Highgate School – Millinson Sports Centre

Ventilation / Extraction Statement

March 2025

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Document Control

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Executive Summary

This Ventilation and Extraction Statement is submitted in support of a complete planning application by Highgate School for the redevelopment of the Mallinson Sports Centre Complex located on Bishopswood Road. The redevelopment is intended to be carried out in phases. It includes the extensive refurbishment of existing buildings and extensions to create new indoor spaces.

Type of Development

The swimming pool project was granted planning permission on the 31st May 2018 (reference: HGY/2018/1223) and referred to this further project in the Design and Access Statement as a master-planning intention. The works are intended to be constructed as a phased development. They are related to the current project on-site for the refurbishment of the existing Pool Hall, which is being retained at the heart of the proposed scheme.
The proposed works will modernise this important indoor sports facility with alterations and extensions and significantly extend the life of the retained elements of the existing building, additionally providing significant improvements for accessibility, energy efficiency and reduction of the carbon footprint of the whole Development.

Aim

This report identifies the possible external and internal sources of air pollution and measures taken to reduce the effects.

- The report describes the ventilation strategy.
- Address the acoustic requirements and odour emission.

Site

The site is located in an Air Quality Management Area (AQMA) residential area. The air handling plant requires filters to remove particulates, mainly airborne dust particles (PM10).
Pollen filters reduce the energy efficiency of the air handling unit (AHU) and are only deemed necessary for a relatively short time in the year when the pollen count is high enough that it may cause a problem with the sports hall.

Ventilation system

Dry Sports Hall and Internal Squash Court

The proposed Development has the external air handling plant which provides fresh air supply & extract ventilation to indoor spaces.
New Air Handling Plant for refurbished sports hall 1, new sports hall 2 and squash court. The new AHUs will be provided with air intake & exhaust silencers to ensure compliance with limitations set out in external noise report.

Fitness Studios and Gym

The studio and weight gym require enhanced fresh air supply rate to maintain low relative humidity to provide a healthy environment. The proposal is to use local mechanical ventilation units with heat recovery (MVHR).
The MVHR can provide varying air flow rates at dictates of temperature, humidity or Carbon dioxide sensors. Therefore, the MVHR can change the ventilation rate in line with occupancy and activity in the room, controlling room humidity. The operation of ventilation system based on room occupancy will provide energy savings when room is not in use.
These units have standard filter packs designed for dust removal. There is no requirement for additional filters.

Swimming pool ventilation

The swimming pool was constructed 40 years ago, with a basic ventilation plant consisting of two fans. The fans were replaced in 2021 with a new AHU designed for swimming pool use. The AHU can alter and mix the air flow rates in the pool hall to control the pool hall's temperature and humidity levels. Maintaining the environment is essential for the occupants' thermal comfort and avoiding condensation within the building structure.
The new AHU is fitted with a silencer, making these units quieter than the plant it replaced.

Changing Rooms

The changing rooms ventilation is new, having been replaced as part of the pool refurbishment works. The fresh air handling units are designed to provide heating and ventilation. The AHU contains a heating coil with terminal reheat on supply ducts to control the temperature in the changing rooms and heat recovery.

Extract Ventilation Risk

The proposal includes Café selling food items prepared offsite or from the school kitchen therefore a commercial kitchen extract system will not be required. The café will be provided with mechanical supply & extract ventilation via local MVHR unit and a separate extract fan system for back of house areas.

All new ventilation plant will be provided with silencers to ensure compliance with limitations set out in external noise report.

1 Introduction

1.1 This ventilation and extraction statement supports the planning application for constructing a new dry sports hall and the refurbishing of Mallinson Sports Centre facilities at the Bishopswood Road campus (Lower School) of Highgate School, Haringey.

1.2 Haringey's Local Plan Strategic policies (Core Strategy) and Highgate Neighbourhood Plan Strategic Environment Assessment Report (Regulation 16 Update) stated the importance of considering the location of sensitive receptors such as children in schools when applying air quality improvement measures and ventilation design.

1.3 This document outlines the ventilation systems and constraints considered and assessed as part of the more comprehensive planning application.

1.4 The following documents provide background information:

- Design and Access Statement
- Fire Strategy report
- Energy Statement
- Sustainability Statement
- Air quality assessment report
- External noise report

Site

1.5 The Mallinson Sports Centre (MSC) is on the Bishopswood Road campus of the school estate, close to other principal school buildings such as the Mills Centre, the Dining Hall, the Pre-Prep School, and the Junior School.

1.6 The address is:

Mallinson Sports Centre
Bishopswood Road
Highgate
Haringey London N6 4PB

1.7 The site is located in a residential area close to Hampstead Heath and surrounded by sports fields and school buildings.

1.8 All of Haringey is in an Air Quality Management zone, and the London Borough of Haringey and all other London boroughs have joined the Greater London Authority GLA in committing to improving London's air quality.

1.9 The main building comprises the Pool Hall and associated changing rooms, which was the first building on the site in 1969, followed by the main sports hall with associated ancillary accommodation, gym, entrance hall, central offices and other sports spaces completed in 1989.

1.10 The overriding aim of the design seeks to transform this building and create enhanced building aesthetics within the Conservation Area while providing all the sports and ancillary-related facilities that the School will need in the future.

1.11 The intention is to retain the essential elements of the existing building that have significant long-term value and condition, provide spaces of the required technical standard, and integrate them with alterations and extensions into a unified whole, a single sports centre.

1.12 The new sports hall is the principal component of the proposed Development of the School's indoor sports facilities. As part of the work, the School intends to demolish the existing Fives and Squash court buildings to open a large area within the site that can be more efficiently and architecturally developed. Integrated with these works are to build a new sports centre building comprising an indoor sports hall, teaching classrooms and staff offices.

1.13 The hall's design is to accommodate a National standard netball court within the sports hall, one that will allow Premier League games to be played. There is an aspiration nationally for netball courts of this standard, for a sport that is increasing in popularity. Many other sports courts will fit within this same interior footprint.

