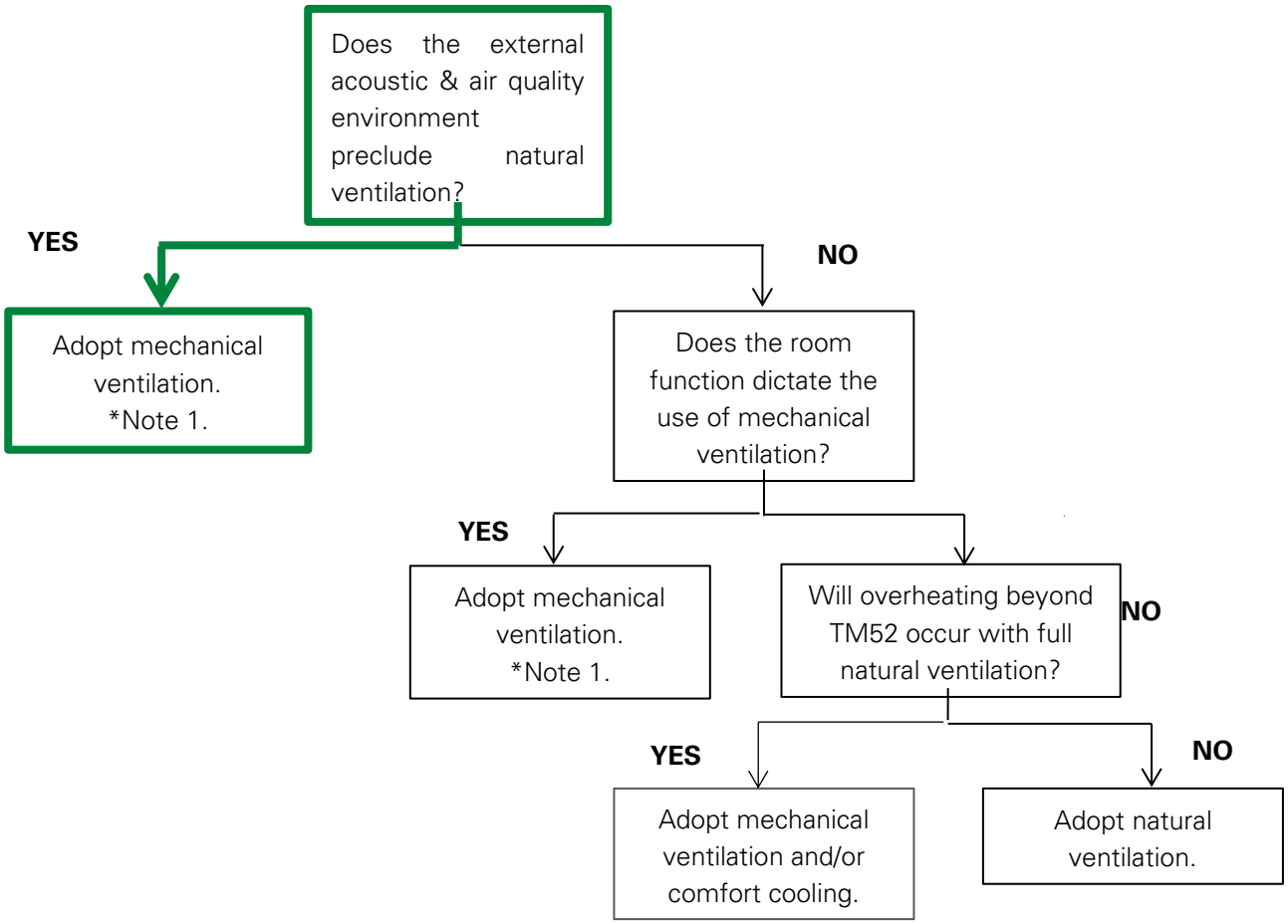
*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation Systems

6.5. Ancillary Areas

Some spaces, such as the plantrooms, bin and cycle stores and storerooms require Mechanical Extract Ventilation to meet the ventilation requirements defined in Approved Document Part F and CIBSE Guides.

The exhaust louvres through the façade will be coordinated to minimise cross contamination with intake louvres for other areas.

