GOSH CCC
Ventilation & Extraction Statement

20/05/2022

GOSHCCC-ZZ-ZZ-RP-J-5000-6110

S2 P01

NHS
Great Ormond Street Hospital for Children
NHS Foundation Trust

BUILDERS SISK CONTRACTORS

BDP.

Rev	Description	Orig	Review	BDP Approval	Date	Client Approval
P01	First Issue for Town Planning	MH	MB	MH	20.05.22	N/A

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1.0 INTRODUCTION

This Ventilation and Extraction Statement has been prepared on behalf of the Applicant, Great Ormond Street Hospital for Children NHS Foundation Trust, in collaboration with the appointed design and build contractor John Sisk & Son (Holdings) Ltd, to support an application to the London Borough of Camden (LBC) for full planning permission for the redevelopment of the Great Ormond Street Hospital (GOSH) Frontage Building on Great Ormond Street WC1N 3JH, to provide a new Children's Cancer Centre (CCC).

1.1 SITE PROPOSALS

Most of the site is currently occupied by the existing GOSH Frontage Building, a five-storey building is currently occupied by several GOSH departments including Audiology Department, Clinical Research Facility (CRF), Department of Child and Adolescent Mental Health and Paediatric Psychology Department.

The western most part of the site is occupied by the main GOSH Entrance providing connections to the wider GOSH hospital island site and by a small rear element (external staircase) of the Paul O'Gorman Building that will be removed to facilitate the proposed development. The site is bounded by the Paul O'Gorman Building to the west, Octav Botnar Wing to the east, the Variety Club Building and Premier Inn Clinical Building to the north and Great Ormond Street to the south.

The proposed development involves the replacement of the existing Great Ormond Street Hospital Frontage Building with an 18,288m2 new build hospital, housing all the essential elements and functions of the GOSHCCC as well as providing a new main entrance to GOSH. The Proposed Development will also include an extensive roof garden, along with external balcony terraces at Levels 3 to 8, which will serve as amenity spaces for patients. All major plant serving the building will be located on Levels 1 and 9.

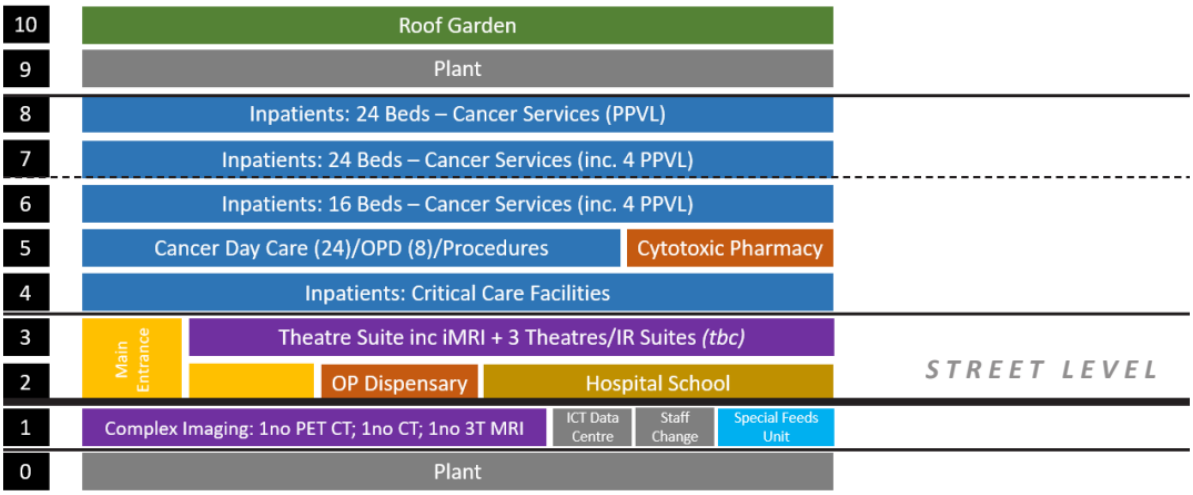

Figure 1: Essential Elements & Functions of GOSHCCC

2.0 VENTILATION

2.1 GENERAL VENTILATION

Ventilation and comfort cooling will be provided by ducted supply and extract systems operating on 100% outdoor air and comprising central air handling units located in the Level 9 and Level 0 plant rooms, distribution ductwork and ceiling mounted supply and extract air terminals.