Figure 1 Arial View of the site in Red

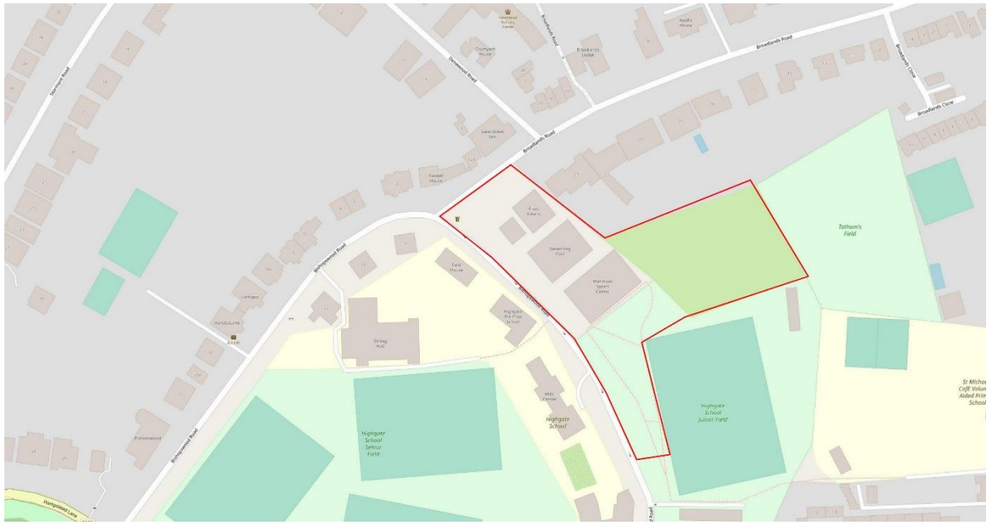


Figure 2 Site Location in Context (Open Street Map)

The Proposed works

1.14 The new extensions will create a larger building with various sports facilities, including a second sports hall, which will also be used for other School events, parent evenings, examinations, and assemblies.

1.15 The principle of a single secure point of access at the south end is to be maintained, with a larger and more open entrance and foyer fronting the all-weather pitches. Once inside the foyer via a draught lobby, the main Sports Centre reception desk immediately controls the area, which will always be staffed during regular operational hours. The desk will be open within the space to create a friendly and welcoming impression for pupils and visitors and improve visibility. It is anticipated that turnstiles will be used to control and monitor access within the building – these are also provided at the west entrance next to the second hall. Turnstiles and entry doors would all be linked to the building fire alarm and detection system and default to open in the event of a fire for emergency egress.

1.16 As a result of the proposed extensions, new lifts will allow complete accessibility for disabled users to all areas of the building which is not currently wheelchair accessible.

1.17 Generally, during the School Day, the main doors will be openable, the entry doors being on automatic electric opening systems for disabled and Part M access. After School hours, it is anticipated that the main doors at both entrances will have access security control, operated by coded entry devices with magnetic closing locks. An option being investigated is to have the entry systems used by pupil and staff cards, which will also serve several other functions in the School.

1.18 The proposed works in this submission include:

- Demolition of the existing Fives Court and Squash Courts building at the north end. Including the removal of the external games court area and high chain-link fencing.
- New north-west extension for a second indoor sports hall with associated new circulation corridor, viewing gallery, access stairs and lift, ancillary spaces for storage and plant, and a teaching block extension for 'Combined Cadet Force' and 'Outdoor Education' classrooms, offices, and associated storage.
- A new south extension to the existing sports hall for eight (8) no. New external covered Fives Courts with run-off area.
- New southwest extension and alterations to the existing building to create an enhanced entrance with a foyer, reception, and café. Including a bespoke staircase down to the current changing rooms.
- New roof to sports hall 1 with new roof lights adding natural daylight to the and improved thermal Comfort.
- The courtyard between the pool hall and sports hall 1 will be covered to provide additional space. The space provides indoor squash courts and forms connections back to the changing rooms, with ancillary external storage for sports.
- The external surrounding is improved with new hard and soft landscaping around the site's perimeter, including removing three trees. The trees will be replaced with new semi-mature trees and form an entrance courtyard area at the new south main entrance.

1.19 The works are intended to be constructed as a phased development. The fist phase of works was the refurbishment of the existing Pool Hall and changing facilities completed in 2020. The refurbished pool hall will be retained at the heart of the overall proposed scheme. Planning permission on 31st May 2018, reference: HGY/2018/1223, referred to this further project in the Design and Access Statement as a master-planning intention.

1.20 The proposed works will modernise this important indoor sports facility with alterations and extensions and significantly extend the life of the retained elements of the existing building while also providing significant improvements to accessibility, energy efficiency and reduction of the carbon footprint of the whole Development.

2 Ventilation strategy

2.1 The ventilation proposal for the refurbishment and extension (Sports Hall 2) of the Mallison Sports centre is a mixed-mode ventilation strategy. Mixed-mode ventilation uses both natural ventilation and mechanical ventilation. The building controls system and occupants will be able to select the appropriate ventilation option to suit the activities taking place in the space.

Natural Ventilation

2.2 Natural ventilation uses openings through the structure to promote airflow through the building. The air movement is driven by the pressure differences between the inside and outside of the building. The pressure differences are created when there is a temperature difference between the inside and outside of the building or wind passing over the building.

2.3 A temperature-driven pressure difference occurs on low wind days when there is above-average hotter or colder weather.

2.4 Wind action passing over the building creates pressure differences between elevation and height. The wind-driven pressure difference can result in sizeable uncontrolled air movement in the building, which can become accelerated through opening resulting in noise, slamming of a door or unwanted draughts.

Mechanical Ventilation

2.5 Mechanical ventilation uses fans to drive the air through the building, creating a controllable internal environment. The fans are often located in a box external to the building allowing heat exchange between extract and supply air streams.

2.6 Mechanical ventilation systems can filter the air passing into the building, creating a cleaner environment.

2.7 As a controllable system, it can increase ventilation rates in response to heating requirements or activity within sports halls. Recirculating air helps to increase the rate at which the space heats up. Supplying and extracting a greater volume of fresh removes airborne pollutants and reduce humidity.

Mix-mode control

2.8 Mix-mode ventilation is a term that describes where it is possible to use both natural and mechanical ventilation options in buildings. In the case of sports halls, natural ventilation is the primary ventilation method as sports halls are large volumes with a small but active occupancy. Most of the spaces are passive and do not require substantial heat input.

2.9 The sports hall will also be used for events with large numbers of people when mechanical ventilation may be beneficial to control space temperature and humidity.

2.10 Sports halls are also used as examination rooms when the hall is required to be heated and thermally comfortable for students sitting at an exam for up to three hours.

Ventilation System

2.11 The classrooms, non aquatic Sports Halls, Squash courts, Gallery to Sports Hall, Studio, Gyms, Café area, and office spaces are to be provided with a mixture of natural & mechanical ventilation known as a mix mode system. These will be provided with manually openable windows and mechanical ventilation units controlled by sensors measuring room temperature, relative humidity and, in higher occupancy spaces, Carbon dioxide levels.