STRATEGIC DESIGN APPROACH – ANCILLARY AREAS



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

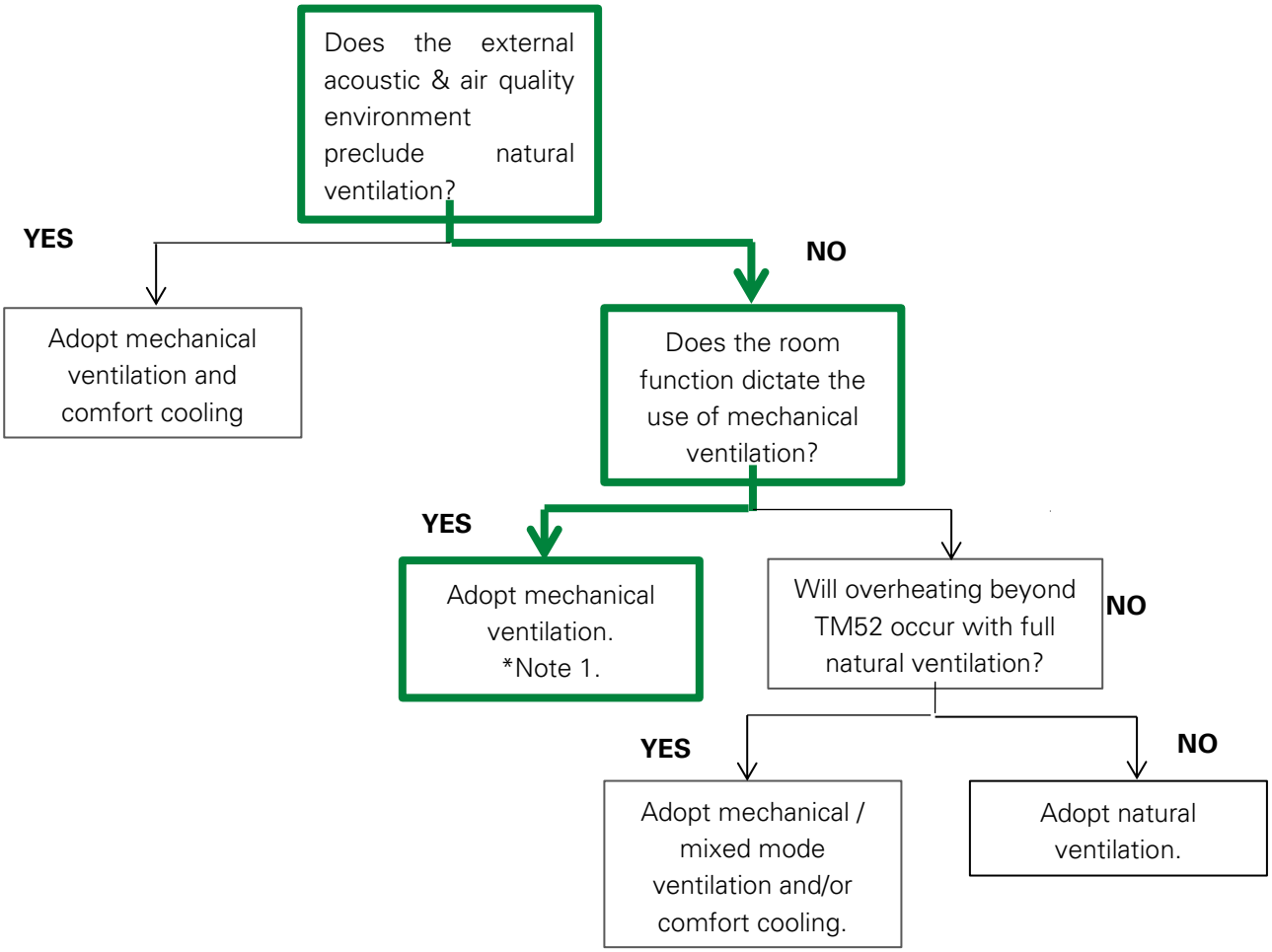
6.6. Hotel Bedrooms (Double, Twin, Suites)

Due to the functional requirements for the hotel rooms, natural ventilation is not suitable for inclusion and therefore mechanical ventilation and comfort cooling will be provided to the hotel bedrooms.

The hotel bedrooms will be ventilated via centralised Air Handling Units located on the intermediate hotel plant deck. Fresh air intake and exhaust louvres on the plant deck will be coordinated to mitigate cross contamination.

The supply air will be delivered to the bedroom with the exhaust taken from the en-suite/ bathroom.

STRATEGIC DESIGN APPROACH – HOTEL BEDROOM



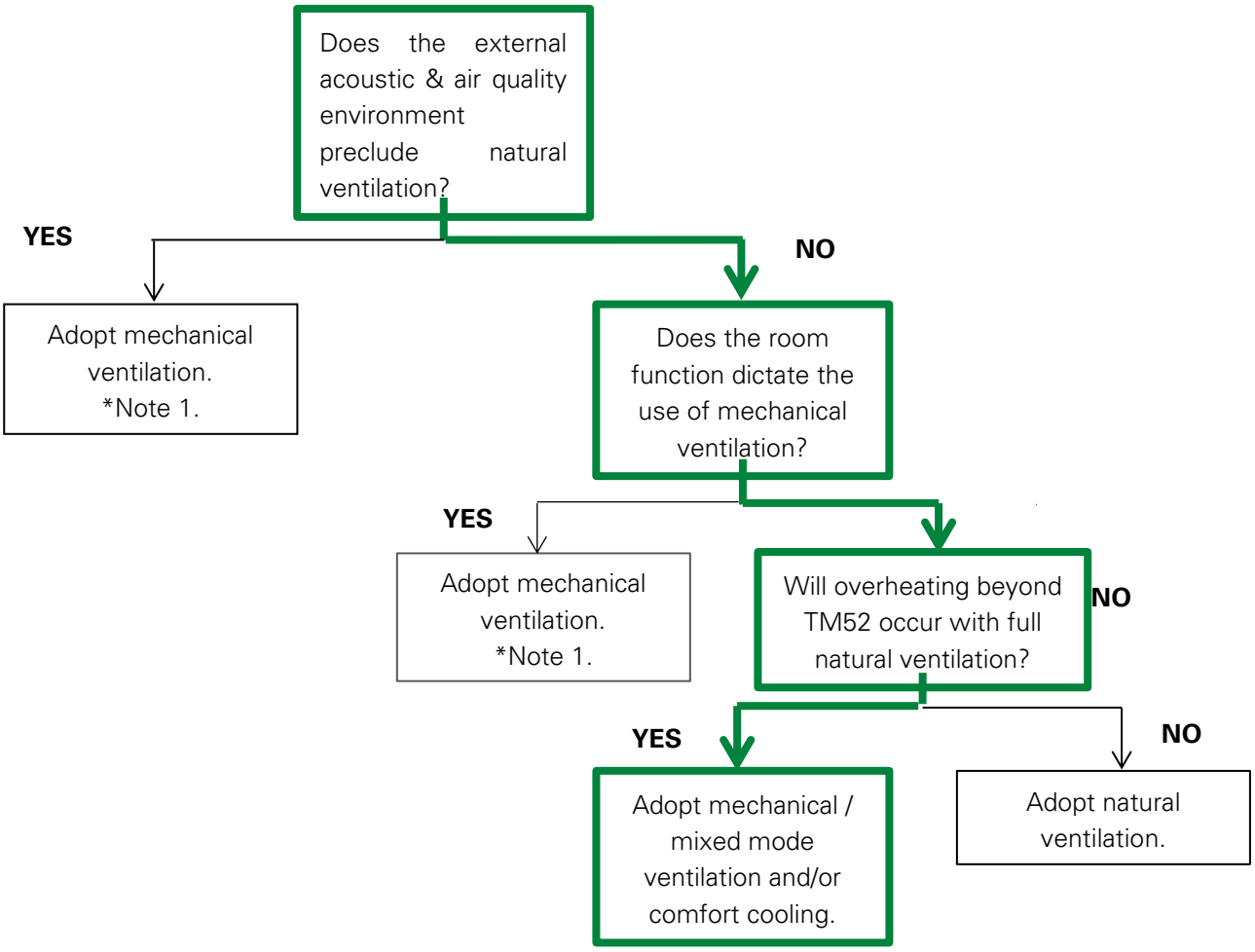
*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation Systems

