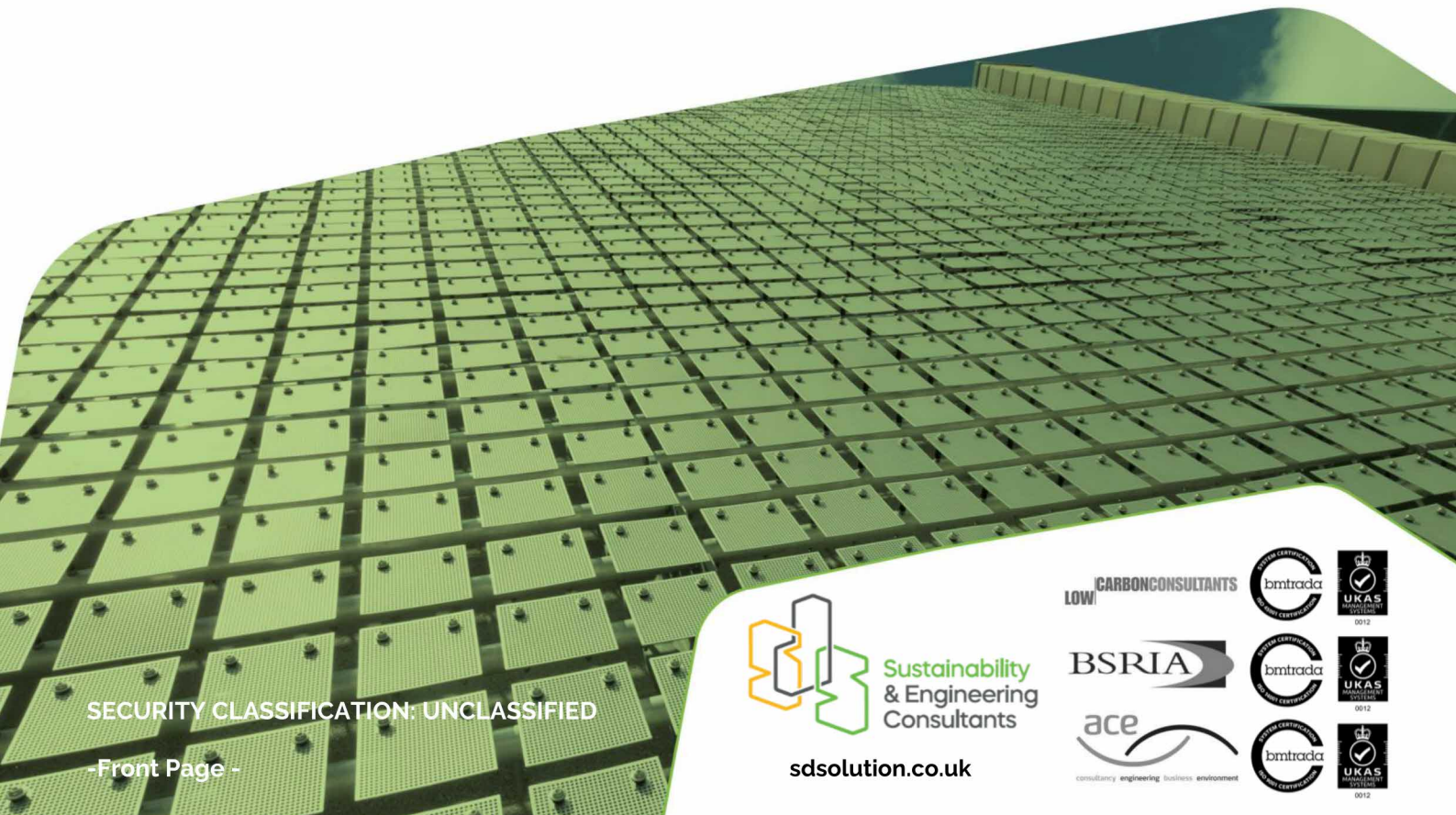
[redacted]