2.12 Several Air Handling Units (AHU) will be utilised to provide mechanical ventilation as part of the mixed-mode approach.

Changing Rooms

2.13 The use of the changing room requires space that is warm with slightly elevated humidity. The changing room is connected with the pool hall and must be kept under slight positive pressure compared to the pool hall. The positive pressure stops warm and humid air from entering the changing rooms.

2.14 The positive pressure in changing rooms is achieved by always supplying more air than is extracted from the changing rooms.

2.15 The extract ventilation replaces the air 8 times per hour to remove humidity, drying the shower area between uses.

2.16 The ventilation plant includes temperature and humidity sensors and allows the ventilation to adjust to varying occupancy levels across the day.

Swimming Pool

2.17 Supply and Extract Air – The new pool hall air handling plant is in the upper plant room area at the north corner of the swimming pool building. The fresh air handling unit supplies treated fresh air into the pool hall to maintain design environmental temperature and humidity levels.

2.18 The AHU has energy-efficient variable speed plug fans reducing energy consumption and running costs. The fans are inherently quieter than traditional fans reducing the size of silencers. The fans will typically operate between 20-50% of design volume to maintain design condition within the pool hall, only increasing in speed when the pool hall relative humidity rises above 65%RH.

2.19 The AHU recovers approximately 70-80% of the thermal energy from the exhaust air stream and uses the power to pre-heat the cooler incoming fresh air.

2.20 The AHU dehumidifies the pool hall by introducing relatively dry external air to replace the moisture-laden pool air. The fresh air mixing box removes the requirement for cooling by introducing increased levels of dry fresh air into the pool hall. The increased fresh air promotes a higher quality environment and dilutes odours.

2.21 The new pool hall AHU will minimise the pool air exhaust outside, reducing the potential for pool hall odours to be sensed by persons in the vicinity.

Dry Sports Hall 1

2.22 The refurbishment of the dry sports hall involves the replacement of the existing heating and air handling plant. The replacement AHU will have the ability for heat recovery and a mixing box to enable the quick heating of ample volume space and control of the internal environment. The ventilation system has not

significantly changed over the life of the building, and the new plant will improve ventilation and reduce energy consumption.

2.23 Ideally, a sports hall should be kept at cool temperatures for team games and warmed to higher temperatures for specific sports or as an examination room.

2.24 Additional ventilation from opening lower-level fire doors. The automated high-level windows and roof vents. Sports halls, like sizeable industrial buildings, can suffer in the summer months because of the lack of ventilation in the wall and roof.

2.25 The new insulated roof will have a light reflective pint, and insulation will help to insult against fabric heat gains. The installation of PV array will shade a portion of the roof.

2.26 The external air handling plant will have refrigerant heating coils connected to an external heat pump unit.

Dry Sports Hall 2 and Squash Court

2.27 Dry Sports Hall 2 is a new construction sport designed to use a competition space with a viewing gallery. This sports hall will have alternative uses for assembly and performance. The alternative uses require the plant to operate over a broader range of internal conditions and more sophisticated controls than other sports halls.

2.28 Intenral squash court will also be a new construction designed to be mechanically ventilated using supply and extract air handling units with heat recovery to improve energy efficiency whilst maintaining good indoor air quality. Controls will be commissioned to enable ventilation in the Squash court only when occupied.

2.29 The ventilation plant may also be used to monitor carbon dioxide levels, humidity, and temperature.

Classroom

2.30 Classrooms have high occupancy rate that change every hour. Traditional classrooms have relied on natural ventilation (open windows); however, energy efficiency requires mechanical ventilation with heat recovery to control humidity and carbon dioxide levels, helping to keep the occupants awake and reduce energy loss from uncontrolled ventilation.

2.31 The classroom windows include a high and lower-level opening (approximately 1m vertical apart). It proposed providing automated higher-level window openings linked to room humidity and carbon dioxide sensor. Automatic window openers increase the fresh air ventilation, reducing the moisture and carbon dioxide levels required when the room is full of occupants. The mechanical ventilation system is designed to operate lower ventilation rates suitable for typical occupancy levels and standard conditions.

2.32 The classroom may be unoccupied for long periods of day; during these periods, natural ventilation purges the classroom and reduces the space temperatures.

2.33 BREEAM requires that each classroom has separate temperature controls, and the occupants can adjust the internal temperatures. Generally, classrooms should heat and be controlled 18°C with the ability for occupants to raise room temperatures to a maximum of 23°C. Modern classroom heating control enables each classroom to have different temperatures and does not rely upon thermostatic radiator valves. At the end of each day, the heating controls will reset to the set point.

Corridors and Storeroom

2.34 Modern heating controls save energy by avoiding overheating and can control ventilation to maintain humidity levels. Automated openings in the High-level window and roof vents provide introduce fresh air. Corridor space heating controls include an electronic temperature sensor and motorised radiator control valves.

2.35 Mechanical thermostatic radiator valves (TRV) often cause overheating in circulation spaces as the valve limits the water flow rate through the radiator. The TRV value cannot regulate space air temperature, and regulation is best achieved with electronic temperature sensors and zone valves.

BREEAM Thermal Comfort (HEA4)

2.36 Thermal Comfort is 'that condition of mind which expresses satisfaction with the thermal environment. The term 'thermal comfort' describes a person's psychological state of mind and is usually referred to as whether someone is feeling too hot or too cold. Thermal Comfort is difficult to define because it needs to account for various environmental and personal factors to establish what makes people feel comfortable. Health and Safety Executive considers 80% of occupants as a reasonable limit for the minimum number of people who should be thermally comfortable in an environment. This issue aims to encourage appropriate and robust consideration of thermal comfort issues and specification of proper occupant controls to ensure maximum space flexibilities and thermal Comfort for most building occupants.