6.7. Meeting rooms

Although the functionality of the offices alone does not dictate the use of mechanical ventilation, the "depth of plan" and the extent of internal heat gains dictate the requirement for comfort cooling and hence associated mechanical ventilation delivered through mechanical ventilation with heat recovery units.

High level strip louvres will be allowed for with the fresh air intake and exhaust louvres coordinated to mitigate cross contamination.

STRATEGIC DESIGN APPROACH – MEETING ROOMS



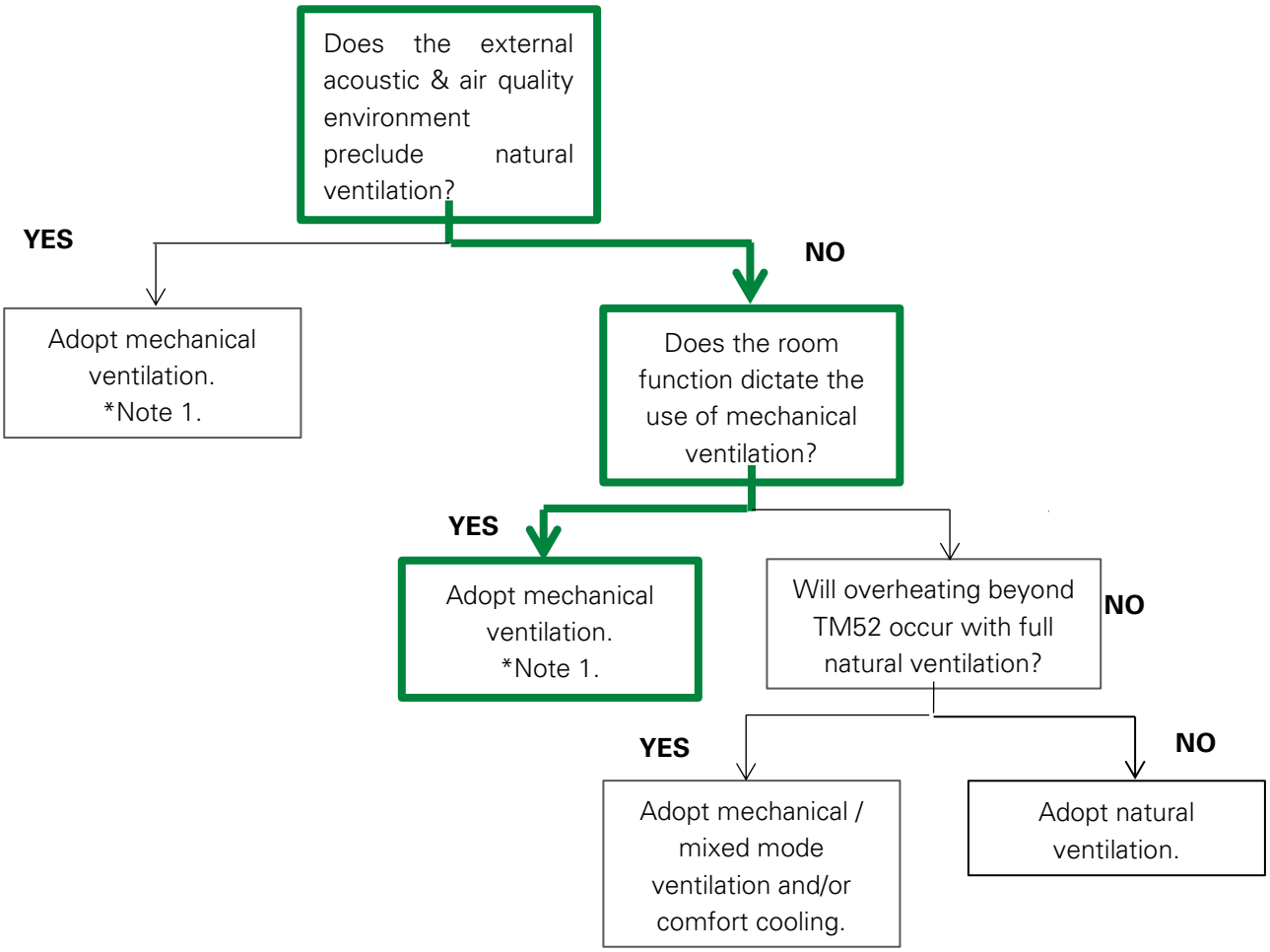
*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation Systems

6.8. Bar & Restaurant

Although the bar & restaurant spaces alone do not dictate the use of mechanical ventilation, the "depth of plan" and extent of internal heat gains dictate comfort cooling and hence the associated mechanical ventilation.