The ductwork will be distributed from each plant room to the floors via fully accessible vertical risers. Horizontal distribution ductwork will run within the suspended ceiling voids. Air supply and extract terminals will be located such that the general flow of air is from "clean" to "dirty" areas.
Generally, all internal areas of the hospital will be provided with one of the following:

- Ducted mechanical supply and extract ventilation with local zone re-heat batteries.
- Ducted mechanical supply and extract ventilation with local fan coil units
- Dedicated ducted air conditioning system (AHU serving a single space or suite)

Air change rates for clinical spaces will follow the guidance in HTM 03-01. Natural ventilation is not considered appropriate due to the urban setting of the hospital.

All ventilation systems will incorporate sound attenuators on the atmospheric sides of the supply and extract fans. Duct mounted sound attenuators shall be provided on the room side of the air handling units to achieve the required internal noise criteria. Design internal noise levels arising from the HVAC systems will be as per HTM 08-01 Table 2. For external noise Levels refer to Acoustic Report GOSHCCC-BDP-ZZ-ZZ-RP-A-3000-0002-P02

2.1.1 Level 0 Plant Arrangement

Ventilation for the lower floors of the building, Levels 1 to 4, will be provided by air handling units located in one of the ventilation plantrooms on Level 0. The air handling units will be packaged, double stacked units complete with heat recovery either via a plate heat exchanger or a pumped run around coil circuit.

Fresh air will be provided to the basement air handling plant via a common intake plenum which draws air in at level at the rear of the GOSHCCC, away from traffic pollution, via a concrete builderswork shaft. The shaft will be sealed as recommended in HTM 03-01 and will terminate with an accessible double banked weather louvre, accessible from the Level 4 flat roof. Exhaust air from the AHUs will be routed via a common exhaust plenum to the lightwell at the front of the building and discharged vertically. The discharge plenum will be fully accessible through doors in the plantroom with level access and will be provided with drainage points to convey rainwater to the surface water drainage system.

Figure 2: Level 0 Ventilation Intakes & Exhausts

2.1.2 Level 9 Plant Arrangement

Ventilation for the upper floors of the building, Levels 5 to 8, will be provided by air handling units located in either the east or west ventilation plantroom on Level 9. The air handling units will be packaged, double stacked units complete with heat recovery either via a plate heat exchanger or a pumped run around coil circuit.

Air intake and exhaust louvres will be located along the front of the building and will be separated by a minimum of 10 meters to prevent exhausted air being drawn into the fresh air intakes. The exhaust and intake louvres will be double banked weather louvres to mitigate water ingress.