2.37 The building will be zoned as below:

Zone	System	Control
Swimming pool	AHU rapid space heating, mixed fresh air, control of humidity, air temperature	The Building system controls multiple sensors. Sports staff can make temperature adjustments from the computer in the staff office.
Changing room	AHU rapid space heating, constant fresh supply humidity, air temperature sensors, changing rooms kept under positive pressure.	The Building system controls multiple sensors. Sports staff can make temperature adjustments from the computer in the staff office.
Dry Sports hall & Squash Courts	AHU rapid space heating, mixed fresh air, control of humidity, air temperature. High-level windows and roof lights are fitted with automated actuators.	The Building system controls multiple sensors. Sports staff can make temperature adjustments from the computer in the staff office.
Dance and fitness studio	Refrigerant fan-coil units. Mechanical ventilation with heat recovery. Some high-level windows are fitted with automated window openers. Linked to temperature humidity and Carbon Dioxide Sensor	Local Space temperature control via wall-mounted controller with space reset to set point every hour. Temperature control from a computer in the staff office and BMS.
Classrooms	Low Surface temperature radiators. Mechanical ventilation with heat recovery. Some high-level windows are fitted with automated window openers. Linked to temperature humidity and Carbon Dioxide Sensor	Local Space temperature control via wall-mounted controller with space reset to set point every hour. Temperature control from a computer in the staff office and BMS.
Circulation spaces	Mechanical ventilation with heat recovery. Low Surface temperature radiators. Some high-level windows are fitted with automated window openers and linked to temperature.	Temperature control from a computer in the staff office and BMS.
Storage area	Low Surface temperature radiators. Mechanical ventilation with heat recovery.	Temperature control from a computer in the staff office and BMS.

Table 1 BREEAM (Hea4) Control of Thermal Comfort.

AHU Filters

2.38 The suburban site requires a filter design to remove mainly PM10 and the finer PM5 particulates.

2.39 PM_{10} Particulates are larger dust particles that can often be seen collecting on Flat surfaces. PM_{10} particles are easily filtered out supply air stream using standard manufactures supplied filters

2.40 PM5 are finer particles often generated as combustion in road vehicles. A finer grade filter is required to remove this sizer of particles.

2.41 Often a combination of filters is required to clean the supply air efficiently.

2.42 The technical details of proposed AHUs are shown in Appendix B, Air Handling Unit Specification.

2.43 Appendix C Indicated Filter specification provides details of the proposed filters that consider NOx levels identified in external air around the site.

2.44 In addition to this unit, a separate kitchen extract (direct to the atmosphere) is proposed to eliminate kitchen odours and remove heat from the apartment. The discharge location for this duct shall be away from air intakes.

2.45 Mechanical supply and extract ventilation with heat recovery is proposed to provide ventilation for changing rooms. The intermittent mechanical extract is proposed to ventilate toilet areas.

2.46 Most AHUs are proposed in external locations, whereas internal AHUs are being proposed. Air intake and exhaust locations will be designed with suitable separation between intake and discharge locations.

2.47 Natural ventilation is being proposed for circulation corridors, storage areas, and plant rooms.

2.48 Both existing and new sports halls will be provided with openable windows and roof lights to purge ventilation and smoke clearing in the event of a fire.

2.49 Bin/Refuse stores are to be naturally ventilated via louvres on external walls of the building.

2.50 The cleaners' stores will be provided with intermittent mechanical extract ventilation designed to operate only when the space is in use.

3 Conclusion

3.1 GLA's London Plan 2021 and London Borough of Haringey's Local Plan 2013 with 2017 ammendments encourage all new developments to consider natural/passive ventilation strategies where possible in order to achieve greater energy savings and occupant satisfaction.

3.2 The proposal of utilising mixedmode ventilation for this development aims to provide optimum comfort levels and achieve energy savings with the use of natural ventilation to provide free cooling and manage indoor air quality when external weather conditions allow the use of natural ventilation.

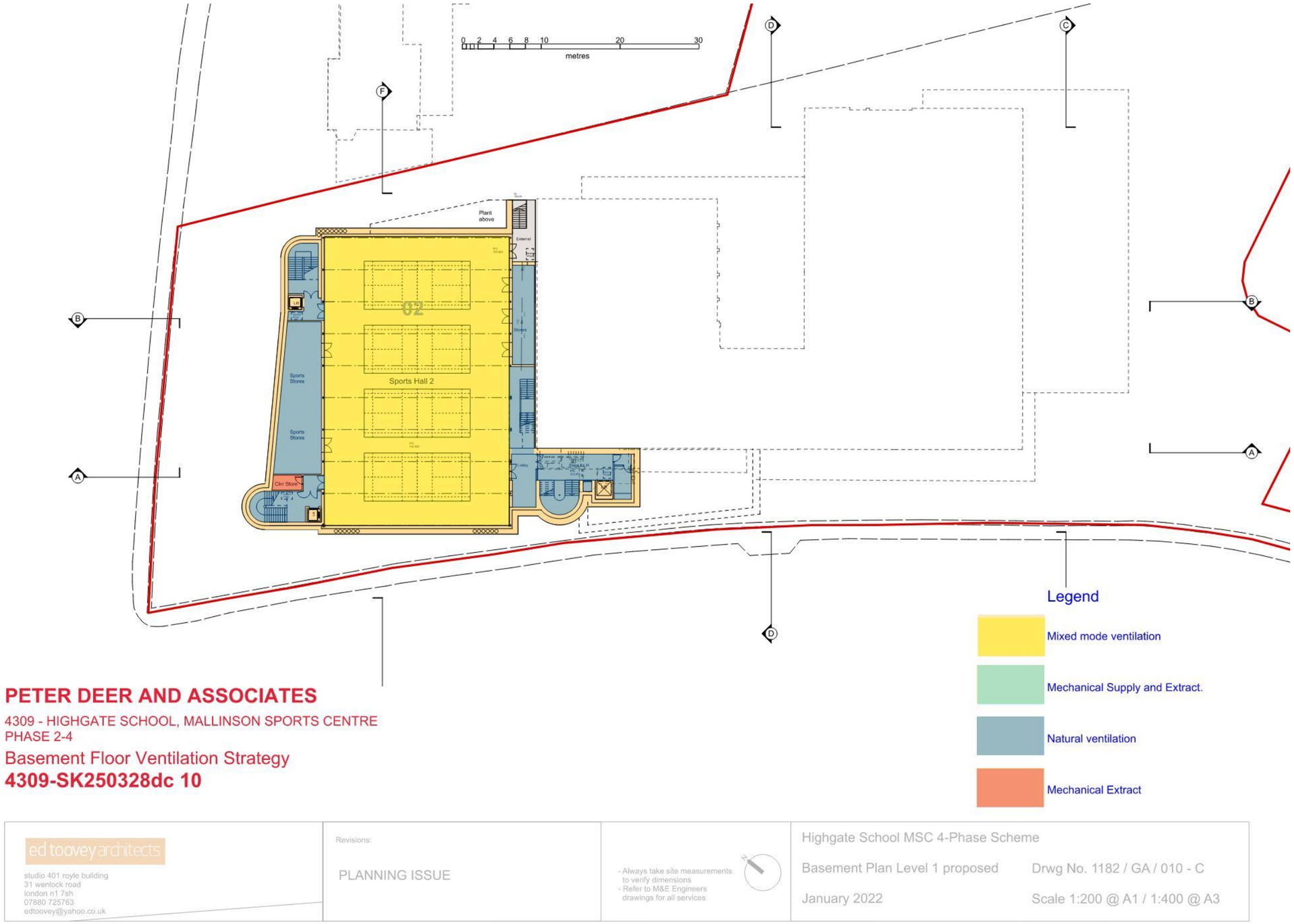
3.3 The impact on the acoustic conditions and air quality within the area has been considered and natural ventilation via openable windows/roof lights is recommended.