The mechanical ventilation will be delivered via Mechanical Ventilation with Heat Recovery (MVHR) with high level strip louvers allowed for. Fresh air intake and exhaust louvres will be coordinated to mitigate cross contamination.

STRATEGIC DESIGN APPROACH – BAR & RESTAURANT



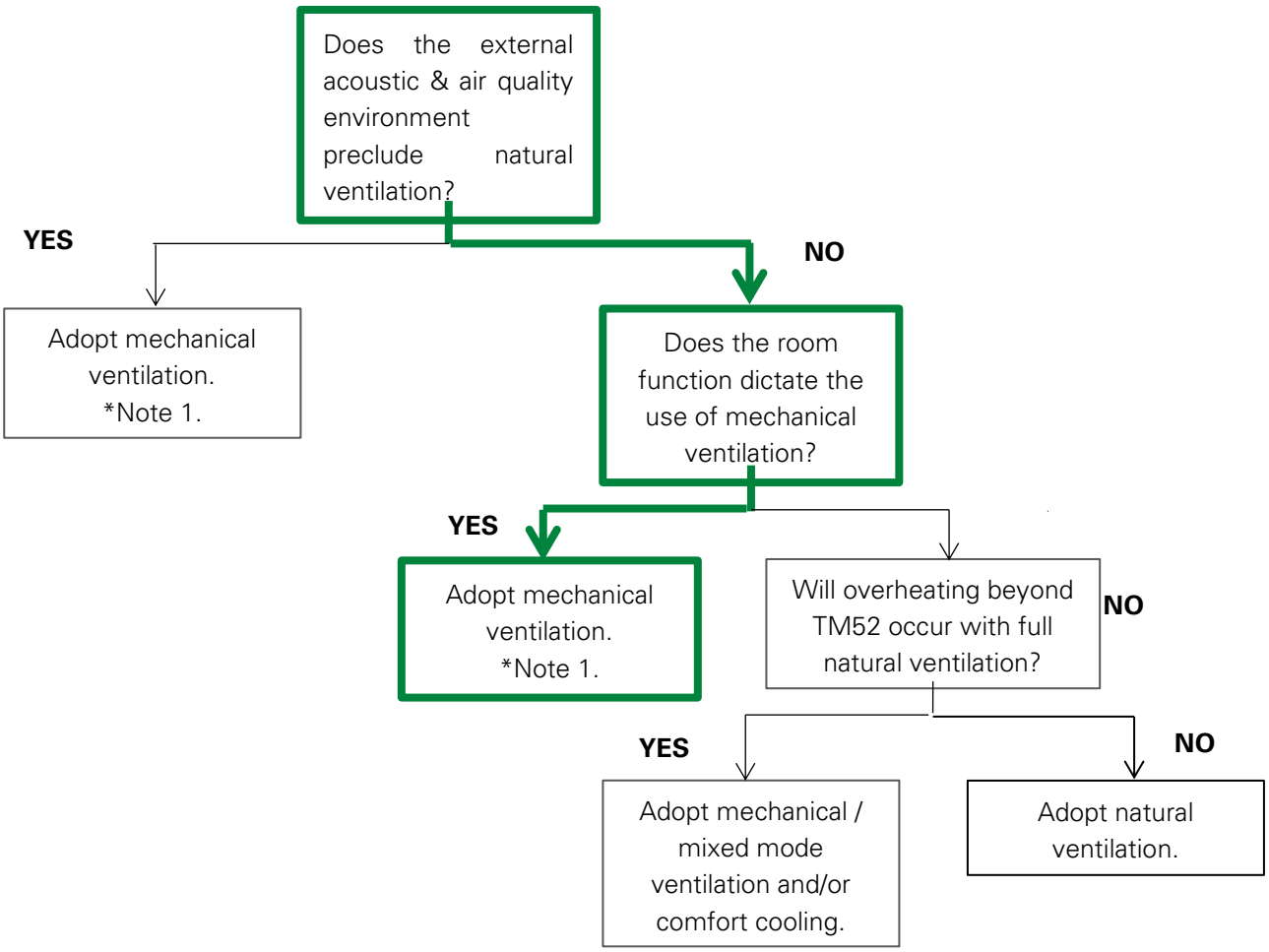
*Note 1: Utilise comfort cooling where overheating occurs and/or appropriate mechanical ventilation systems

6.9. Commercial Kitchen (including kitchen back of house)

The commercial kitchen (including the back of house kitchen areas) will be ventilated through central air handling units installed in the intermediate plant deck.

A filtration system will be required to be installed to remove oil, smoke, grease and odour from the return air.

STRATEGIC DESIGN APPROACH – COMMERCIAL KITCHEN



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

6.10. Residential Apartments

The residential apartments shall be predominantly naturally ventilated through the opening panels in the façade. However, it is anticipated that there will be restrictions on the frequency that that panels can be opened. As a result, for the purposes of the Part O assessment, the residential apartments shall be considered as "predominantly mechanically ventilated".

For the opening panels to be effective, an adequate amount of free area is required to be provided. The extent of glazing and the specification must be considered to reduce unwanted solar gain, thus reducing the risk of overheating.

Although natural ventilation will be adopted as the primary method of ventilation, the living / kitchen spaces and bedrooms will be mechanically ventilated via a mechanical ventilation heat recovery system (MVHR) to achieve Part O compliance.

