

Engineering Services Stage 3 Report

Bognor Regis Digital Hub Development

WSCC

25 April 2018



Quality information

Prepared by

Redouane Dehkal – Mechanical Engineer
Bronwen Byng – Electrical Engineer

Checked by

Anthony Lincoln – Principle Engineer

Approved by

Paul Brooks – Associate Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
01	25/04/18	Stage 3 Issue			

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

West Sussex County Council

Prepared by:

Redouane Dehkal

AECOM Limited
Aldgate Tower
2 Leman Street
London
E1 8FA
aecom.com

Project Number: 60562528

© 2018 AECOM Limited. All Rights Reserved.

This document has been prepared by AECOM Limited ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

1. Introduction.....6

1.1 Introduction.....6

1.2 Executive Summary6

1.3 Engineering Services Strategy.....6

1.4 Scheme design expectations6

1.5 Energy Position6

1.6 Project Brief.....6

1.7 Limitations of the report.....6

1.8 Project Risks6

2. Design Parameters.....8

2.1 Basis of Design8

2.2 Scope of services to be provided8

2.3 British Standards and Codes of Practices8

2.4 Insurers Requirements.....8

2.5 Life Expectancy.....8

2.6 Water Treatment.....8

2.7 Commissioning.....8

2.8 Future Provision8

2.9 Enabling Works8

2.10 Design Criteria.....9

3. Incoming Services12

3.1 Estimated Loads.....12

3.2 (R11) Domestic Foul Water Disposal12

3.3 (S10) Domestic Water Supply12

3.4 (V11) Electricity Services.....12

3.5 W10 Communications / Network.....12

4. Mechanical Services13

4.1 Environmental Performance.....13

4.2 (U10) Supply and Extract Ventilation13

5. Public Health Services15

5.1 Public Health Engineering Services.....15

6. Electrical Services.....16

6.1 (V10) Electrical Supply.....16

6.2 (V10) Electrical Generations16

6.3 (V20) LV Distribution16

6.4 (V21) General Lighting16

6.5 (V22) General Power16

6.6 (V32) Uninterruptable power Supplies17

6.7 (V40) Emergency Lighting.....17

6.8 (W10) Communications.....17

6.9 (W30) Data Installation.....17

6.10 (W15) Facilities for the Disabled17

6.11 (W20 & W41) CCTV and Alarms.....17

6.12 (W21) Audio Visual.....17

6.13 (W40) Access Control17

6.14 (W50) Fire Detection & Alarm18

6.15 (W51) Earthing & Bonding18

6.16 (W52) Lightning Protection.....18

Appendix 1. Engineering Services Indicative Locations19

Appendix 2. VRF System Schematic Overview Error! Bookmark not defined.

Appendix 3. Mechanical Service Layout Proposal22

Appendix 4. Luminaire Schedule23

Tables

Table 1. Design issue outstanding/ to be resolved at next stage7

Table 2. Common Design Criteria9

Table 3. Public Health Design Criteria.....9

Table 4. Electrical Services Design Criteria10

Table 5. Initial estimated loads12

Table 6. Initial estimated loads, based on drawing12

Table 7. Lighting Control criteria.....16

Table 8. Fire Alarm General Interfacing.....18

1. Introduction

1.1 Introduction

This RIBA Stage 3 Developed Design Report sets out the Engineering Services proposals and Utility information that have been developed in sufficient detail for the project to inform cost planning.

All of the proposals within this report are subject to agreement with the Local Authorities, Utility Suppliers.

This report addresses the development by the following uses and areas:

- Commercial Office Space
- Plant, systems and distribution serving areas at Mezzanine and office accommodation.

1.2 Executive Summary

The key activities for this Stage 3 report have been:

- Building utilities load assessments
- Development of the services strategy with regards to external equipment locations and on floor services distribution from the Conservation Planner or permission of Network Rail.
- Plant proposal strategy
- Development of concept designs for areas provided.

1.3 Engineering Services Strategy

The engineering services strategy is based upon on centralized system for cooling and heating. Local plant for hot water services, ventilation, power, lightings and fire alarms to the office space, kitchen, WCs and showers.

The building services strategy is flexible to facilitate multiple tenants and adapt to changing tenant requirements throughout the life of the development.

Plant replacement has been considered and a separate plant replacement strategy prepared at the next stage of design.

Scheme design expectations

Scheme design is intended to provide sufficient preliminary information in relation to the works in the form of advice, sketches, and reports or outline specifications to enable us preparing the scheme proposals and assist the cost plan, and as defined by the Building Services Research and Information Association (BSRIA) should include:

- Line diagrams and layouts indicating basic proposals
- Locations and lists of main items of plant
- Routes of main pipes, air ducts and cable runs
- Design parameters
- Full system descriptions

- Typical general arrangement drawings
- Block layouts of plant areas
- System Schematics

When building up the cost plan, sufficient allowances should be made for ancillary equipment which will be detailed at later stages, e.g. pumps and dampers. Typical MEP layouts are shown on first floor level.

1.4 Scheme design expectations

Scheme design is intended to provide sufficient preliminary information in relation to the works in the form of advice, sketches, and reports or outline specifications to enable us preparing the scheme proposals and assist the cost plan, and as defined by the Building Services Research and Information Association (BSRIA) should include:

- Line diagrams and layouts indicating basic proposals
- Locations and lists of main items of plant
- Routes of main pipes, air ducts and cable runs
- Design parameters
- Full system descriptions
- Typical general arrangement drawings
- Block layouts of plant areas
- System Schematics

When building up the cost plan, sufficient allowances should be made for ancillary equipment which will be detailed at later stages, e.g. pumps and dampers. Typical MEP layouts are shown on first floor level.