4 Appendices

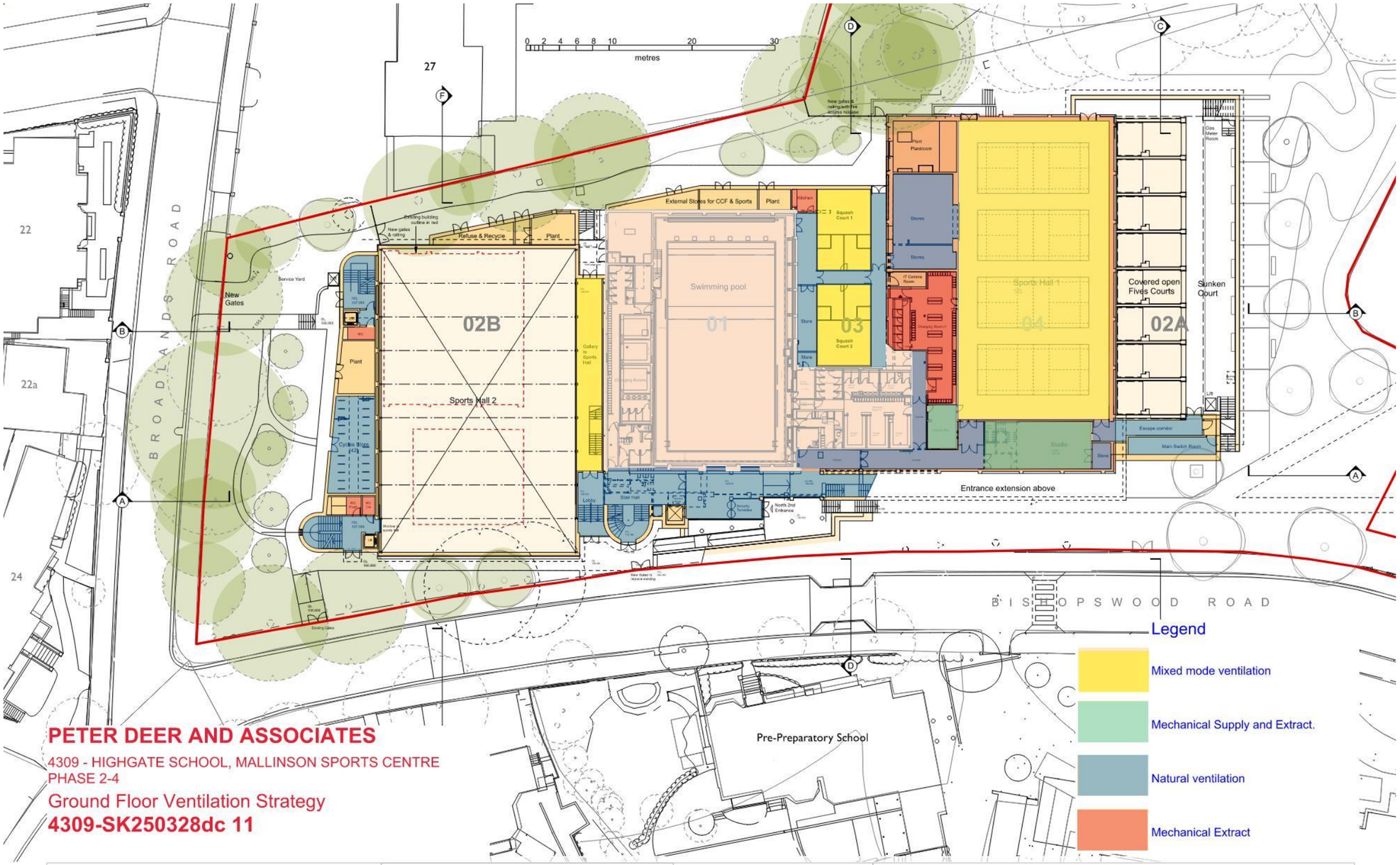
Appendix A Proposed Ventilation Strategy 12
Appendix B Air Handling Unit Specification 16
Appendix C Indicated Filter specification 18

