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# KIRKLEES CULTURAL HEART

## VENTILATION AND EXTRACT STATEMENT

CDT430201-ARP-XX-XX-RP-N-00052

ARUP

Revision : P02

Issue date : 30.09.22

ARUP

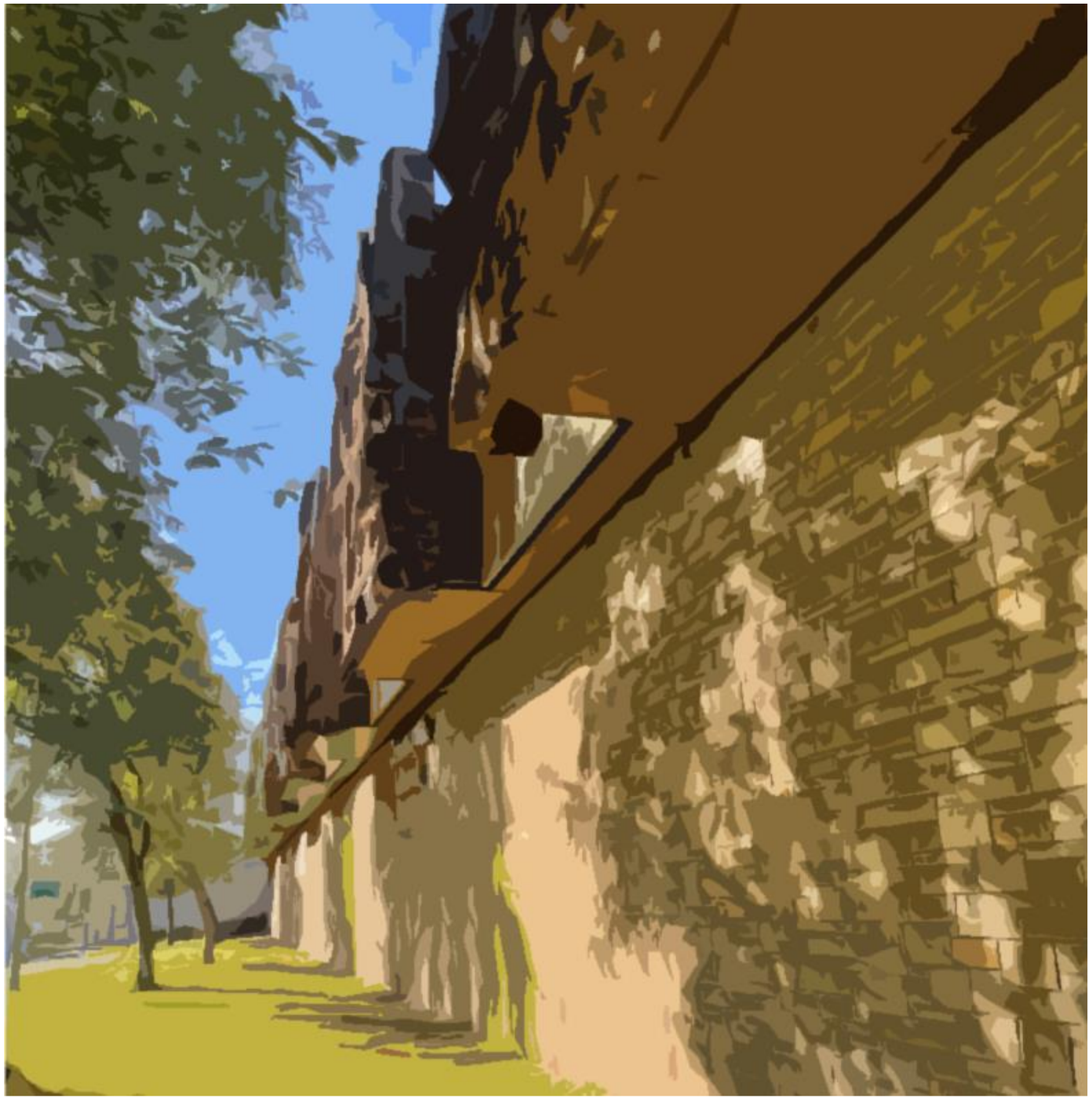
Kirklees Council

# Kirklees Cultural Heart

## Ventilation & Extract Statement

CDT430201-ARP-XX-XX-RP-N-00052

27th September 2022 | P02



# Section 1
# Introduction

## INTRODUCTION

Ove Arup & Partners, have prepared this Ventilation & Extraction Statement to support the planning application for the Kirklees Cultural Heart development.