COMMUNITY DIAGNOSTIC CENTRE

Mechanical

Ventilation Strategy



Sustainability & Engineering Consultants

sdsolution.co.uk

COMMUNITY DIAGNOSTIC CENTRE

Mechanical

Ventilation Strategy

Document Number: CDC-SDS-ZZ-ZZ-SY-M-808523

Current Status: S4–P01

Date of Issue: 14 December 2023

Prepared By: M. Jackson

Suitability	Revision	Date	Description	Author	Checked
S4	P01	14/ 12/ 23	First Issue	MJ	JB

CONTENTS

TABLES

FIGURES

1 VENTILATION STRATEGY

1.1 General space ventilation systems

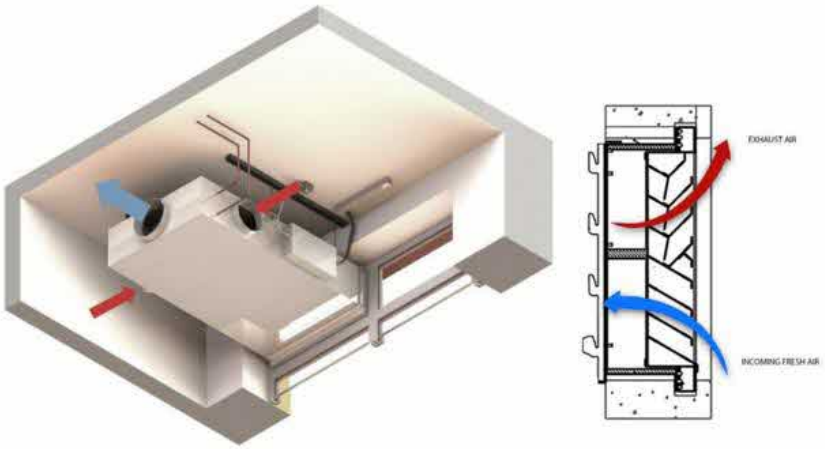


Figure 1 | Hybrid ventilation unit image

Table 1 | Ventilation system design criteria

Item	Description	Design Criteria	Units	Notes
1.	**Limiting velocity**			
1.1.	**Ductwork**			
1.1.1.	Main ducts	5.0 – 6.0	m/ s	
1.1.2.	Branches	2.5 – 5.0	m/ s	
1.1.3.	Run outs	2.0 – 2.5	m/ s	
1.1.4.	Limiting spigot velocity of grilles and diffusers	< 2.0	m/ s	General grilles and diffusers only
1.2.	**External weather louvres**			
1.2.1.	Hybrid intake/exhaust	≤ 0.5	m/ s	
1.2.2.	AHU general intake	≤ 1.5	m/ s	
1.2.3.	AHU general exhaust	≤ 1.5	m/ s	
2.	**Pressure**			
2.1.	General ductwork pressure class	Low pressure	Class A	To DW/144 classification

1.1.1 Hybrid ventilation systems

Rooms such as Offices, Staff and Exam/Consulting Rooms where natural ventilation strategies are acceptable under HTM 03-01 and ADB sheets, will be provided with local room hybrid (mixed mode) ventilation units (HVU). Units are now available with heat recovery up to 75%, with high efficiency fans having low power consumption.

Although traditionally hybrid systems operate in recirculation mode it is proposed that in clinical spaces each unit operates in full fresh air mode and is filtered to reduce the infection risk associated with recirculating air systems. In non-clinical rooms, when occupied, HVU will provide more than 20% fresh air and have final filter to reduce the risk associated with a recirculating air system.