1.5 Energy Position

Where practicable, low energy services items such as LED light fittings, efficient ventilation plant, Heat Pump for heating and cooling has been considered within the scheme design.

At this stage no specific energy targets have been identified for this project.

No BREEAM certification is being targeted for this project.

1.6 Project Brief

This report forms the brief as it has been captured by the design team. The proposed basis of design for engineering systems covers the following engineering system:

- Incoming utilities
 - Water
 - Electrical
 - Natural Gas
- Disposal systems
 - Foul drainage above ground

- Piped Supply Systems
 - Cold Water
 - Hot Water
- HVAC

Heating / Cooling

Ventilation

- Electrical Distribution
 - Electrical Distribution boards
 - Cable containment systems
- Lighting
 - General Lighting
 - Lighting controls
 - Emergency lighting and escape signage
- Electrical Accessories
 - Socket outlets, switch plates etc
- Fire alarm
 - Fire detection (Alternations to existing)
- Earthing
 - Standard earthing and bonding system

1.7 Limitations of the report

The report is based on the Client's brief, Hemingway Design drawings and information provided by the client as well as non-intrusive surveys.

1.8 Project Risks

The items below have not fully been resolved at the point of issuing this report and have been recorded here for information and to prompt further dialogue as necessary.

Table 1. Design issue outstanding/ to be resolved at next stage

Description	Context/ Reason for Asking
Sign off of design proposals, outlined within this report	Allowing tender designs and documents to reflect the client's vision for the space.
Need to see the Fire Strategy report or Insurance requirements	To ensure the Fire detection and escape route lighting are designed correctly,
Connecting into recently installed existing services; fire panel and distribution boards etc	As not void warranties or interrupt existing service contracts, we need to confirm if there are specific contractors to be used for the alternations, if needed.
Confirmation of access control, IT and CCTV services and the preferred suppliers / who will be managing them on completion of the works.	To confirm if there are specific equipment suppliers / manufacturers to be used that the service/ facility team who will manage the completed installation only work with.
Coordinating with existing services	To ensure minimal disruption to the adjacent and external areas of the work space.

2. Design Parameters

2.1 Basis of Design

The design team is committed to delivering a fully integrated building solution and will adopt design criteria best suited to the building and its occupants under the current legislative and institutional requirements.

Design criteria as outlined below is set to deliver the most optimum balance of occupant comfort and building energy performance.

Office Ventilation plant, Space heating and cooling, Toilet extract, Electrical services, Fire alarm, Water Services will be all located internally.

2.2 Scope of services to be provided

The following Engineering Services systems will be provided:

Mechanical Engineering Services

U10 Supply and Extract Ventilation

U30 Air Conditioning

Y46 Grilles, Diffusers, Louvers

U70 Air Curtains

Public Health Services

R11 Domestic Foul Water Disposal

S10 Domestic Cold Water Services

S11 Domestic Hot Water Systems

S20 Treated Water Services

Electrical Engineering Services

V20 Low Voltage Distribution

V22 General Power Installation

V32 Uninterruptable Power Supplies

V21 General Lighting Installation V40 Emergency Lighting

W30 Telecommunications/ Data Installations

W15 Facilities for the disabled

W20/41 CCTV and Alarms

W50 Fire Detection and Alarms Installation

W51 Earthing and Bonding

Building Control Systems

W60 Automatic Control Systems/Monitoring

2.3 British Standards and Codes of Practices

Whilst this development is looking to 'create new standards of excellence' the MEP design will still be in accordance with all relevant current British Standards, Building Regulations and Codes of Practice. Compliance is required with all statutory requirements and the following:

- CIBSE Guides, CIBSE Lighting Guides,
- IEE Regulations,
- HSE, COSHH, BCGA, HTM's.
- British Standards
- Building Regulations
- Insurers Requirements

The following are usually identified by Clients' Insurers

- Category of fire alarm systems
- Requirements for fire suppression or sprinkler systems

At this stage of the project no information has been received direct from the Insurers.

2.4 Insurers Requirements

The following are usually identified by Clients' Insurers

- Category of fire alarm systems
- Requirements for fire suppression or sprinkler systems

At this stage of the project no information has been received direct from the Insurers.

2.5 Life Expectancy

The engineering services equipment will be designed / selected to provide the anticipated service life factors in accordance with CIBSE Guide M Appendix 13.A1, which will be dependent on replacement of serviceable parts, good and regular maintenance being undertaken throughout the life of the plant together with correct water treatment.

2.6 Water Treatment

All water systems in the building will be designed in compliance with the measures outlined in the Health and Safety Executive's "Legionnaires' disease - The control of legionella bacteria in water systems"; approved Code of Practice and Guidance, 2000 and, where relevant, other industry/sector best practice guidance.

Domestic cold water treatment will include chlorine dioxide dosing in accordance with HSE L8 and Drinking Water Inspectorate legislation.

Where possible the water temperatures will be controlled to avoid temperature ranges where bacteria grow, or at least avoid the more ideal propagation temperatures (27°C to 41°C). Refer to Design Criteria for system design temperatures.

2.7 Commissioning

Commissioning works for MEP installations will be undertaken in accordance with the appropriate CIBSE, BSRIA and HVCA guides to good practice.