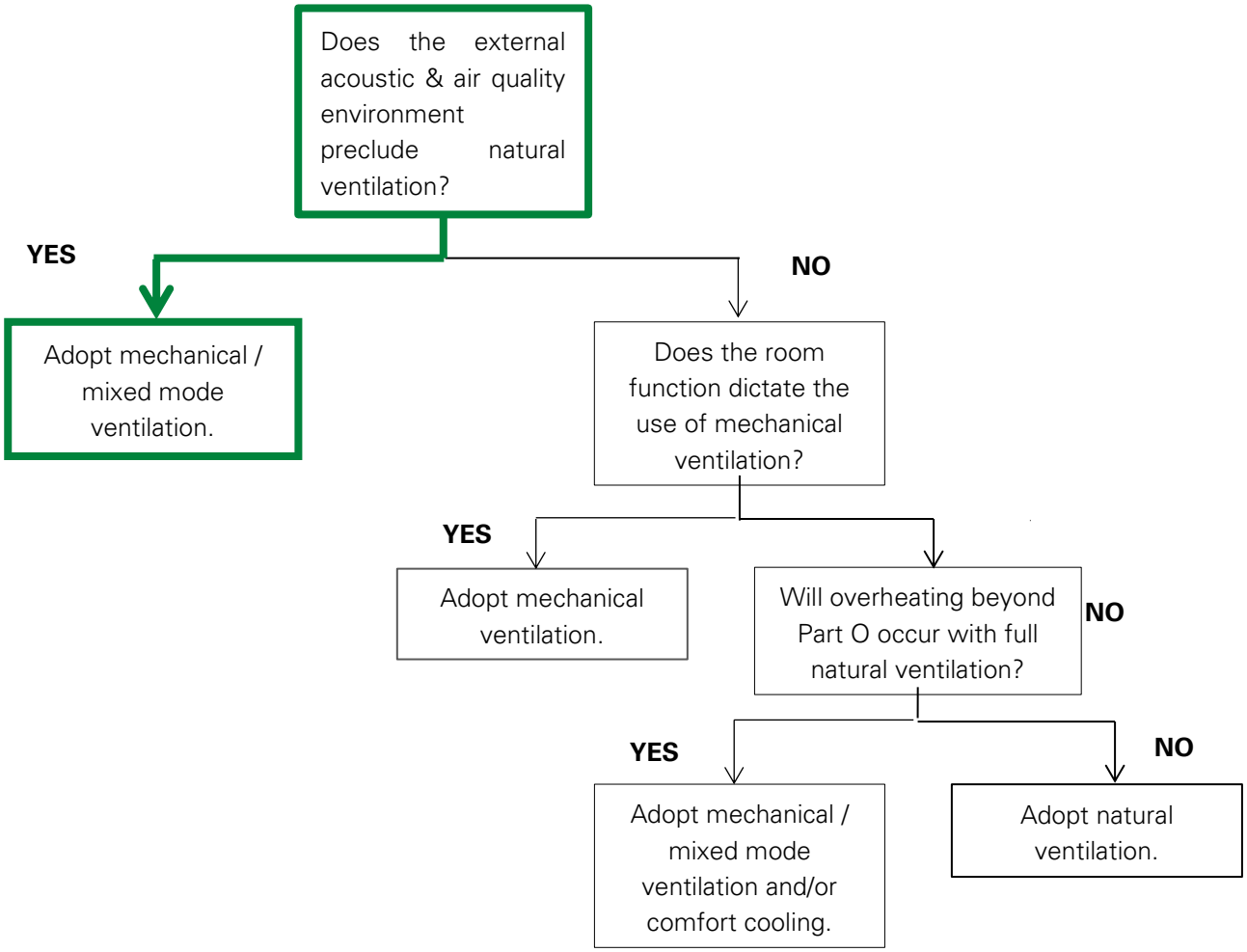
Each apartment will have a MVHR system located within the utility cupboard, with the ductwork in the void between the ceiling and the underside of the slab. Fresh air intake and exhaust louvres will be contained within the demise of each apartment but designed to mitigate cross contamination.
Bathroom and kitchen areas will be mechanically ventilated via the MVHR to comply with Part F of the Building Regulations.

An initial Part O assessment has been carried out on a typical floor in Plot 2a in accordance with the Approved Document Part O requirement to use the guidance contained within CIBSE TM59:2017 'Design methodology for the assessment of overheating risk in homes', as per section 2.3.

Due to the opening panels likely having restrictions on when the panels can be open, the spaces have been assessed under Section 4.3 of CIBSE TM59:2017, which requires the following criteria to be met:

4.3 Criteria for homes predominantly mechanically ventilated
For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e., all occupied rooms should not exceed an operative temperature of 26 ˚C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

STRATEGIC DESIGN APPROACH – RESIDENTIAL AREAS



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

6.11. Smoke Ventilation

The smoke ventilation will be in accordance with the Fire Engineers Report.

7. CIBSE TM52 RESULTS

An overheating assessment will be carried out in accordance with CIBSE Technical Memorandum 52 (TM52) to assess the likelihood of a building overheating.

Building spaces with mechanical cooling will be assessed for sufficient thermal comfort using Predicted Mean Vote (PMV) and Percentage of People Dissatisfied (PPD) measures according to TM52.

The overheating assessment will be undertaken during the next design stage.