This document outlines the ventilation systems and constraints that should be considered for the Proposed Development, including mitigation of the impacts of air quality and noise, which are assessed as part of the wider planning application.

This planning statement shall detail the following information:

- Position and design of ventilation and extraction equipment, including odour abatement techniques and acoustic noise characteristics.
- Details of the position and design of air conditioning equipment.

## SITE LOCATION

The Kirklees Cultural Heart development occupies a 3.18 hectare site in Huddersfield town centre.

The site is located at the southern extent of the town centre, contained by the ring road to the south and east.

The site has been identified as an area in need of regeneration, separated by a local highway and tired existing buildings.

## SURROUNDING CONTEXT

The Kirklees Cultural Heart sits between the university campus and the main commercial district of Huddersfield. There are strong connections between town centre and university on the East West Link.

Buildings outside of scope which have strong connections to KCH include St Paul's Hall, the Town Hall and the Theatre.

There are listed buildings within the site, the Food Hall and the Museum (previously Library).

Queensgate road bounds the site to the south and east, as a major distributor road around Huddersfield centre.

The shopping area on New Street is in the process of being redeveloped. The KCH Project will have its own identity to create a sense of placemaking within the town centre.

# Section 2
# Ventilation & Air Conditioning

## VENTILATION & AIR CONDITIONING

This Ventilation and Extract Statement Report fulfils the planning requirements for The Kirklees Cultural Heart development.

This statement summarises the ventilation and extract strategy for all of the buildings (and ancillary service areas) across the development, this consists of the following:

- Multi-storey Car Park (MSCP)
- Venue (combined with MSCP)
- Food Hall
- Library
- Gallery
- Museum
- Service Tunnels

## GENERAL VENTILATION

Centralised Air Handling Units (AHUs) shall serve the general accommodation within each of the buildings associated with the development.

The AHUs shall be complete with high efficiency, heat recovery devices (either thermal wheel or plate heat exchangers as appropriate).

Outside air shall be brought into AHUs at roof level via intake air louvres and filtered, heated and/or cooled by the AHUs prior to being delivered to the building.

The intake air will be positioned away from any exhaust air discharge to mitigate the risk of cross contamination of air streams, in line with BREEAM requirements and industry best practice.

Primary air will be provided to the floors via distribution ductwork. The ductwork shall be routed within designated risers and at high level on the floors with branches then taken off to serve terminal units which will provide heating and cooling.

Extract air shall be removed via. dedicated extract ductwork. Extract ductwork shall be routed within designated risers and terminate on each floor ducted to each room, as required.

The extracted air will pass through the heat recovery devices within the air handling unit to recover heat or coolth as required prior to being discharged through exhaust louvres.

The fresh air provision delivered to the floor will exceed the minimum Part F requirements and will align with BREEAM requirements.

## NATURAL VENTILATION

Opportunity exist to implement natural ventilation strategies with the use of openable windows within specific buildings across the development, particularly within smaller offices and transient spaces.

Utilising natural ventilation can provide energy savings compared to traditional mechanical ventilation systems.

## WC EXTRACT

Dedicated duty/standby roof mounted fans shall extract air from the toilets and changing areas.

Extract air will be distributed via ductwork in a dedicated riser serving toilets and changing areas within each building.

The negative pressurisation within the areas will draw make up air through from the building and mitigate migration of odours from the toilets.

Exhaust air will be discharged at roof level.

For smaller isolated toilets and changing areas dedicated inline extract fans shall be provided locally. These shall be ducted to louvres within the façade of the building at agreed locations.

Exhaust air discharge shall be positioned to mitigate the risk of cross contamination of air streams, in line with the following industry guidance:

- BRE FB 30 Ventilation for healthy buildings: Reducing the impact of urban air pollution (2011),
- BRE IP 9/14 Locating ventilation inlets to reduce ingress of external pollutants into buildings (2014), and,
- CIBSE TM21 Minimising pollutants at air intakes (1999), as appropriate.