Appendix A Proposed Ventilation Strategy

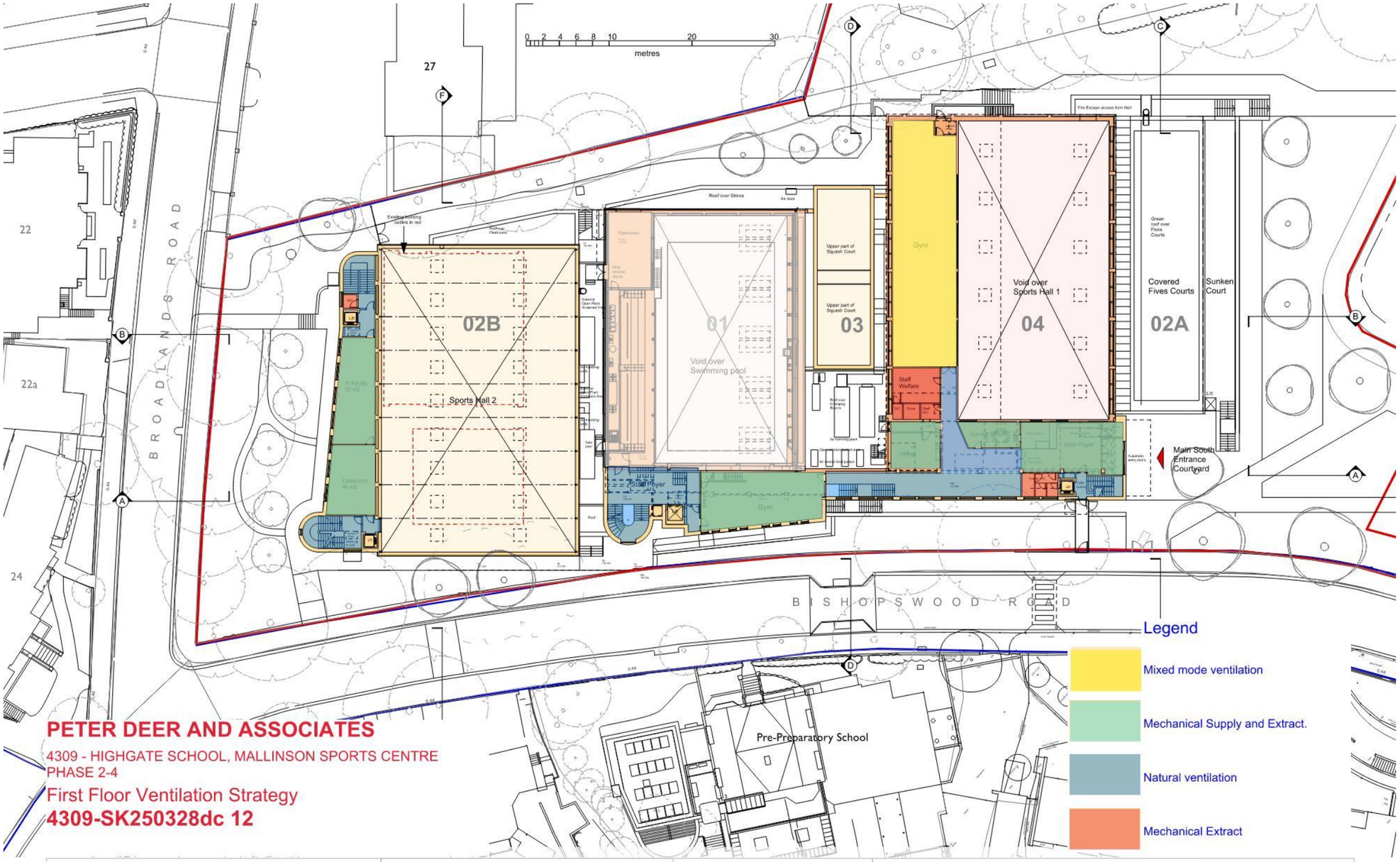
Basement Floor



Ground Floor



First Floor



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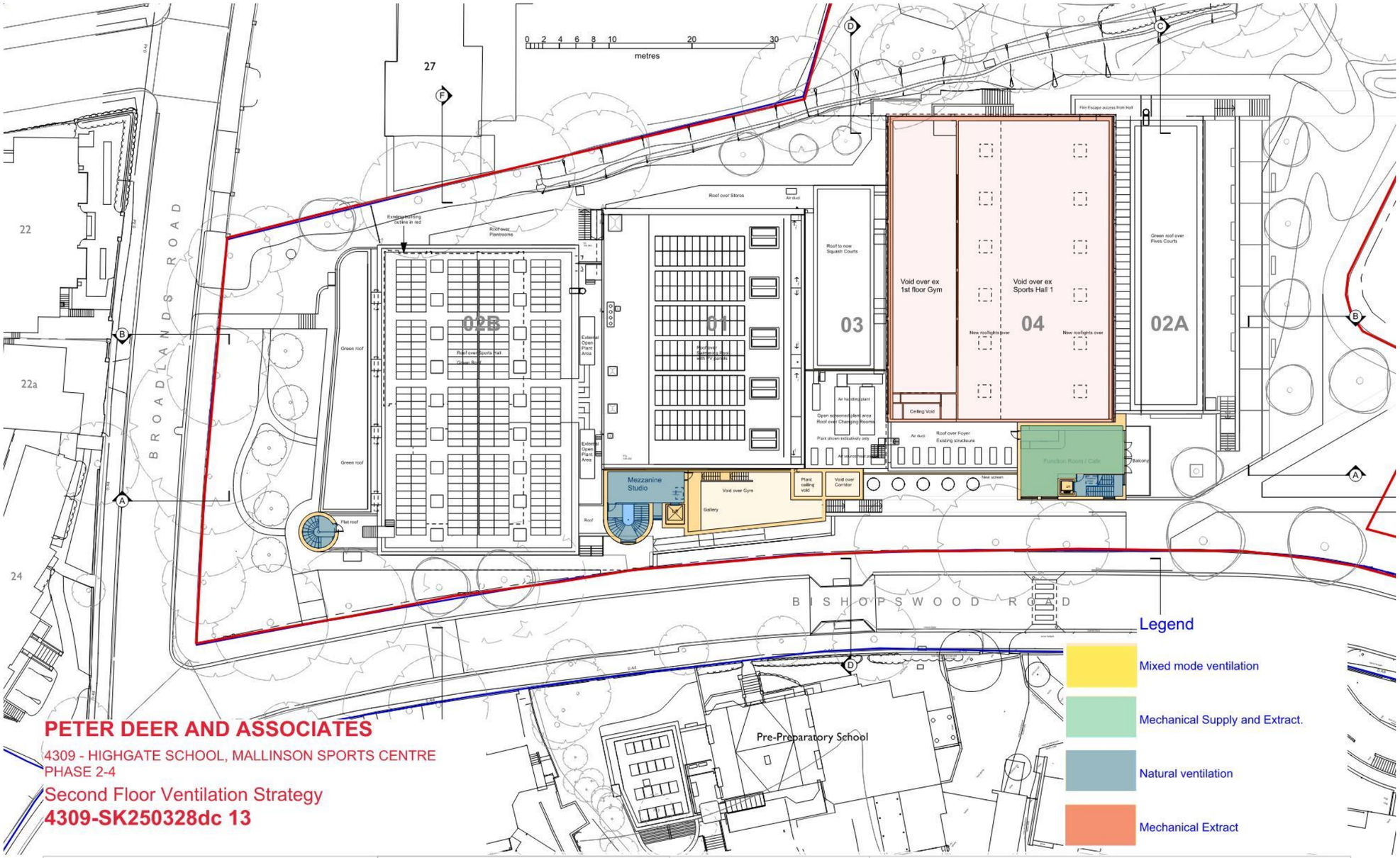
Revisions:
PLANNING ISSUE

- Always take site measurements to verify dimensions
- Refer to M&E Engineers drawings for all services