8. 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
Amenity including lounges, pre function space and event space	Mechanical Ventilation with Heat Recovery (Supply & Extract)
Bar & Restaurant	Mechanical Ventilation with Heat Recovery (Supply & Extract)
Gym & spin studios	Mechanical Ventilation with Heat Recovery (Supply & Extract)
Hotel bedrooms (Double, Twin, Suites and accessible types of room)	Centralised Mechanical Ventilation from Air Handling Unit with Heat Recovery
Commercial Kitchen	Centralised Mechanical Ventilation from Air Handling Unit with grease destruction. Refer to Section 8.5.2 for details on grease destruction system.
Meeting rooms	Mechanical Ventilation with Heat Recovery (Supply & Extract)
Reception	Displacement Ventilation from MVHR (Supply & Extract)
Refuse Store	Mechanical ventilation (Extract only)
Swimming Pool & associated areas including spa and changing rooms	Mechanical ventilation (Supply & Extract via Air Handling Unit) by specialist
Residential Apartments	Local Mechanical Ventilation with heat Recovery to bathroom and kitchen. (Possible purge ventilation / cooling)

8.1. Residential Mechanical Ventilation with Heat Recovery (MVHR)

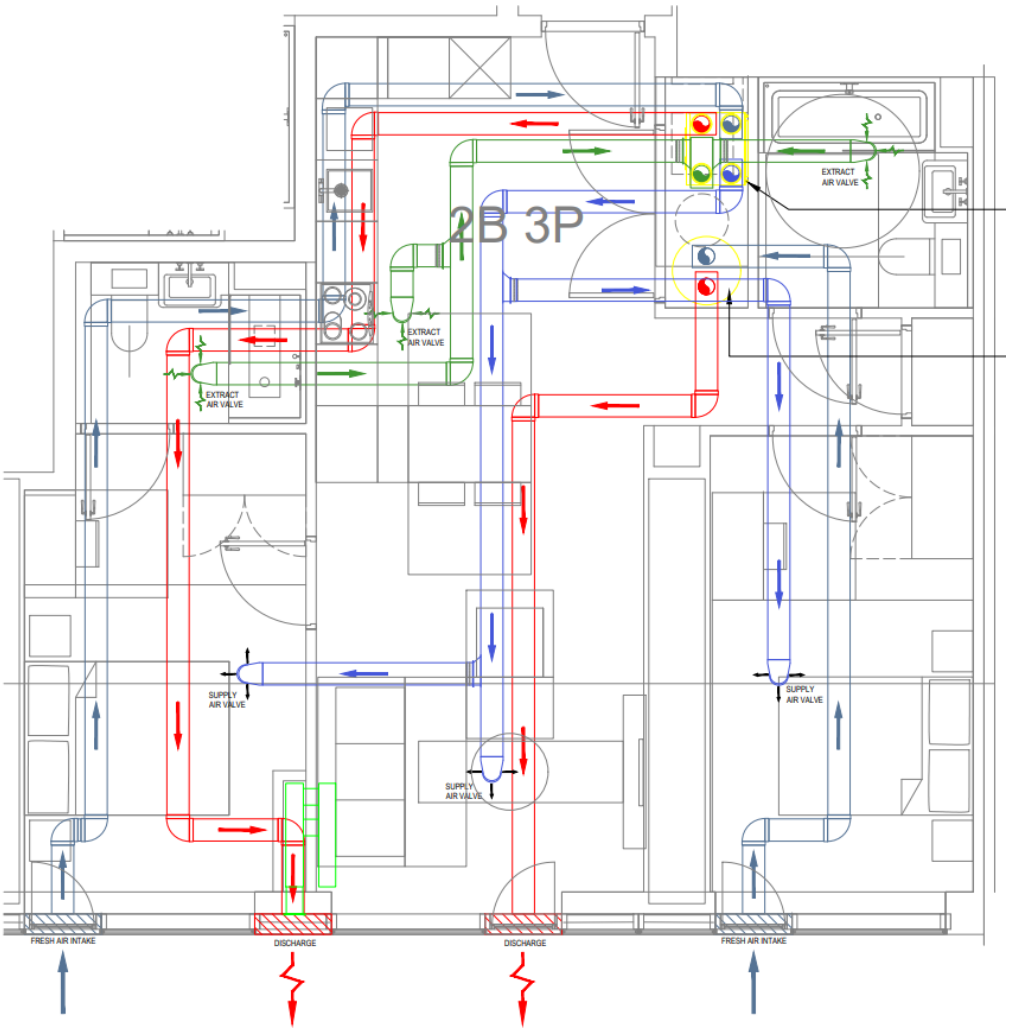
Each apartment shall be provided with a mechanical ventilation heat recovery (MVHR) system to maintain fresh air quality and provide heat recovery functionality. This shall comprise of a centralised continuous mechanical supply and extract ventilation unit, able to operate in 100% summer bypass, with a high heat recovery efficiency (minimum 80%) designed to assist in achieving a high SAP rating for the Building Regulations. The air volumes shall be determined to satisfy the requirements of the Approved Document Part F of the Building Regulations. The units will be provided with a boost facility to satisfy the Part O overheating criteria.



The MVHR units shall be in the Utility cupboard of each apartment. Each unit shall draw fresh air and discharge extract through each apartment façade. The intake and exhaust louvers shall be separated to prevent cross contamination with a filter inside the unit near the heat exchanger to remove pollen and particulate matter.

The ventilation unit will remove air from the wet rooms including the kitchen and create a permanent air path, through the property, from the dry habitable rooms; the bedrooms and the living room, connected through a system of rigid flat ducts. The air grilles shall be in the ceiling. The ventilation systems shall be designed in rooms to meet the NR level stated elsewhere within this report.

The ventilation system shall also be designed to determine autonomously whether to activate the heat exchanger or not. The bypass damper changes over during the summer, when it is cooler outside than in, and channels cool air inside.