Section 2
# Ventilation & Air Conditioning

## VENTILATION & AIR CONDITIONING

### F&B UNITS

Dedicated Air Handling Units (AHUs) shall be provided for the Food and Beverage Units located within both the Venue and Food Hall.

The AHUs shall be complete with heat recovery devices (currently run around coils are assumed for all kitchen AHUs).

Outside air shall be brought in to AHUs at roof level or within the service tunnel via intake air louvres and filtered, heated and/or cooled by the AHUs prior to being delivered to the building.

The intake air will be positioned away from any exhaust air discharge to mitigate the risk of cross contamination of air streams, in line with BREEAM requirements.

The system performance is to be such that the extract rate of air from the F&B units is greater than the make-up air provision. This will result in there being a negative pressure created within the areas adjacent to the units.

Provisional inlet and exhaust positions for the kitchen ventilation systems have been shown on the accompanying drawings at the back of this document.

Kitchen AHU heat recovery will require enhanced filtration (ultraviolet and electrostatic filters) to prevent fouling of the heat recovery device – this will also reduce odours in the exhaust at service tunnel or roof level.

Primary and grease baffle filters are to be provided at the hood opening and an additional secondary grease baffle filter at the neck. An odour control counteractant is to be fitted either within the hood or between the secondary grease filter and the fan. A particle bag filter will be fitted before the fan to reduce smoke and fine particulates.

Carbon filters are to be incorporated into the extract ducting with a grade of carbon suitable to ensure enhanced elimination of remaining cooking odours and ozone.

### CAR PARK & SERVICE TUNNEL

A “hybrid” ventilation system is proposed for the multi-storey car park (MSCP) and service tunnel.

This will include both natural ventilation openings and mechanical extract to prevent the build-up of fumes and smoke within the space.

The system will utilise a combination of impulse fans and dedicated extract fans to facilitate air movement within the MSCP and service tunnels.

For smoke clearance purposes any system will have to achieve ten air changes per hour in the event of fire.

Impulse fans will be provided to assist with the movement of air from intake locations to exhaust locations. Impulse fans are specifically designed for the ventilation of car parks and underground service areas.

These fans shall be mounted to the soffit of the MSCP and service tunnel and shall utilise the tunnel ventilation effect to move air throughout the space without the need of ductwork.

### REFUSE STORES

Refuse stores will be provided with extract air at a rate of 3 air changes per hour. This will negatively pressurise this space and prevent odours escaping into the surrounding habitable areas of the building.

A dedicated mechanical extract ventilation system will be provided, located within the refuse store, and ducted to discharge externally to louvres within the building façade or at roof level.

### GENERATORS

Life safety generators shall be provided to supply standby power to the requirements of the fire strategy report.

This is expected to include the fire-fighting lifts and basement extract fans.

There are proposed to be generators located within each of the buildings within the development with an individual flue discharges running to atmosphere (either at roof level or discharging within the service tunnel).

Generator exhaust air will be positioned away from any air intakes to mitigate the risk of cross contamination of air streams, in line with BREEAM requirements.

# Section 2
# Ventilation & Air Conditioning

## VENTILATION & AIR CONDITIONING

### COOLING AND HEAT REJECTION

Dedicated central heating and cooling plant shall be provided for each of the buildings across the KCH development.

This shall include Air Source Heat Pumps (ASHPs), Air Cooled Chillers and dedicated DX / VRF refrigerant plant, where required.

Central plant and ancillary equipment, including pumps and buffer vessels, shall be located at roof at the following locations:

- Venue – ASHP, Air Cooled Chiller(s) and ancillary equipment located in East plant well.
- Food Hall – ASHP, Air Cooled Chiller and ancillary equipment located on Library building roof.
- Library – ASHP, Air Cooled Chiller and ancillary equipment located at roof level.
- Gallery - ASHP, Air Cooled Chiller and ancillary equipment located at roof level within plant area.
- Museum - ASHP, Air Cooled Chiller and ancillary equipment located at roof level within plant area.

Internal plant rooms will have external louvres and be strategically located to avoid it being viewed from any building adjacent or from below.

The equipment will be selected inline with the acoustic criteria for the development.

Cooling and heating will be distributed from central plant, at the locations indicated above, through primary risers to each floor within the buildings.