It is proposed that each single sided façade HVU is supplied as a pre-manufactured bespoke composite unit with the following additional features:

- Final filter to improve air quality
- 4-pipe LTHW heating and CHW cooling coil to control the temperature of the fresh air in winter and summer, respectively
- Ducted option for concealment in a ceiling void to offer a clean appearance
- Proprietary common intake and exhaust weather louvre designed by the manufacturer to minimise short circuiting and prevent cross contamination
  - To be integrated into the top section of the associated rooms glazing system to provide a standardised installation detail for MMC

Systems will operate with ducted fan coil units, where additional cooling is required to control room temperatures, that will provide final heating and cooling, refer also to section 1.1.4.

1.1.2 Local mechanical supply and extract ventilation

Rooms will be ventilated by either HVU or connected to the corresponding central mechanical supply and extract ventilation system for that zone.

1.1.3 Central mechanical supply and extract ventilation

It is proposed that clinical, internal rooms, and rooms requiring privacy, are provided with central supply and extract air handling plant with heat recovery zoned to suit the end use as follows:

- **System 1:** MRI Facility – HTM unit
- **System 2:** CT Facility – HTM unit
- **System 3:** X-Ray Facility – HTM unit
- **System 4:** General and Support Areas – Standard Unit
- **System 5:** Not in use
- **System 6:** Clinical & Treatment – HTM unit
- **System 7:** Staff & Admin – Standard unit

Air handling plant will be positioned in internal plant rooms on the roof (Third Level). The plant room will be fully accessible for regular service and maintenance, as well as plant install, replacement and decommissioning. A landing deck is proposed on the roof adjacent to the plant for vertical transport of large modular components using a crane lift, with clear routes provided for horizontal transport and final site assembly in the plant room.

Each air handling unit will be a bespoke purpose-built unit incorporating; dampers; pre and final filtration; high efficiency heat recovery device; high efficiency variable speed fans; frost, reheat, and cooling coils; and noise attenuators.

Air handling plant will be provided with intelligent BMS controls to provide free cooling and night-time cooling strategies.

Supply attenuators shall be incorporated into the air handling unit upstream of the final filtration to avoid migration of insulation material into the supply air duct system. All other attenuators can be duct mounted.

Humidification will be provided to the X-Ray, CT, and MRI Facility air handling plant to control the room humidity within the manufacturer's recommended control range.

Fresh air will be taken from atmosphere through weather louvres integrated into the plant room façade and delivered to each space using a system of ducting and supply diffusers.

Extract air will be removed from each space using a system ductwork and grilles, then discharged to atmosphere by weather louvres integrated into the plant room façade.

Louvres will be positioned to prevent cross contamination and to maintain the quality of fresh air.

Air transfer devices will be provided to allow air movement from clean to less clean. Pressure Stabilisers will be provided where required to precisely control room pressure differentials.

It is proposed that each system is provided with constant and variable volume boxes to control air flow to rooms/ zones and provide opportunities for energy savings using demand based controls, such as air quality and temperature control, setback, and isolation when rooms are not in use activated by occupancy sensors. The central air system will be provided with variable speed fan control using pressure sensors to proportionally increase or decrease fan speed in response to system demand.

Ductwork will be distributed from each plant room in vertical purpose-built risers and horizontally in ceiling voids to suit the building layout.