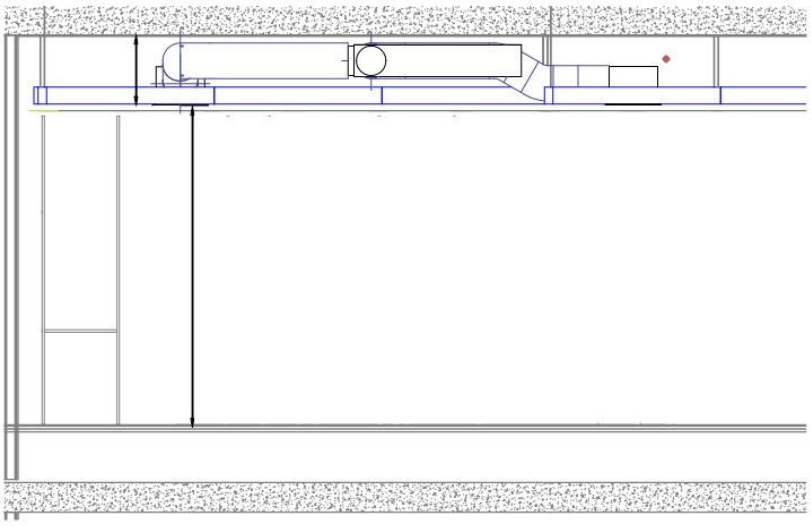
Typical Apartment Ventilation Layout

8.2. Commercial Mechanical Ventilation with Heat Recovery (MVHR)



Commercial spaces will be provided with mechanical ventilation heat recovery (MVHR). This shall comprise of a centralised continuous mechanical supply and extract ventilation unit, able to operate in 100% summer bypass with a high heat recovery efficiency (minimum 80%). The air volumes shall be determined to satisfy the requirements of the Approved Document Part F of the Building Regulations and CIBSE Guides and the Specific Fan Power requirements of the Approved Document Part L of the Building Regulations.

The MVHR units shall be in the ceiling void. Each unit shall draw fresh air and discharge extract through the façade. The intake and exhaust louvers shall be separated to prevent cross contamination with a filter inside the unit near the heat exchanger to remove pollen and particulate matter.



Section showing Mechanical Ventilation with Heat Recovery Unit installed in ceiling void with connections to grilles

8.3. Local Extract

Local extract will be installed in spaces such as bin stores, stores and other ancillary areas.

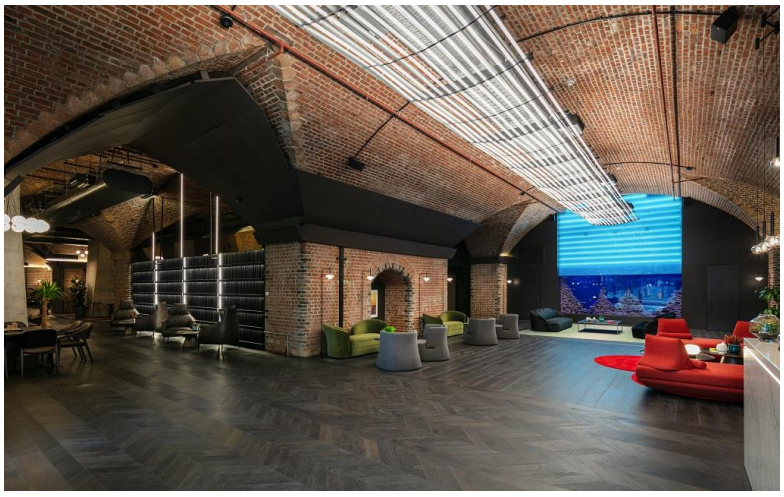
The extract fan will be installed in the ceiling void and will have the option to operate on a temperature sensor or an occupancy sensor (PIR) with a run-on timer.

The mechanical extract installed within the bin stores will operate continuously.

The exhaust louvres will be coordinated to minimise cross contamination with intake louvres for other areas.

8.4. Displacement Ventilation

The ground floor reception in Plot 2a will be ventilated by displacement ventilation to eliminate visible ductwork within the existing arches.



View of the existing arches within the Viadux Phase 1 development

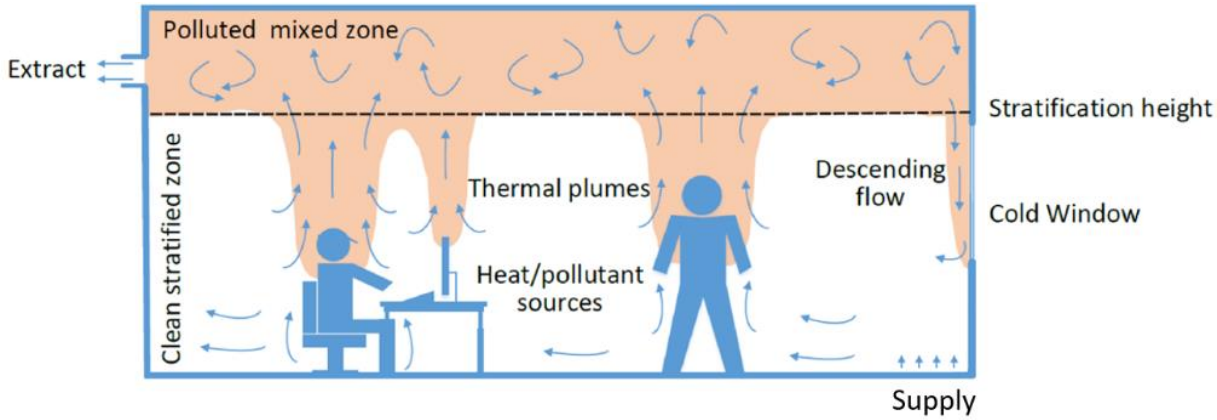
Adequate floor to ceiling heights is needed to make displacement work, a minimum floor to ceiling height of 2.7m is recommended.

Displacement ventilation introduces low velocity fresh air from the floor void into the reception area without mixing the fresh air and room air. The fresh air becomes more buoyant as it heats up upon contact with people, equipment and lighting thus leading it to rise and form a stratified region above the occupied area, where it is extracted as a plume is created. This avoids the risk of short circuiting where supply air is extracted before it has ventilated the occupied space.

Airflow within a displacement ventilation system has both characteristics of both horizontal and vertical air movement.