### SPRINKLER PUMP

The duty pumps for the central sprinkler systems will be electrically powered, however on failure of the mains power a diesel-powered standby pump will start.

The pumps will be located in the service tunnel plant area and the diesel pump exhaust will be dealt with via the service tunnel ventilation system, see page 4.

### SMOKE EXTRACT

A dedicated smoke extract system shall be inline with the requirements of the fire strategy report.

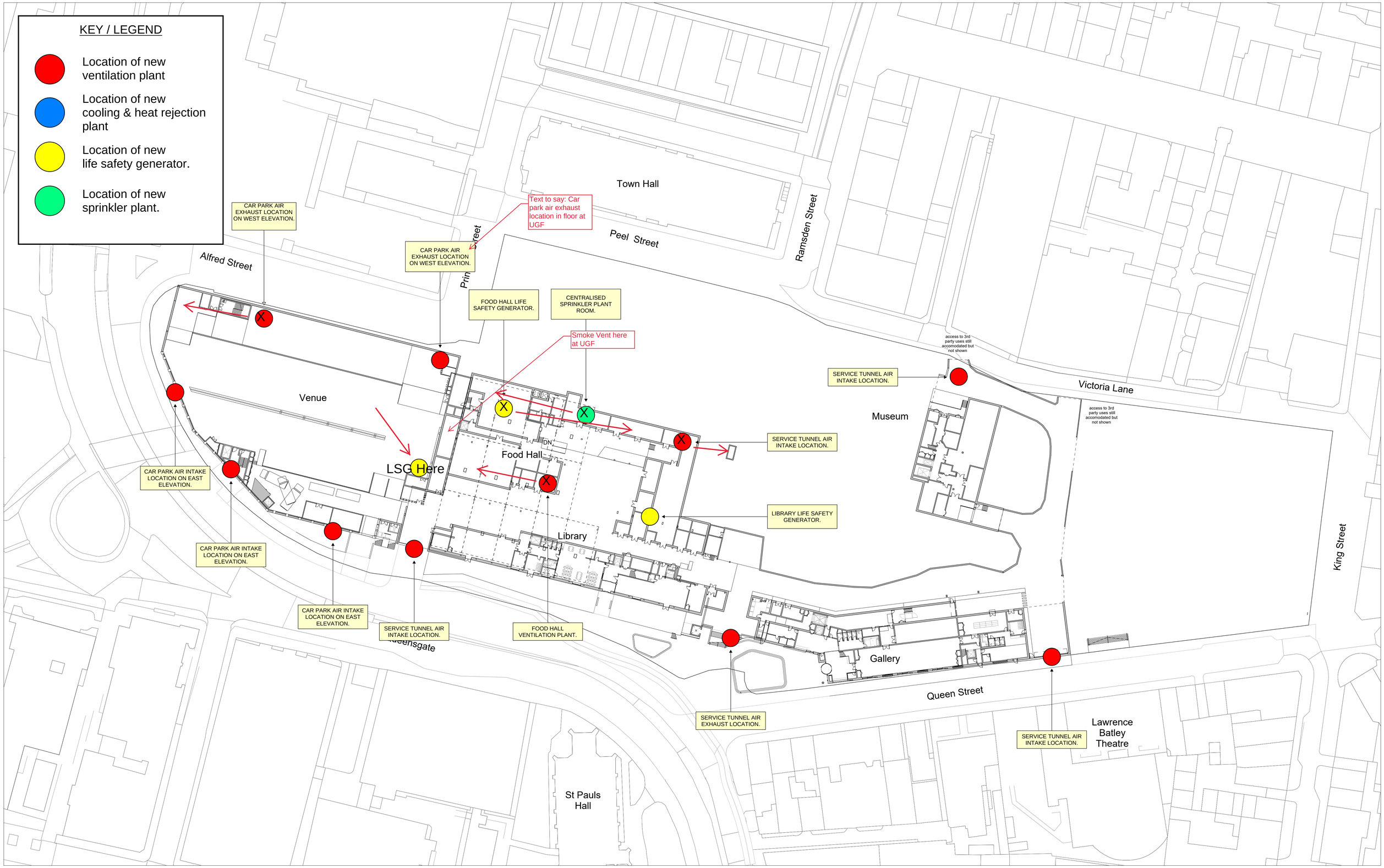
The smoke extract systems shall be provided to the following areas, as a minimum:

- Basement areas
- Atrium / voids (subject to design development)
- Loading bays

Dedicated fan sets shall be located at roof level for each building where smoke extract systems are required.