Highgate School MSC 4-Phase Scheme
First Floor Plan Level 3 proposed
Drwg No. 1182 / GA / 012 - C
January 2022
Scale 1:200 @ A1 / 1:400 @ A3

Second Floor



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Revisions:
PLANNING ISSUE

- Always take site measurements to verify dimensions.
- Refer to M&E Engineers drawings for all services

Highgate School MSC 4-Phase Scheme
Second Floor Plan Level 4 proposed
Drwg No. 1182 / GA / 013- C
January 2025
Scale 1:200 @ A1 / 1:400 @ A3

Appendix B Air Handling Unit Specification

AIR HANDLING UNIT eQ Prime Side

Project	30987 () / 4309 - Highgate School MSC		*Acon 3.07.62676*
AOC	ACON-02939916		
Unit	1 () / AHu 01 1.65m3s		2022-04-22
Size	023		Page 3/18
Customer			
Customers ref.			
Our ref.	Daniel Evans		
Supply air volume flow rate	1.65 m³/sec	Exhaust air volume flow rate	1.65 m³/sec
External static pressure	250 Pa	External static pressure	250 Pa
Mains electricity	3x400VAC±10%+N+PE, 50Hz	Weight	1277 kg
Specific el. power demand (SFPv)	1.44 kW/(m³/s)	Dimensioned for wet condition	
Ref. density	1.2 kg/m³	Ref. altitude above sea level	0 m

SUMMARY

Functional sections in direction of air flow	v0 (m/s)	Et (%)	tw (°C)	ts (°C)	dP* (Pa)
Supply air:					
Connection section	2.3				38
Filter	2.1				124
Heat exchanger	1.9	86.1	-4 / 18.4	30 / 24.9	115
Plenum fan		69.9	18.4 / 19	24.9 / 25.6	545
Air heater	1.6		10 / 35		18
Connection section	0.0				0
Supply outlet					250
Exhaust air:					
Exhust inlet					250
Connection section	0.0				0
Filter	1.9				110
Heat exchanger	2.0		22 / 1.6	24 / 29.1	114
Plenum fan		68.3			492
Connection section	2.3				18

*Refers to the fan design case
Fan system effect is taken into account in fan performance

SOUND POWER LEVELS
(standard: EN13053 ISO/CD 13347-2)

	Lw per octave band (dB)								LwA
Octave band (Hz)	63	125	250	500	1k	2k	4k	8k	dB(A)
Fresh air connection	61	69	64	60	52	49	45	42	61
Supply air connection	69	80	72	73	70	64	59	56	75
Extract connection	72	69	66	61	54	51	48	47	63
Exhaust connection	78	81	77	77	74	69	66	65	79
To surroundings	65	63	54	43	37	37	35	30	51

AIR HANDLING UNIT eQ Prime Side

Project	30987 () / 4309 - Highgate School MSC		*Acon 3.07.62676*
AOC	ACON-02939916		
Unit	1 () / AHu 01 1.65m3s		2022-04-22
Size	023		Page 4/18
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Specific el. power demand (SFPv)	1.44 kW/(m³/s)	Dimensioned for wet condition	
Ref. density	1.2 kg/m³	Ref. altitude above sea level	0 m

SUMMARY TECHNICAL SPEC.

Unit				
Supply air volume flow rate	1.65 m³/sec		Installation	Outdoor horizontal
External static pressure	250 Pa		Material	AlZn sheet steel
Internal static pressure	295 Pa		Thermal insulation	T3
Exhaust air volume flow rate	1.65 m³/sec		Condensation insulation	TB3
External static pressure	250 Pa		Leakage class	L1(M) / L2(R)*
Internal static pressure	242 Pa		Casing strength	D1(M)
Design outdoor temperature summer	30 °C		Sum filtration supply air	ePM1 - 55.0%
Dim. humidity summer	21 °C wb		Sum filtration exhaust air	ePM1 - 55.0%
Design outdoor temperature winter	-4 °C			
Dim. humidity winter	-4 °C wb			
Temperature in, supply air, summer	18 °C		Temperature in, extract air, summer	24 °C
Air humidity in, supply air, summer	12.5 °C wb		Air humidity in, extract air, summer	17.1 °C wb
Temperature in, supply air, winter	20 °C		Temperature in, extract air, winter	22 °C
Air humidity in, supply air, winter	13.8 °C wb		Air humidity in, extract air, winter	15.4 °C wb
Mixing ratio at winter design temperature	0 %			
Temperature efficiency (EN308)	86.1 %		Heat recovery capacity	60.9 kW
SFPv supply air	0.71 kW/(m³/s)		Total dry weight	1277 kg
SFPv exhaust air inlet	0.73 kW/(m³/s)			
SFPv total sum	1.44 kW/(m³/s)		Heaviest block	1110 kg
SFPe total sum	1.61 kW/(m³/s)			

ErP (according to (EU) directive 1253/2014)

Approved according to requirements 2018

Unit type: NRVU BVU	
SFPint (2016: 1525 W/(m³/s), 2018: 1245 W/(m³/s))	427 W/(m³/s)
Dry temperature efficiency (balanced) (EN308) (2016: 67 %, 2018: 73 %)	86.1 %
External leakage rate	0.3 %
Internal leakage rate	0.0 %

	Supply air	Extract air	Unit
Heat exchanger pressure drop	110	110	Pa
Filter energy classification			
Filter pressure drop, start	46	28	Pa

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

FläktGroup

AIR HANDLING UNIT eQ Prime Side

Project	30987 () / 4309 - Highgate School MSC		*Acon 3.07.62676*
AOC	ACON-02939916		
Unit	1 () / AHu 01 1.65m3s		2022-04-22
Size	023		Page 5/18
Customer			
Customers ref.			
Our ref.	Daniel Evans		

Supply air volume flow rate	1.65 m³/sec	Exhaust air volume flow rate	1.65 m³/sec
External static pressure	250 Pa	External static pressure	250 Pa
Mains electricity	3x400VAC±10%+N+PE, 50Hz	Weight	1277 kg
Specific el. power demand (SFPv)	1.44 kW/(m³/s)	Dimensioned for wet condition	
Ref. density	1.2 kg/m³	Ref. altitude above sea level	0 m

Filter area	0.9	0.9	m²
Filter cross section air velocity	1.8	2.0	m/s
Air flow	1.65	1.79	m³/sec
Total pressure rise	480	436	Pa
Fan fan system effect	0	0	Pa
Fan total efficiency	69.5	68.1	%
Fan system input power (absorbed electrical power) according to SFP	1.18	1.21	kW