2.8 Future Provision

In terms of specific spare capacity allocated within the new plant and distribution mains especially for the new labs, the following allowances will be made:

- 25% capacity on electrical distribution boards
- 25% spare capacity (by number of points) on BEMS systems.

Within the layout where feasible, consideration will be given to potential future layouts and the servicing of them.

2.9 Enabling Works

Generally the site has been made into a white box installation with limited power and lighting installations.

All existing services to which modifications are to be made will require validation to confirm the capacity matches that indicated on the record information and they are suitable for the required modifications to be made.

2.10 Design Criteria

The following tables summarise the design criteria, parameters and principles that will be applied to the design of the Engineering Services.

Table 2. Common Design Criteria

Parameter	Value / Criteria	
External Conditions		
Temperature		
Winter	-3°C db. 100% RH	
	-10°C db. (Frost protection temperature)	
Summer	33°C db. 23°C wb	
Internal Conditions		
Temperature:	Winter	Summer
Offices	22°C db.± 2°C	24°C db. ± 2°C
Toilet areas	20°C db. - 2°C minimum	Uncontrolled
Occupancy Design Criteria		
Occupancy density (based on NIA)		
Office Cooling and Ventilation;	Based on the available seats according to the provided units layout	
Hot/Cold Water Storage	1 Person per 8m2	
Operating (occupied) Hours	TBC	
Noise and Vibration Criteria		
Internal Noise Criteria		
(Subject to completion of the specified Category A fit out, maximum design internal noise levels from the mechanical and electrical services)		
Offices	According to CIBSE guide	
Toilet areas		
All noise levels quoted are applicable when the base build equipment's are running under normal operation and greater than 1metre away from an enclosing surface.		
External Noise Criteria		
In accordance with Planning and Environmental requirements, noise levels at the boundary of the site are not to be increased.		
These targets are sound pressure levels in dB(A) re: 2 x 10-5 Pa, measured at 1m from the nearest noise sensitive façade.		
The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise-sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.		
Where the noise source(s) from the proposed site/building is greater than these levels, measures will be installed to attenuate the noise at its source to a level where it will comply with criterion.		

Parameter	Value / Criteria	
S32 Natural Gas Distribution		
None		
W60 Automatic Control Systems/Monitoring		
Outstation spare points	20% average (minimum 10% on each)	
U10 Supply and Extract Ventilation		
Outside Air & Ventilation Rates:		
Offices	Outside Air	12 l/s/person
Toilet Areas	Supply	Make up from office space
	Extract	10 AC/hr extract by dedicated extract plant
Filtration standards:		
Office systems	Pre-filter Grade EU3 panel type After-filter Grade EU7 bag type	
Ductwork Cleaning provisions:	“Intermediate Level” to HVCA TM2.	
System Redundancies:		
Office Supply	N	
Office Extract	N	
Toilet Extract	N	

Table 3. Public Health Design Criteria

Parameter	Value / Criteria
R11 Foul Drainage Above Ground	
Design	In accordance with BS EN 12056-2-2000 based on the following discharge units:
Water Closet	1.7 DU
Urinal	Not defined in BS EN 12056-2
Wash hand basin	0.3 DU
Shower	0.15 litres/second
Sink	1.3 DU
Catering equipment	To suit future tenant.
The following Frequency factor, k to be used:	
Kitchen areas (not kitchenette)	0.7 (frequent use)
All other areas	0.5 (intermittent use)
S10 Domestic Cold Water Services	
Service Capacity	To be capable of filling the primary domestic and mechanical cold water storage tanks within 3 hours minimum and 4 hours maximum at a maximum velocity of 5m/s
Cold Water Storage	N
Service	Single metered service pipe for domestic service only.
S11 Domestic Hot Water Systems	
Hot Water Storage	Local electric instantaneous (Single point or multi-point)
Hot Water Demand	5 litres per person / day
Storage temperature	65°C
Minimum Delivery temperature	55°C
Outlet Pressures:	
Minimum	2 bar
Maximum	Approx 2.5 bar
Spare capacities:	None

Table 4. Electrical Services Design Criteria

Parameter	Value / Criteria			
V20 Low Voltage Distribution				
Voltage drop limits (steady state):				
Mains and Sub-mains distribution	4% (of the fundamental)			
Final distribution	2%			
Notes:				
1. Voltage drops are expressed at 50Hz.				
Office Lighting				
Infrastructure	10 W/m ²	0.9(l ag)	100 %	
Office Small Power:				
Generally	25 W/m ²	0.8(l ag)	100 %	
Office Fan Coil Units:				
Generally	5 W/m ²	0.8(l ag)	100 %	
Associated cooling and ventilation plant	Included in tenants small power load allowance			
Sub (or Satellite) Equipment Rooms (SER's):				
Equipment Power;				
SER's 1No per floor	3kW each	0.8(l ag)		100%
Associated cooling and ventilation plant				
Notes :				
1 All W/m ² allowances are applied to the net area of the building, unless indicated otherwise.				
2 Indicates an enhancement which is added to the office small power allowance.				
Diversities:				
Main LV Switchboards				
Tenants Equipment Loads	60%			
SER Loads	100%			

