chapmanbdsp

13 Blackburn Road
MEP Stage 2 Report

Revision 00
May 2020
Ref: 55186

Revision	Issued for	Date	Author	Checked by
00	Information	6th May 2020	Ben Sewell Satpal Dhangal	Phil Gardener

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chapmanbdsp
40 Gracechurch Street, London EC3V 0BT
T: 0207 618 4800
www.chapmanbdsp.com

Contents

1 Introduction

This stage 2 report has been produced to outline the mechanical, electrical and public health design proposed for the new Commercial Office block and two residential blocks located in West Hampsted – 13 Blackburn road.

This report should be read in conjunction with the rest of the design team reports and drawings.

It is intended that the design scope and intent will be revised and augmented as systems evolve through discussions with the Client, Professional Team and Statutory Authorities. This document must be read in conjunction with Reports prepared by the other Design Team Consultants.

1.1 Project Description

The proposed development is located on Blackburn Road, West Hampstead, near to West Hampstead railway station.

The proposed development is located at the London Borough of Camden. The works include demolition of the existing building and redevelopment through the erection of three new buildings for Commercial, Residential, and Retail. There will be two residential blocks, one at 6 stories and the other at 5. The Commercial block at the north of the site will consist of 8 stories of Cat A fit-out. There will be a shared underground basement that will store the main MEP equipment to serve the development. There are also two retail spaces, showers, and an office cycles store proposed in the basement.

13 Blackburn Road Site – Aerial view

Location plan of 13 Blackburn Road site

1.2 Area Schedule

The outline scheme to date has been based on the following draft areas taken from the GA's issued by HKR. Any change to the net office areas from below will have a potential increase in loads, lifting and plant requirements.

Level	Building A			
	Commercial		Residential	
	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2
Basement Floor	729	702	-	-
Ground Floor	260	252	157	-
Level 1	-	-	399	323
Level 2	-	-	399	323
Level 3	-	-	399	323
Level 4	-	-	399	323
Level 5	-	-	265	210

Area Schedule Building A

Level	Building B			
	Commercial		Residential	
	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2
Basement Floor	521	445	-	-
Ground Floor	222	222	111	-
Level 1	-	-	322	252
Level 2	-	-	322	252
Level 3	-	-	322	252
Level 4	-	-	322	252
Level 5	-	-	322	252
Level 6	-	-	217	159

Area Schedule Building B

Level	Building C			
	Commercial		Residential	
	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2
Basement Floor	391	-	-	-
Ground Floor	531	401	-	-
Level 1	314	233	-	-
Level 2	314	233	-	-
Level 3	314	233	-	-
Level 4	218	148	-	-
Level 5	218	148	-	-
Level 6	218	148	-	-
Level 7	218	148	-	-
Level 8	218	83	-	-

Area Schedule Building C

	Gross Internal Area (GIA) m^2	Total Apartment Units
Site Total	8,642	52

Area Schedule Grand Total

1.3 Design Team

The design coordination has been progressed with the following design team:

- Client — Loftus Family
- Architect — Stiff + Trevillion
- Project Manager — Beadmans
- Structural Engineer — Elliot Wood
- Fire Engineer — Elementa
- Acoustic Engineer — Ion Acoustics
- CDMC — TBC
- Facade Access Consultant — TBC
- Planning Consultant — Boyer
- Landscape Architect — Camlins
- MEP Engineer — chapmanbdsp
- BREEAM — chapmanbdsp.

1.4 Key design Strategies and Conclusion

- Route to zero carbon – No gas to site for heating and hot water services.
- Core layout design and co-ordination
- Confirmed landloard and tenant plant/ risers.
- Confirmed residential utility cupboard dimensions.

1.5 Design team Outstanding Design Issues

The following are key engineering services issues that will need discussion/resolution and client approval during the next stage of design (Stage 3):

- Below-slab drainage interface provision and the provision for sump-pumps as necessary
- Finalise target cost plan for MEP elements;
- Logistic assessment of construction approach of basement plant areas to inform design and plant selection at an early stage. Design for construction at an early stage;
- Plant replacement strategy;
- Produce and issue a Design Risk Register for MEPH
- Atmospheric acoustic design criteria for the building services plant set has been set by the Acoustic Consultant and assumptions made with regards to attenuation of plant and indicative plant selection however these assumptions need to be tested and attenuation requirements verified during the future phases of design by an Acoustic Consultant.
- Confirmation needed for television requirement for the development.
- Confirmation needed for entertainment TV requirement.
- Final electrical services point of connection and utility load availability to be confirmed by utility provider.

1.6 Summary of Services

1.6.1 Site Wide Infrastructure

The existing building located on the site is currently provided with utility supplies. Existing water, gas & power supplies will be disconnected and removed as part of these demolition works, excluding services being retained as a temporary network or building supplies. New supplies will be provided for water, drainage, IT/data and power supplies. No gas will be provied on site.

1.6.2 Potential Tenancy Arrangements

The building services will be designed to facilitate the tenancies on each floor plate.

The CAT A mechanical, electrical and comms services for each floor are also distributed within the cores, to facilitate typically tenancies per floor for future tenant fit-out.

1.6.3 Commercial Floors

The commercial floors will be provided with utilities fed from the common building infrastructure to serve the tenancies per floor. Each tenancy zone would be provided with:

- Electrical supply;
- Primary fresh air & exhaust from ceiling mounted MVHRs
- Boosted mains cold water supply;
- Drainage and stack connections;
- Containment for incoming telecommunications;
- Sprinkler connection as dictated by the fire strategy;
- VRF roof mounted external cassette to deliver all the tenants heating and cooling.