Horizontal air movement occurs within the thermally stratified layers of the upper warmer air layers and the lower cooler layers within the room.

Vertical air movement is caused by the present of cold and warm objects (such as people) which create upward convection currents. Cold objects, such as windows and walls create downward currents.



8.5. Air Handling Unit (AHU)

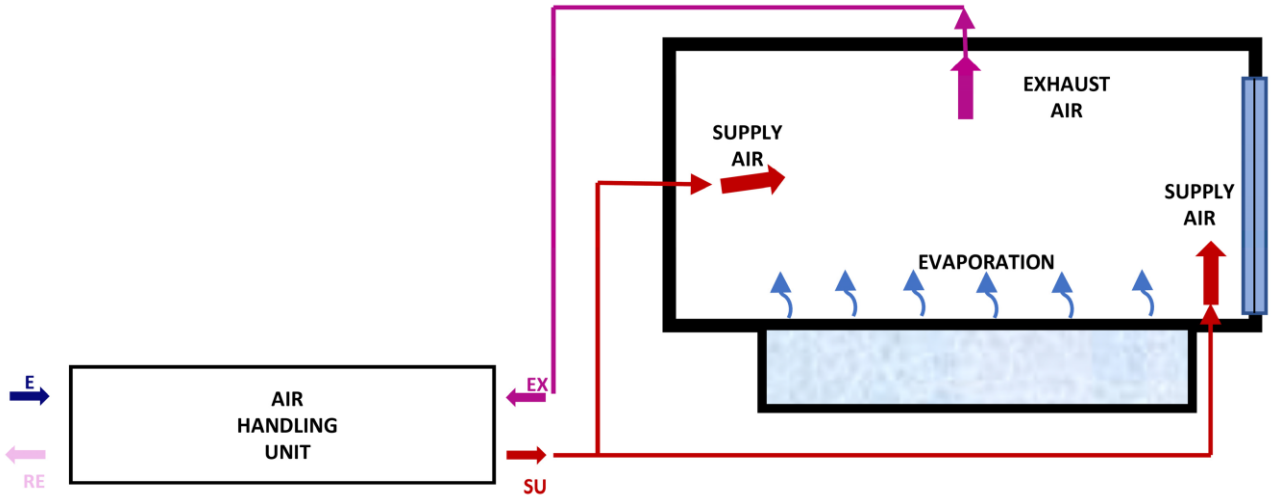
8.5.1. Swimming Pool

The swimming pool and associated areas will be ventilated through a dedicated Air Handling Unit (AHU) installed on the intermediate plant deck.

The AHU will feature corrosion resistant coatings to protect against chlorine. The fresh air intake and exhaust ductwork on the roof will be separated to avoid cross-contamination.

Swimming pools suffer from high humidity as water evaporates from the surface of the pool and without dedicated ventilation, this water content can linger in the air leading to the internal conditions to deteriorate which can cause allergies and other health problems.

The AHU, which will include heat recovery with a minimum efficiency of 80% and dehumidification, will provide balanced continuous ventilation to the swimming pool, sauna, steam room and associated areas such as the changing rooms.



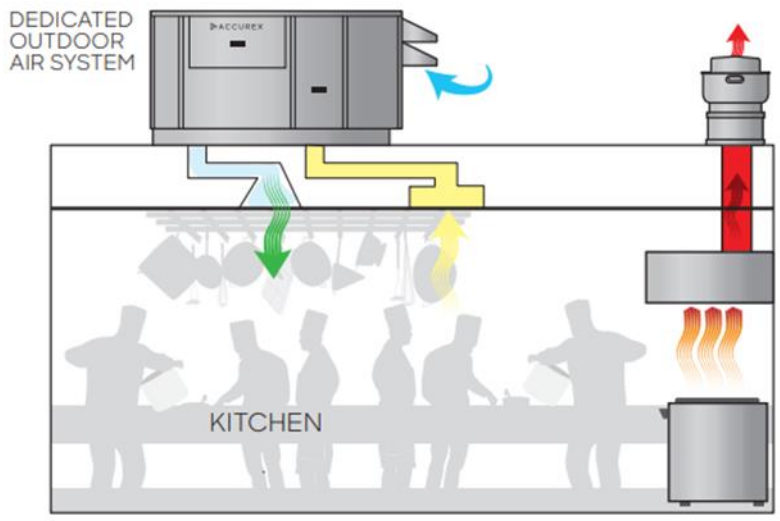
8.5.2. Kitchen

The kitchen will be ventilated through dedicated Air Handling Unit (AHU) installed on the intermediate plant deck.

The AHU will feature a filtration system consisting of an Electrostatic Precipitator (ESP) and short wavelength ultraviolet radiation (UV-C) to remove oil, smoke, grease and odour from the return air.

The filtration system will consist of an Electrostatic Precipitator (ESP) with integral sumps to collect oil, grease and smoke particles filtered out of the exhaust air. The ionisation voltage runs at a negative potential which increases the ionisation and also produced more Ozone, helpful for reducing the commercial kitchen odours.

UV-C produces ozone and hydroxyl free radicals which oxidise odours and grease, permanently destroying the molecular structure of the compounds.



The fresh air intake and exhaust ductwork on the roof will be separated to avoid cross-contamination.

The AHU, which will include heat recovery with a minimum efficiency of 80% and dehumidification, will provide balanced continuous ventilation to the swimming pool, sauna, steam room and associated areas such as the changing rooms.

Manchester City Council does not have any bespoke odour control ventilation requirements and instead refer to the Department of Environment, Food and Rural Affairs Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems 2005 and Odour Guidance for Local Authorities 2010.

Both documents were withdrawn in 2017 and since then guidance from EMAQ+ Control of Odour and Noise from Commercial Kitchen Exhaust Systems has been used since 2018



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