Parameter	Value / Criteria		
Spare Capacities:			
Main LV Switchboards:			
Rating			
Switchboard spare ways / expansion	Room space to facilitate extension to provide 25% additional devices.		
Mains and Sub-Mains Distribution cables	25%		
Tenants Lighting & Power			
	10W/m ²		
Space on containment systems for future mains and sub-mains cables.	20%		
Final distribution boards:			
Rating	25%		
Spare ways (Landlords)	25% of used ways, Un-used ways to be fitted with blanking pieces		
V21 Lighting			
Maintained Average Illuminance Levels:			
Normal Lighting			
Office	300lux		
Toilets	150 lux ⁽¹⁾		
Lighting Installation Maintenance Periods			
Area	Annual Use (Hours)	Cleaning Period (Months)	Room Surface Cleaning Period (Months)
Office	2,500hours	12 months	12months
Toilets	2,500hours	12months	6months
Notes:			
1. Lamp replacement periods will be based upon the lesser of 4 years use or when the lumen output of the lamp reduces below 70% of the 100hour lumen output (only applicable to fluorescent lamps).			
2. It will be assumed that 'spot' lamp replacements will be performed upon lamp failure.			
Lamp type / colour temperatures	Generally LED lighting.		
Minimum Final Circuit Conductor Sizes:			
Lighting circuits	2.5mm ²		
V22 Small Power			
Areas and or circuits designated as for use by un-supervised or persons	Area / Circuit	Method of Protection	
	Cleaners socket outlets within circulation areas	(1)	

Parameter	Value / Criteria
not under instruction.	Entrance lobby / reception (2)
	Plantrooms (1)
	Protection Methods
	(1) Outlets incorporate 30mA trip RCD
	(2) Circuit protected by a 30mA trip RCD
Minimum Final Circuit Conductor Sizes:	
Small power circuits	4.0mm ²
V40 Emergency Lighting	
Defined escape routes (up to 2m in width)	1 lux (minimum) along the centre line, minimum of 50% illuminance to the central band, 40:1 uniformity (maximum : minimum) along the centre line.
First aid points and manual fire alarm call points located outside escape routes and open areas	5 lux minimum at floor level
Open area (anti-panic) lighting	0.5 lx at the floor level of the 'empty core area'. Uniformity to be a maximum of 40:1 (maximum : minimum)
High Risk Task Areas	10% of the required maintained illuminance for that task, with a minimum of 15 lx. Uniformity not less than 0.1.
Areas to be classified as high risk	LV Switchrooms, UPS Rooms, Mechanical Switchboards
Battery duration	3 hours
Average Battery Life	3-5 years
W50 Fire Detection and Alarms Installation	
Category of Protection	
Shell and Core	Category / Area(s)
	Category M:
	Manual Call Points to all escape routes
	Category L2:
	Areas protected by automatic detection; • Core areas
Standby Cell Duration	24 hours, followed by 30 minutes in alarm condition
Notes:	
1.	All ancillary area lighting will be in accordance with the appropriate maintained Illuminance (lux) levels Part Two of the CIBSE Code of Lighting 2002 and its 2004 Addendum
2.	All internal lighting levels will be in accordance with the appropriate maintained Illuminance levels in (lux) recommended by CIBSE Lighting Guide 7 'Lighting for Offices and SLL Code for Lighting 2012 and any other relevant industry standard.

- 3. All external lighting levels will be in accordance with the appropriate maintained Illuminance levels in (lux) recommended CIBSE Lighting Guide 6 'The outdoor environment'.

3. Incoming Services

3.1 Estimated Loads

The following loads have been estimated for the development based on the building brief requirement and basis of design and allow for margin and diversity where applicable.

Table 5. Initial estimated loads

Cooling Load (kW)	Heating (kW)	DHW (kW)
64.0	73.0	20

Table 6. Initial estimated loads, based on drawing

	No.	Area m²	Estimate W/ unit
	455		
Office equipment & desk power		40	18200
Lighting		10	4550
Data Rack		2000	200
Ventilation / Heating		25	11375
TOTAL Estimated kW			37.12
Estimated Power Factor			0.95
TOTAL Estimated kVA			35.27
Estimated Diversity Factor			0.7
Div TOTAL Estimated kVA			24.69
			57 W/m²

3.2 (R11) Domestic Foul Water Disposal

The existing foul drainage stacks shall collect within the ground and connect to the foul drainage system provided within each unit.

3.3 (S10) Domestic Water Supply

The building is provided with a metered water supply to the domestic water services. And separate internally electric water heater storage will be provided to each unit 1 & 2.

3.4 (V11) Electricity Services

No works to be done to the existing incoming supplies.

3.5 W10 Communications / Network

A new incoming fibre connection rated at 100mbps is to be installed for Ultra-fast capabilities within the workspace. The new incoming fibre will be terminated into a new 19” rack within a secure network room.

Based on Broadband Vantage feasibility and strategic report it is proposed that BT ultrafast connection be looked into, as BT has an exchange at Gloucester road. The Client is to confirm if the incoming service is to be self-managed or via a service provider.

No incoming telephone lines will be provided. A VoiP (Voice over IP) system to be used for all telephony requires.

4. Mechanical Services

4.1 Environmental Performance

The building will be designed to meet best practice comfort levels, and design criteria for ventilation, heating and cooling within Units space temperature requirements.

Design study has confirmed that the use of an all air system will provide the most comfortable and energy efficient environment with sufficient flexibility to enable the Units spaces usage to accommodate the change in requirements during the life of the building.

The ventilation strategy has been developed for the site to Part F requirements for ventilation and fresh air to the occupants.

4.2 (U10) Supply and Extract Ventilation

4.2.1 General

Outside air will supplied into the space via a Mechanical Ventilation Heat Recovery (MVHR) at high level, low velocity, balanced with high efficiency heat recovery and at a temperature just below room temperature 17-18C° (see fig1). The MVHR will quietly and efficiently provide the fresh air, filtered air all year round, improving the indoor air quality and reducing dust and allergen levels.