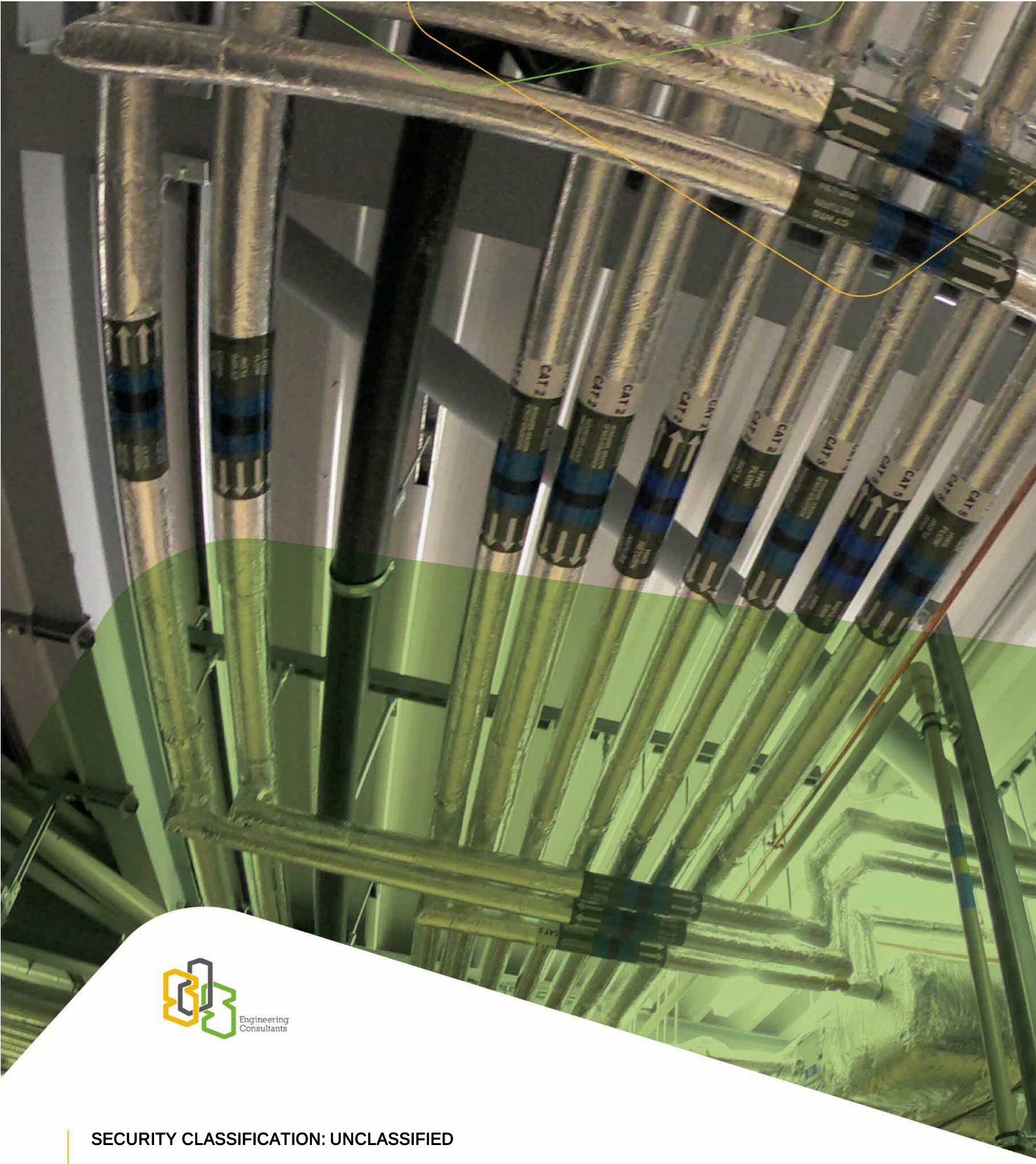
Figure 2 | Air handling unit image

1.1.4 Fan coil unit air conditioning systems

In the CT Scanner and non-clinical spaces where process cooling or the CIBSE TM52 overheating analysis identifies requirements for additional room cooling, fan coil units will be provided with filtration and either 2-pipe CHW cooling coil, or 4-pipe LTHW heating and CHW cooling coil.

Each fan coil will be supplied with more than 20% fresh air to reduce the risk associated with a recirculating air system.

Figure 3 | Ducted fan coil image



Engineering Consultants

SECURITY CLASSIFICATION: UNCLASSIFIED

Services Design Solution Ltd.
19-23 Mary Seacole Road | The Millfields
Plymouth | Devon PL1 3JY | United Kingdom
+44(0)1752 255900
contactus@sdsolution.co.uk
www.sdsolution.co.uk
Building Services Consulting Engineers

- Back Page –