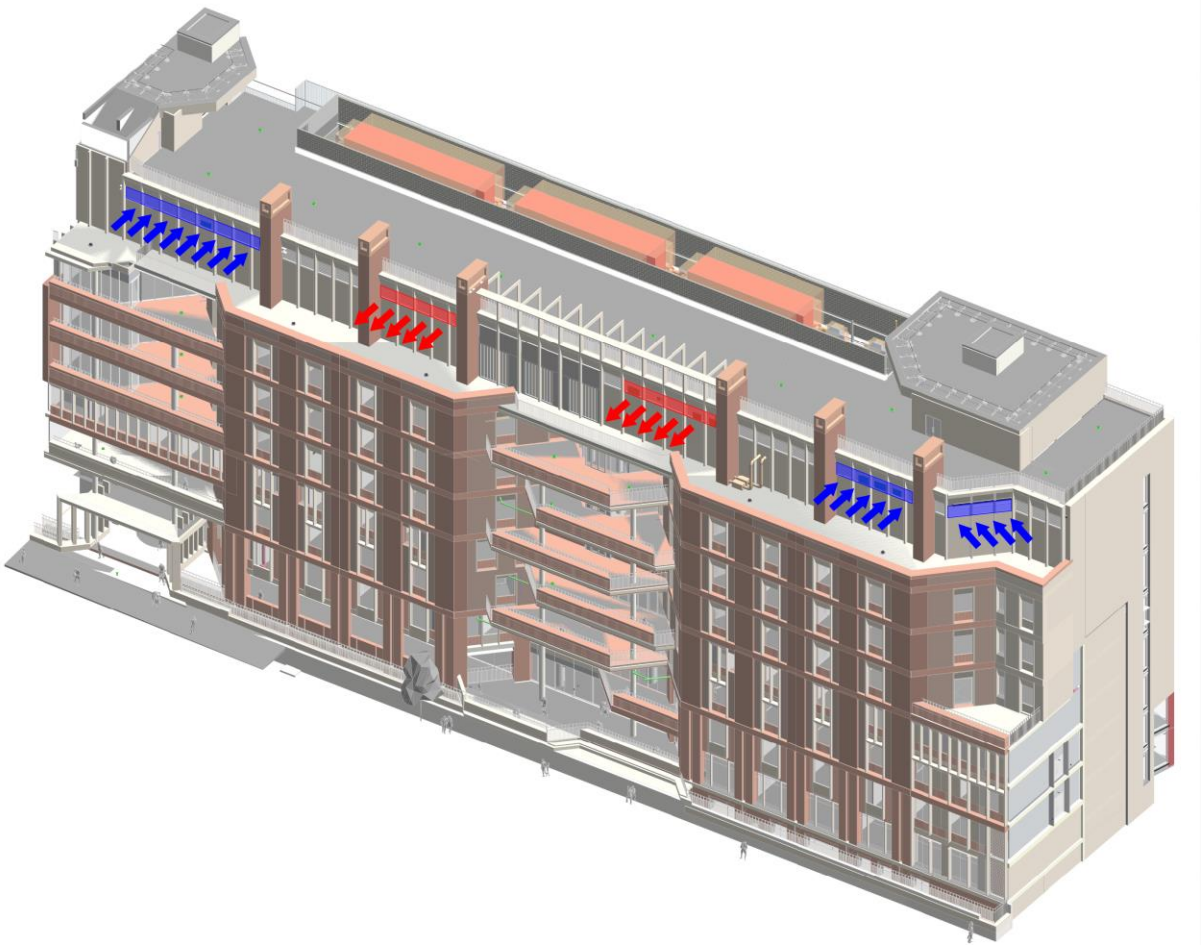

Figure 3: *Level 9 Ventilation Intakes & Exhausts*

2.2 Kitchen Extract

Independent extract systems will be provided to serve the kitchen units at Levels 2 and 6. The systems will comprise extract canopies and fire rated extract ductwork rising to roof mounted extract fans. Extract canopies will be provided above cooking equipment for adequate capture of odour and grease removal.

Ductwork will extend from the roof mounted extract fans to discharge in a safe location 5m above the roof garden via one of the chimneys located at the front of the building.

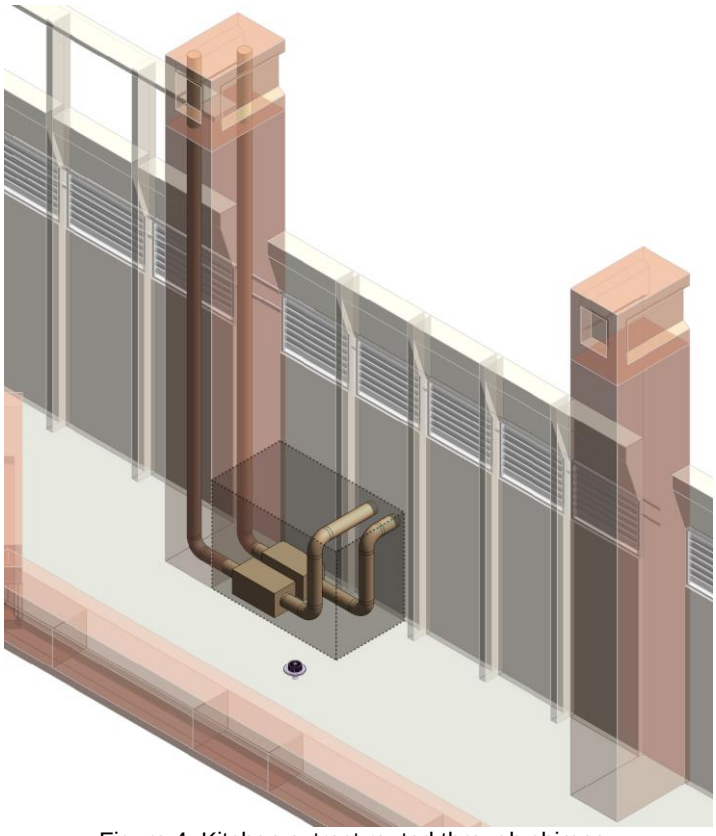

Figure 4: Kitchen extract routed through chimney

2.3 MRI Quench Pipes

The MRI magnets are cryogenically cooled using liquid helium. Each of the two MRI scanners on Level 1 and 3 will be provided with a dedicated quench pipe running from the unit via a dedicated riser to one of the chimneys located at the front of the building. The vent will provide for discharge of rapidly expanding helium gas during fault conditions, in addition to venting helium during initial cool down boil of and the small amount of helium which will boil off in normal use.