The supply air will be ducted and routed at high level and then connections will drop to dedicated suspended diffusers. The return air to the MHRV will be at high level via a via bell mouth connections with no ductwork. The fresh air intake and extract will also be ducted at high level and routed to terminate on external wall mounted louvers.

Typically, the system will be capable of supplying a minimum of 20 % of the building for out of normal working hours.

Extract systems will generally be rated at 95% of the supply systems to achieve a positive pressure regime, minimising infiltration.

Ductwork will be DW144 galvanised sheet steel unless otherwise specified. All plant/equipment will be isolated from the building structure as necessary by appropriate means of anti-vibration mountings.

Access sections will be provided throughout the MVHR to provide access between and to components.

The building will be designed to provide Outside Air and minimise internal pollutants (and ingress of external polluted air into the building). Provision of outside air for occupied spaces will be a minimum of 10-12 litres per second per person in accordance with CIBSE guide A.

The building's air intakes and outlets/exhausts will be through and outside wall AND will be over 20m from sources of external pollution (e.g. highways, main access roads to the site, car parks, delivery/vehicle waiting areas, other extracts from building services plant industrial/agricultural extracts, cooling towers etc.).

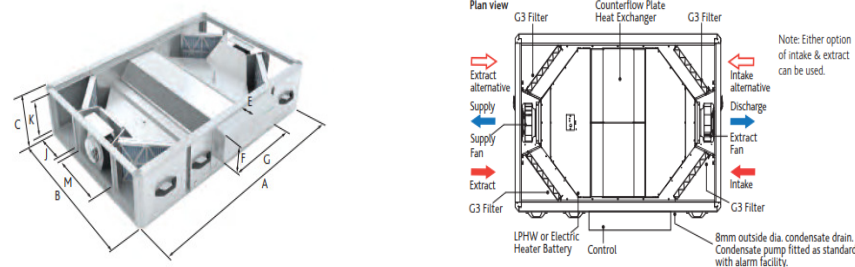


Figure 1: MVHR Plan View

4.2.2 Toilet Extract

In line with the building regulations, the toilet within the building will be provided with its own extract system. 10 Air Changer per Hour (ach) will be extracted from each toilet area.

Extract from the toilets and showers will be ducted via grilles in the toilets to a single fan extract unit located at ceiling void level. The make up for the supply air will be introduced via transfer grilles from the adjacent space to create a negative pressure, thus preventing smells being forced into the wider environment.

Each toilet will have controlled ventilation linked to the lighting PIR sensors in each toilet area, with suitable quantities to suit the cubicle arrangements, in order to minimise energy usage and ensure our philosophy of demand controlled low energy solutions are realised.

4.2.3 Shower Extract

In line with the building regulations, the shower facilities within the building will be provided using the same WC extract system of at least 10ach. The make up for the supply air will be introduced via transfer grilles from the adjacent space to create a negative pressure, thus preventing smells and moisture being forced into the wider environment.

Each shower cubicle will have controlled ventilation linked to the lighting PIR sensors in each shower/changing area, with suitable quantities to suit the cubicle arrangements, in order to minimise energy usage and ensure our philosophy of demand controlled low energy solutions are realised.



Figure 2: WC/Shower In-Line Fan

4.2.4 Heating/Cooling System

The building is listed and heat loss through the fabric is considerable. A Variable Refrigerant Flow (VRF) heat pump system will be provided the space heating and cooling to meet the peak heating and cooling load.

Heating and cooling directly into the space will be provided via a mixed range of fan coil unit, ducted and cassette units connected to the VRF outdoor unit. This mixed indoor unit's selection should suit the space in terms of aesthetics and performance.

4.2.5 (U30) Air Conditioning

It is recommended that a 3 pipe VRF refrigeration system with mixed range of fan coil units are to be provided for cooling and heating to the following areas:

- Cassette fan coil unit for office area below mezzanine within unit 1 assuming false ceiling is provided.
- Ducted fan coil unit to be provide for mezzanine's enclosed offices.
- Ducted fan coil unit to be provide for all open plan area in both units



Figure 3: VRF_3Pipe refrigeration system



Figure 4: Slim Ducted Fan Coil Unit



Figure 5: 4-way Cassette Fan Coil Unit



Figure 6: 2-way Cassette Fan Coil Unit

4.2.7 (W60) Controls / Monitoring

A controls system will be installed to both units to provide controls to the new heating/cooling VRF system, MVHR and WC/Shower extract system with motor control centres provided to suit. The system will also pick up readings from all the meters in the field.

A fully functional Building Management Control System (BMCS) shall be provided to service the building. The control system shall comprise interoperable direct digital control (DDC) technology in conjunction with electronic control loops. The DDC system shall be integrated, automatic and self-checking with provision to manage and reliably control all connected equipment to achieve efficient and economic operation with monitoring, alarm and energy management functions. Unless specified all equipment will be controlled via the BMCS, with sensors feeding information back to the BMCS before the BMCS sending a signal back to the piece of equipment in the building.

The system shall provide control functions, switching, and monitoring for the following building services:

- Mechanical services including air conditioning, ventilation, cooling plant, and the like.
- Electrical services including lighting, energy use monitoring and recording.
- Fire services including system fault alarms.

4.2.6 (U70) Air Curtains

The design requires a provision for air curtains (fig 5). Air curtains will be provided on entry or exit doors. Air curtains can be suspended from high level, built into a bulkhead detail, or built into service voids within appropriately located walls. It is recommended that provision is made for air curtains at the main entrance, with details to be confirmed as the detailed design of the two units develops.