Fan system effect is taken into account in fan performance

Coils

	Capacity [kW]	Air In [°C/°C wb]	Air Out [°C/°C wb]	Water in/out [°C]	Antifreze	Water [l/s]	Water [kPa]	Conn [mm]
Air heater	50	10/4.9	35/15.8	55/45		1.21	12.5	32

Fan power supply data

Voltage, supply flow	3x400VAC+PE, 50Hz	Voltage, extract flow	3x400VAC+PE, 50Hz
Power, supply flow	1.7 kW	Power, extract flow	1.7 kW
Current, full load, supply flow	2.2 A	Current, full load, extract flow	2.2 A

SOUND POWER LEVELS
(standard: EN13053 ISO/CD 13347-2)

	Lw per octave band (dB)								LwA
Octave band (Hz)	63	125	250	500	1k	2k	4k	8k	dB(A)
Fresh air connection	61	69	64	60	52	49	45	42	61
Supply air connection	69	80	72	73	70	64	59	56	75
Extract connection	72	69	66	61	54	51	48	47	63
Exhaust connection	78	81	77	77	74	69	66	65	79
To surroundings	65	63	54	43	37	37	35	30	51

*Flakt Group eQ AHUs are leakage class L2 real unit as certified by Eurovent.
CAL class @-400Pa and @+700Pa. For units were the casing has; (i) a customised or special design that differs from standard module box, (ii) nonstandard components penetrating the casing that is non-standard for a real unit, and (iii) where holes or penetrations are made in casing after delivery to site, the leakage class cannot be guaranteed. This also includes damage to the unit from handling and transportation.

camfil

CityCarb I

Particulate and Molecular Filtration

- Safe, light, clean and easy to handle. Low resistance to airflow.
- Performance tested for industry leading control of particles, ozone and toluene.
- Ozone efficiency and Camfil rating.
- Includes Camfil's exclusive RAD carbon.
- High efficiency control of nitrogen dioxide.
- EN779:2012 F7 rating and ASHRAE 52.2 MERV 15 rating.

A combination or "2 in 1" filter providing both particle and molecular filtration in a compact filter configuration. CityCarb is a group of solutions to address the problem of atmospheric chemical burden and odours in building. It is especially useful when; due to lack of space, molecular filtration must be combined with particle filtration in a single device.

The filters are constructed from 2 distinct layers of pleated media that are formed into panels and held in a robust plastic frame. They are designed to fit in place of existing 300mm (12") deep filters within an air-handling unit. The filters are readily mounted in standard ventilation system frames without the need for modification, so upgrading bag or compact filters is a simple process. Each filter has a jointless gasket on the header frame to ensure an effective leak-free installation.

Rapid Adsorption Dynamics carbon

The CityCarb I model uses broad spectrum carbon and will adsorb more than 99.5% of the thousands of different molecules that might be expected in the indoor environment of a city-centre building. The broad spectrum carbon operates with Rapid Adsorption Dynamics and is specifically designed to be highly efficient against the multiple contaminants present on an individual basis in low or moderate concentrations in city-centre buildings. CityCarb I filter provides the highest levels of indoor air quality (IAQ) that can be expected in a commercial building.

The CityCarb I filter may be used in both fresh air make-up and recirculation air systems. In the make-up air system it will provide efficient control of external pollutants including ozone and nitrogen dioxide that are classed as irritants and have maximum exposure limits recommended by the World Health Organisation (WHO). In the recirculation air system the filter will remove virtually all internal source volatile organic compounds (VOCs) that arise from multiple sources including construction and finish materials, cleaning agents, photocopiers and humans.

About outgassing

It is a logical requirement that the performance of molecular filters is not compromised by outgassing from the materials used in the filter construction. On a weight basis, the principal raw materials used in filter construction include; the filter media, plastic frames, adhesives and sealants. Camfil have selected and tested the materials used in all CityCarb filters (E, I and CH versions) to have extremely low outgassing characteristics. The total outgassing level is less than 4 micrograms/cm².

Outgassing is determined by heating to 50°C and measuring the concentrations of the most prevalent gases released from the material. *Note, the outgassing test is conducted at approximately double the normal operational temperature for air filters.*

Many competitive products may use more economic raw materials that will have significantly higher outgassing values.

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Appendix C Indicated Filter specification

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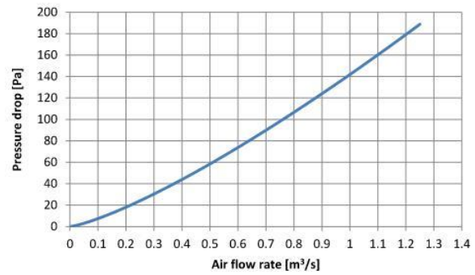
CityCarb I

Particulate and Molecular Filtration

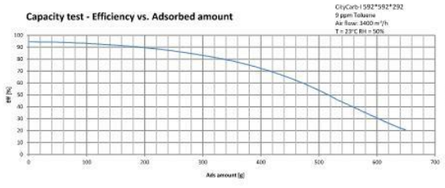
Pressure drop

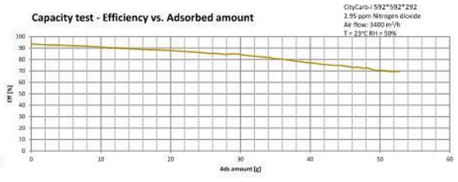


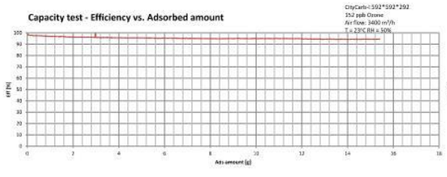
Performance Data

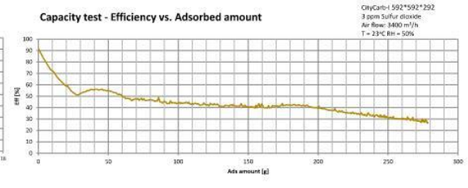
Width	Height	Depth	Filter class EN 779:2012 / MERV[1]	Air flow m³/hr	Pressure drop Pa	Media area m²	Weight kg	Energy class
592	592	292	F7 / MERV 15	3400	130	8	9.3	E
592	490	292	F7 / MERV 15	2800	130	6.6	6.8	E
592	287	292	F7 / MERV 15	1500	130	3.8	4.8	E

Data Notes:
[1] MERV, Minimum Efficiency Reporting Value per ASHRAE Filter Testing Standard 52.2









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