## KEY / LEGEND

- Location of new ventilation plant
- Location of new cooling & heat rejection plant
- Location of new life safety generator.
- Location of new sprinkler plant.




**Notes:**

- Refer to individual building drawings for more information.
- Current layouts are in development and for coordination purposes only.
- Where shown, structure is for illustrative purposes only. Any works will require consultation with a Structural Engineer.
- Where shown, M&E services are for illustrative purposes only. Any works will require consultation with a Services Engineer.
- Drawings to be read in conjunction with other consultants information.
- M&E, Structure, Fire & Acoustics is to be coordinated with current layouts.
- Areas as noted are subject to change due to ongoing coordination.
- Landscape shown indicatively, refer to Landscape drawings.
- All information shown should be verified by up-to-date surveys.
- Existing locations and footprints of surrounding buildings are taken from OS Map - Promap-1634985-1735589-720-0.dwg, received 27/10/2021 and 21359-100-Topo-Millimetres.dwg received from Maltby Surveys on 23/02/2022
- Existing building plans and elevations are based on Maltby Surveys drawings and 3D models



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| Rev | Status | | Date |
|---|---|---|---|
| P01 | S2 | Issued for interim Stage 3 cost review | 15.07.22 |
| P02 | S1 | Issued for Coordination | 12.08.22 |
| P03 | S2 | Issued for Information | 02.09.22 |

Job/Drawing No: CDT430201-FCB-XX-LG-DR-A-021999

Revision: P03

Kirklees Cultural Heart

Huddersfield Masterplan - Proposed Lower Ground Level Plan

Status: S2

Scale 1 : 500@A1 | Drawn London Studio | FCBS project no CDT430201

Date 15.07.22 | Checked AW Group

Do not scale | All dimensions to be checked on site

## KEY / LEGEND

- Location of new ventilation plant
- Location of new cooling & heat rejection plant
- Location of new life safety generator.
- Location of new sprinkler plant.

Alfred Street
Princess Street
Peel Street
Ramsden Street
Victoria Lane
King Street
Queensgate
Queen Street

Town Hall
Venue
Food Hall
Library
Museum
Gallery
Lawrence Batley Theatre
St Pauls Hall

Smoke vent here at UGF
COOLING AND HEAT REJECTION PLANT IN WEST PLANT WELL.
VENTILATION PLANT IN WEST PLANT WELL.
LIFE SAFETY GENERATOR ON VENUE ROOF.
COOLING AND HEAT REJECTION PLANT ON VENUE ROOF.
Exhaust Louvre here at L01
VENTILATION PLANT IN EAST PLANT WELL.
COOLING AND HEAT REJECTION PLANT IN EAST PLANT WELL.
Smoke vent here at UGF
Vent from service area below (built into street furniture)
Landscape shown indicatively, refer to Reform plans for detail
COOLING AND HEAT REJECTION PLANT ON LIBRARY ROOF.
VENTILATION PLANT ON LIBRARY ROOF.
VENTILATION PLANT ON MUSEUM ROOF.
Library air intake (built into street furniture)
COOLING AND HEAT REJECTION PLANT ON MUSEUM ROOF.
LIFE SAFETY GENERATOR ON GALLERY ROOF.
LIFE SAFETY GENERATOR ON MUSEUM ROOF.
Landscape shown indicatively, refer to Reform plans for detail
COOLING AND HEAT REJECTION PLANT ON GALLERY ROOF.
VENTILATION PLANT ON GALLERY ROOF.
VENTILATION PLANT ON GALLERY ROOF.

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| P03 | S2 | Issued for Information | 02.09.22 |

Job/Drawing No: CDT430201-FCB-XX-LG-DR-A-022004
Revision: P03
Kirklees Cultural Heart
Huddersfield Masterplan - Proposed Roof Level Plan
Status: S2
Scale 1 : 500@A1 | Drawn London Studio | FCBS project no CDT430201
Date 15.07.22 | Checked AW Group
Do not scale | All dimensions to be checked on site