Figure 7: Air Curtain

The Air Curtain will be decorative, contemporary architectural style, of minimalist and smart design. It will be low noise centrifugal double inlet fans with an option of EC fans for energy saving and optional BMS Interface if required.

5. Public Health Services

5.1 Public Health Engineering Services

5.1.1 (R11) Foul Drainage Above Ground

The above slab soil and waste drainage system will be a one pipe fully ventilated installation in accordance with BS EN 12056 Part 2.

Soil, waste and vent pipe stacks will be provided to drain all sanitary fittings located in toilet areas, shower rooms. Provision for kitchenette will also be provided.

The above ground foul drainage systems shall comprise of uPVC Stub Stacks and uPVC soil pipework WC floats and local appliance uPVC waste pipework. The top of the Stub Stack should be finished with an Air Admittance Valve.

Independent mechanical/condensate drainage pipework shall also be provided to collect maintenance/ safety/condensate drainage.

The soil stub stacks will be housed within purpose-built service ducts with branch connections receiving the discharge from the various sanitary appliances.

Where pipes pass through fire compartments all penetrations will be fire sleeved.

All main SVPs (stacks and offsets) shall be insulated for acoustic control in accordance with the acoustic consultant's requirements, this is particularly important within sensitive areas.

Each WC shall be provided with an internal overflow. All sanitary fittings will be provided with a suitable depth water sealing trap to prevent the ingress of foul air and in accordance with BS EN 12056-2.

5.1.2 (S10) Cold Water Services

The installation will be in accordance with BS 806, BS 8558 and BS 6700 and the current water regulations.

The existing 2No. metered mains water supply from the local authority water main will be extended to serve the office kitchen, WC and shower for both Units.

Systems shall be installed in copper pipework, with capillary joints and fittings. All pipework shall be insulated. Local ballofix isolation valves will be fitted on all appliances.

5.1.3 (S11) Domestic Hot Water Systems

Domestic hot water will be generated locally by electric hot water storage serving the WC's and the showers for each unit.

All water systems in the building will be designed in compliance with the measures outlined in the Health and Safety Executive's "Legionnaires' disease - The control of legionella bacteria in water systems". Approved Code of Practice and guidance, 2000.

An in-line physical water conditioner (electromagnetic scale reducing device) will be installed on the cold feed directly before connection to the local electric hot water heaters.

Hot water shall be stored at 60-65°C and distribute at between 55-60°C with outlet temperatures of not less than 55°C

To reduce the risk of scalding mixer taps will be installed at each hand basin toilets to ensure the hot water outlet temperatures do not exceed 43°C.

The installation will be carried out in accordance with Building Regulations Part G, The Water Supply and fittings Regulations (1999), BS6700 and BS EN 806.

6. Electrical Services

6.1 (V10) Electrical Supply

No changes are proposed to the existing incoming LV supplies.

6.2 (V10) Electrical Generations

No generators or photovoltaic panel installations have been proposed.

6.3 (V20) LV Distribution

There are two existing sub-distribution boards within each of the locations. The detailed design will indicate if there is sufficient capacity and ways within the existing boards. It is estimated that one additional board maybe required for the mechanical equipment.

Distribution boards will be to accommodate the circuiting as indicated on the respective lighting and emergency lighting, small power mechanical power and other drawings. In addition, a minimum of 25 % spare ways (per phase) will be provided for new boards.

All final circuit wiring will be neatly terminated at the distribution boards and each cable will be clearly labelled with coloured ID ferrules. Typed, agreed format, distribution board schedules will be provided. The schedules will be installed in clip frames mounted adjacent to the distribution board.

LV Distribution

Primary distribution of the electrical supplies will be installed on surface mounted cable trays along the sides for the building and will terminate in final circuit MCB / RCBO distribution boards.

Sub-main distribution cabling

All distribution cabling will be steel wire armoured, XLPE insulated, OHLS sheathed multi-core cable (XLPE/SWA/LSF).

The electrical contractor will ensure that each room or area, which contains power / voice / data / fire alarm / security outlets, is provided with the relevant containment into that area. The installed containment should allow approximately 25% spare capacity. Final circuit galvanised conduit distribution systems will connect to the relevant containment above the suspended ceilings and be concealed in wall finishes.

Low voltage cable containment systems for small power final circuits will generally be installed within dado trunking along the walls.



And boom with suspended power leads for tables in the middle of the floor. With the boom connected to the underside of the mezzanine.



SWA final circuits will be routed on cable tray with sub-mains cables.

Cable containment systems for fire alarm will be fixed directly to the building structure using proprietary fixing methods.

Cable containment systems for IT structured cabling, voice and data, BMS / Controls, CCTV and security will be installed upon cable basket.

BS 7671 Amendment 3

Particular attention will be given to all cable systems located within defined escape routes or risk areas, which now require to be installed with a suitable means of fire resistant support/retention.

6.4 (V21) General Lighting

The new lighting installations will predominantly utilise high efficiency energy efficient suspended LED luminaries.

The lighting will be designed to meet BS EN 12464-1 and the CIBSE lighting guidelines.