The detail design and installation for the quench pipes will be undertaken by a specialist sub-contractor with specific experience in designing and installing helium quench systems for MRI units. Final discharge detail will be in line with the MRI supplier's safety guidance

2.4 Cytotoxic Suite

Separate fume extract systems will be provided to serve cytotoxic suite isolators. These systems will comprise ducts rising to fans located externally on the Level 9 balcony, with exhaust stacks terminating at 5m above roof level via one of the chimneys. These specialist extract systems will operate in conjunction with the equipment served.

2.5 Generator flues

Three diesel powered generators located in a dedicated plantroom on Level 9 provide back-up power to the whole building. The generators require significant ventilation for cooling and combustion. Air intakes on the front of the building, and outlets to the rear, are provided for this purpose. The intakes and outlets are provided with attenuators to achieve 65dBA at 1 metre. Anti-vibration mounts and acoustic treatment of the generator room are required to mitigate noise within the accommodation below.

Products of combustion discharged via the generator exhaust system will be conveyed to high level by a twin walled flue system, concealed within one of the chimneys located at the front of the building, discharging 5m above the roof garden.

Whilst the frequency of an emergencies requiring prolonged generator use is extremely low, dispersion modelling has been carried out to assess the impact flue emissions would have on the existing building ventilation intakes, new GOSHCCC ventilation intakes, openable windows and the GOSHCCC roof garden. The predicted PM_{10} and CO concentrations at all assessed receptors did not exceed the relevant air quality standards, and predicted NO_2 concentrations at all air intakes and openable windows did not exceed the relevant air quality standards.

The roof garden, however, shows some exceedances of the target values at certain points of the year. Whilst these figures are still within safe Control of Substances Hazardous to Health (COSHH) workplace exposure limits, the recommendation is that generator maintenance testing is scheduled for a time when the roof garden is unoccupied.

2.6 Smoke Ventilation

2.6.1 Stair core smoke ventilation

Run and standby smoke extract fans located on the roof at evel 9 shall be used to generate a negative pressure in the escape stair lobby and extract smoke from the affected floor

A smoke shaft running up each core will be fitted with smoke shaft control dampers and a lobby ventilator on each floor. Fresh air will be drawn down through the stair into the lobby via an automatic opening vent at the head of the stair, whilst hot smoke is extracted through the smoke shaft by the fans and discharged at roof level. The discharge from the system will be terminated above head height for occupants on Level 9.

2.6.2 Basement Smoke extract

The plant room and ancillary areas at Level 0 will be provided with smoke ventilation by a ducted mechanical extract ventilation system comprising air extract grilles connected to duct mounted extract fans located in a 2hr fire rated enclosure at level 0. A run around coil will be provided in the extract ductwork which can be bypassed using smoke control dampers in the event of fire system activation. All main ductwork will be fire rated.

A control system will be provided with powered smoke dampers that allow selection of an individual space or group of spaces to be cleared with the overall system capacity based on the largest single compartment served. Each room will be provided with automatic smoke control dampers on the extract connection, linked to the smoke monitoring and control panel in the firefighting core. In the event of a fire in a particular room, the fire/smoke dampers will open or close on a predetermined schedule to maintain 10 air changes per hour or greater of extract air from the affected room. Refer to below for further details.

Exhaust will be provided via a shaft rising in the southeast of the building, discharging onto Great Ormond Street at Level 3.

Replacement air to each room will be provided via a ducted mechanical supply ventilation system comprising air supply grilles connected to duct mounted supply fans located in a 2hr fire rated enclosure at level 0. Automatic smoke control dampers will be installed in the ductwork supplying each room and linked to the fire alarm system. These dampers will be open/closed type. A heating coil connected to the main LTHW system will be provided for frost protection and a run around coil linked to the smoke extract fan will be provided for heat recovery.