Table 7. Lighting Control criteria

Area	Light Level	Control system
Offices Space	300 lux	General Lighting: Zoned manual switches at the entrance door. With overriding PIRs (Manual ON, Auto OFF)
Meeting room Spaces	300 Lux	Dimmable Lighting with manual controls.
Plant rooms	200 lux	Local manual switch at the entrance door
Passages	150 lux	PIR Presence Detection

Final lighting circuits within the areas will generally be wired utilising single core LS0H cable within metallic trunking and conduit or pre-fabricated wiring systems.

The existing suspended highbay lighting within the booking hall between the spaces will be remain.

The existing suspending linear lights will be altered is most areas to reflect the space planning vision.

No additional external lighting to be provided. The existing general external lighting for the surrounding area will be kept as is.

6.5 (V22) General Power

Small power services will be provided to serve socket outlets located throughout office, stairways, toilet accommodation, support areas and plantrooms.

In addition switched fused connection units will be provided to serve fixed appliances, e.g. hand dryers, trace heating tapes etc.

Small power outlets (generally double switched socket outlets) will be provided to supply portable electrical appliances. Circuit protection will be required as necessary and to comply with current IEE Wiring Regulations. In addition, power supplies will generally be provided to ancillary services including, but not limited to, the following:

- Lighting control system
- Access control system
- IT Communications
- HVAC controls
- Fire alarm panels
- Wireless Data Point units

Designated socket outlets will also be provided throughout the area for cleaner’s outlets.

RCD protection will be provided as necessary to comply with the IEE Wiring Regulations

IT hub rooms will be provided with their own small power supplies to suit each piece of fixed equipment required within the space.

It is proposed that any new power supplies be supply from new distribution boards and the cables run in dedicated cable trunking supplied at low level via perimeter dado trunking

An allowance for MK Edge accessory plates will be made, the final selection of trunking, switches and outlets will be agreed with the client prior to installation.

6.6 (V32) Uninterruptable power Supplies

No central or local UPS power will be provided for general use . The users would need to provide local UPS if this is required.

Local single phase UPS will be provided for the Network and security systems to be housed in the network room, potentially rack mounted UPS to be used,

6.7 (V40) Emergency Lighting

The Emergency lighting will be designed to comply with the requirements of BS 5266, illumination levels of a minimum of 1 Lux measured at floor level within defined and undefined escape routes.

The Emergency lighting will comprise of:

- Emergency lighting conversion of mains luminaires
- The operation will be automatic following power failure and will provide a minimum of three hours illumination.
- Illuminated exit signs will be provided to supplement the ceiling mounted emergency luminaires in circulation
- Luminaries will be equipped with 3-hour batteries and be linked to a self-testing and diagnostic emergency lighting monitoring and reporting system to be connected back to the BMS system.

Self-illuminated exit signs and fixed signage below emergency luminaires will be provided along escape routes and above final exits from the buildings.

Emergency luminaires will highlight safety equipment and signs, in addition to providing illumination to assist safe travel along the escape route in accordance with BS5266 Pt 7: 1999 which requires that the luminaires sited at points of emphasis must comply with BS EN 60 598-2-22.

Emergency luminaires will be connected to the central lighting control system to provide test facilities (monitoring is excluded).

6.8 (W10) Communications

Telecommunications would be provided mainly via mobile telephony.

Should the Client request a fixed line, it is recommended this is limited to the reception area and meeting rooms and be a hosted VoIP (voice over IP system)

6.9 (W30) Data Installation

As per the recommendations in the ICT Strategy and feasibility study by Broadband Vantage.

It is proposed that a new 19" 42U rack is installed within a dedicate 4 m², room. Exact position to be agreed.



The network rack will provide data points for:

- General data provisions meeting rooms and desks (limited)
- WIFI routers
- PoE (Power over Ethernet) for Security provisions.
- Telephone requirements VoIP (voice over IP)

All areas are to have access to WIFI access points, it is proposed that the main connection to the network would be via the WIFI.

Positions of outlet to be confirmed with the room layout, and the furniture and equipment types.

All outlets and network switches to be CAT 6 cabling capable.

As not active equipment is envisaged in the network no cooling is required. However space provision for cooling or ventilation equipment will considered in the room layout for potential future provision.

6.10 (W15) Facilities for the Disabled

All services will be installed with a particular regard to achieving Equality Act and Building Regulations Part M compliance. Each service in their own right will have a set of design criteria to ensure all requirements are met. These include but are not limited to:

- Small power outlets.
- Lighting switches.
- Audible and visual fire alarms.
- Audible alarms for refuges and disabled usage welfare facilities (toilets).

Each disabled WC will be provided with an attendance alarm system comprising of an alarm call pull cord switch, alarm indicator / sounder located outside of the WC and an alarm accept / reset switch located inside the WC.

Activation of a disabled WC attendance alarm will provide an audible and visual signal at the alarm indicator / sounder outside the WC, on the master exchange and the remote call annunciator on the reception desk. The activation of any disabled WC attendance alarm may only be reset by the accept/reset switch within the cubicle from which the alarm was activated.

6.11 (W20 & W41) CCTV and Alarms

There is existing CCTV cameras within the booking hall and externally.

No additional CCTV or intruder alarm systems have been included at this stage.

6.12 (W21) Audio Visual

No audio visual equipment is allowed for.

An allowance for power and network points for standard audio visual equipment including projector and/ or monitors will be include for within the meeting rooms.

6.13 (W40) Access Control

The areas will have access control on the 3 main entrance doors. The access control systems will be fully configurable; the management software will allow the system to be easily reconfigured to allow the system status to be easily changed.

The Access Control Head end server will be located in the network room.

All Door entry will be by means of a Proximity card reader with egress from the designated areas can be either by Proximity card reader or Request to Exit button.

All Access Control Equipment shall be openly source able and non-proprietary.

The Access Controlled doors will be secured using Electronic Locking devices (Maglocks) on the majority of the doors.

The type of lock shall take into account the nature and construction of the door, the volume of traffic and the level of security required and it is recommended that either Electric Strikes or Maglocks are installed.

It is essential that the contractor include all access-controlled doors, for the following fire related safeguards:

There shall be a green and white coloured breakglass unit clearly marked 'Break glass to exit in emergency' fitted to the secure side of the door and wired directly in series with the door lock when electronic door locks are

used. Where electro-mechanical locks are used, a suitable mechanical release shall be available at the secure side of the door, protected from normal use by a breakable cover. The breaking of any breakglass shall be recorded and reported on the access control workstation and the security management system.

Each door shall be equipped with a relay controlled by the Fire alarm system shall be used to cut the power to the lock.

Proximity Card Readers

The Card Reader required for this project will be a Multi –Technology Proximity and I Class reader.

The dimensions of the RP10 Card Reader is 48mm x 103mm x 23mm (1.9” x 4.1” x 0.9”)

These readers can be used internally and external and will be wall mounted.

The reader has a red LED / Beep which will be activated when a card has been recognised and the LED will change to green

Card Reader:

Request to Exit Button

Request to exit buttons shall be stainless steel flush plate mountings with an illuminated button in the centre of the plate.

The plate shall be marked "Press to Exit" or Door Release”

Cable and Containment

All cable containment (primary and secondary) required for the Access Control System will be installed by the designated Electrical Contractor.

The data cabling installation from the Security Racks to the RJ 45 Data connection unit for each door controller will be installed by either the designated IT Structure cabling contractor or the Electrical Contractor.

The Patch lead from the RJ 45 Data connection unit to each door controller will be supplied by the IT Structure cabling Contractor but installed by the Security Contractor.

Final connection between un-switched fused connection unit and security equipment will be carried out by the designated Security Contractor.

6.14 (W50) Fire Detection & Alarm

There is an existing Fire Alarm panel in the booking hall, and the systems is assumed to be a Category L2 automatic fire detection and alarm is proposed for the building, designed to BS 5839-1. Manual call points should also be located at all final exits.

Changes to the existing system will be made to ensure continued compliance with BS 5839 Part 1 or as required for Building Control approval.

Equipment will include (but not be limited to);

- i. Automatic fire detectors
- ii. Break glass call points
- iii. Visual warning devices
- iv. Interconnecting wiring
- v. Interfaces
- vi. Combined visual and audible sounders

Zoning of the system will be allocated in accordance with BS 5839.

The fire alarm will interface with the following systems (but not be limited to);

Table 8. Fire Alarm General Interfacing

Service	Comments
Security	Magnetic locks will release for 15 minutes after which door will be locked again. This is to allow emergency escape but not allow unauthorized personnel back into the building.
BMS	Interfaces will inform the BMS system of fire alarm status.
Mechanical Panels	Interfaces will inform the mechanical systems of fire alarm status. Refer to mechanical controls sections for further details.

The contractor will employ a fire alarm specialist to develop the design, and subsequently supply, install, test and commission the new fire alarm system.

6.15 (W51) Earthing & Bonding

From the Main Earth Bar, a supplementary earthing system for connection to the building structure, piped services and plant will be installed within the new Electrical distribution cupboards.

General earthing requirements (excluding supplementary earthing) will be carried out utilising local earth bars contained with the Distribution board unit. Supplementary bonding will be provided from a separate earth bar.

A telecommunications bonding network in accordance with BS EN 50301 will be provided to provide earthing facilities within the Building Entrance Facility and communications riser in each notional tenancy at each floor level.

Earthing and bonding will be provided in accordance with the BS 7430:2011 , the IEE Wiring Regulations (BS 7671:2008) and local electricity supply authority regulations.

6.16 (W52) Lightning Protection

No works are estimated to the existing lightning protection for the fit out works,. Any work that maybe needed will be in accordance with BS EN 62305 and will be integrated into the existing system

Appendix 1. Mechanical Services External Locations

Figure 8: External East Wall of Unit 2 Accommodating Proposed Mechanical Services



Figure 9: External South Elevation Accommodating Pipework & Ventilation Louvers



Figure 10: External South Elevation Accommodating Pipework & Ventilation Louvers



**Appendix 2. Mechanical Service Layout
Proposal (VRF System & MVHR)**

See drawings number:

- 60562528_ML_003_REV_P0+2

Appendix 3. Luminaire Schedule

Luminaire Ref.	Picture	Description	Lamp type / colour	Control gear	Application
A		Architectural pendant LED luminaire with 550 mm diameter luminaire. Aluminium body with single point suspension. Equal or approved to Whitecroft Oculus.	LED, white 4000 K Efficiency 3500 lumens (25 W)	Standard	Open Offices
B		LED recessed / suspended luminaire with symmetric wide beam light distribution. Equal or approved to Zumtobel Panos Infinity.	LED, White 3000 K Efficacy 109 lm/CW	Dimmable	Meeting rooms
C		Surface mounted circular IP 65 LED bulkhead luminaire in 400 mm diameter. Polycarbonate opal diffuser. Equal or approved to Whitecroft KOLO IP65 Hood	LED, White 4000 K Efficacy 72 lm/CW	standard	External plant areas

Gary Cannings

AECOM Limited
Aldgate Tower
2 Leman Street
London
E1 8FA
aecom.com