1.6.4 Ground Floor Shell & Core

The ground floor space will be provided with the following shell & core services:

- Cut-out and utility metered electrical supply;
- High-level louvres in the ‘frontage’ of the retail unit approx 400mm to allow tenant’s to connect their void mounted primary fresh air & exhaust AHUs. No provision is currently allowed for air from the base build ventilation plant;
- Sleeves to allow the tenant to bring in their own water supply;
- Drainage and stack connections;
- Sleeves for incoming telecommunications;
- Sprinkler connection as dictated by the fire strategy;
- Ambient loop/Condenser F&R connection hydro box water to refrigerant heat pumps;
- There is no provision for a gas supply.

1.6.5 Strategic Mechanical and Electrical Services

Simplified diagrams, which illustrate the principles of key services strategies adopted, are included within the system descriptions. The table below summarises the plant locations and indicates whether the plant serves the whole development (common services) or the buildings separately (independent services).

Plant	Roof level	Ground Floor	Basement
Office Supply & Extract AHU Plant	✓		
Protected Lobby Smoke Extract Fans	✓		
Air Source Heat Pump/Chillers & Pump Room	✓		
Landlord Core Shower & W/C	✓		
Plantroom Ventilation Plant	✓		
Basement Smoke Extract Fans	✓		
Basement & Core Ventilation AHU	✓		
Sprinkler Tanks & Pumps			✓
Domestic Water Storage & booster sets			✓
UKPN Substation Room		✓	
Office LV Switch Room			✓
Resi LV Switch Room			✓
Life Safety Switch Room			✓
Resi Comms Room			✓
Office Comms Room			✓
Generator		✓	

Plant locations

1.6.6 Residential Blocks (Apartments)

Each apartment would be provided with:

- Electrical supply – Billed direct by utility company/provider with meter in communal riser cupboard within the landlord's corridor;
- Boosted mains cold water supply – Billed direct by utility company/provider with meter in communal riser cupboard within the Landlord's corridor;
- Drainage and stack connections;
- Containment for incoming telecommunications;
- Sprinkler connection as dictated by the fire strategy;
- Ambient Loop (AL) connection – Billed by Landlord as part of the service charge.

1.6.7 Strategic Core Arrangements

Vertical services distribution are accommodated in dedicated risers within the core. The concept core drawings within the Appendices indicate the preliminary strategy and riser sizes proposed within these cores.

- Plant Replacement.

A passenger/fire fighting lift service is provided to serve the floors. The car-size is anticipated to be of sufficient load capacity and dimensions to facilitate all regular maintenance work and some plant replacement.

At this stage, it has been assumed that all fire compartmentation will be vertical.

Where roof mounted plant items are too large or heavy for the goods lift, it will be necessary to crane these items onto or off of the roof from surrounding roads. The strategy for which is to be developed during the next stage of design.

For further initial details on the plant replacement strategy, please refer to the plant replacement section of this report.

1.7 Energy Cost/Metering

The incoming water and electricity will be metered in accordance with the supply authority's/clients requirements. In addition, sub-metering of the energy systems will be provided in accordance with Part L2 of the Building Regulations and CIBSE Good Practice Guides and BREEAM NC 2018. Refer to the BREEAM report.

1.8 'Out-Of-Hours' Operation`

The building management system will enable plant and equipment in accordance with pre-programmed (adjustable) time schedules.

Each tenancy on each floor plate is to be served by a Mechanical Heat Recovery Heat recovery (MVHR) box for the supply & exhaust air, which can be opened/closed remotely by the Landlord's BMS to allow out of hours operation or to shut off a floor or tenancy if not in use.

The MVHRs will also have the facility for demand control ventilation where the tenants have the facility to install CO2/occupancy sensors that control the amount of fresh air supplied to the floor.

The toilet and basement extract fans will have the facility to operate during out of hours when dictated by the Landlord's BMS.

Toilet accommodation areas will be provided with a common boosted cold water valves to shut off the water supply when toilets are not in use dictated by PIRs & time clock.

2 Basis of Design

2.1 Design Standards

The MEP System design will be based on British design standards and the relevant guidance and codes as follows:

2.1.1 Statutory Legislation

- Electricity at Work Regulations;
- Approved Documents of the Building Regulations (UK)
- The Clean Air Act;
- The Control of Pollution Act;
- Construction Design and Management Regulations;
- Health and Safety at Work Act;
- Fire Precautions Act;
- The Control of Substances Hazardous to Health Regulations;
- The Health and Safety (Display Screen Equipment) Regulations;
- The Equality Act;
- Electromagnetic Compatibility Regulations;
- The Electrical Safety, Quality & Continuity Regulations;
- BS EN 12464-1:2002 – Lighting of workplace/ Indoor workplaces;
- The Lift Regulations;
- BS 9999:2008 Code of Practice for Fire Safety in the design, management and use of buildings;
- BS 9990:2006 Code of Practice for Non–Automatic Fire-fighting Systems in buildings.

2.1.2 Main Building Services Related Guidance Documentations

- BSRIA AG4 - Guide to Legionellosis- temperature measurements for hot and cold water services;
- CIBSE - SLL Code for interior lighting:2010;
- CIBSE Lighting Guides - LG9 Lighting for Communal Residential & LG6- The Outdoor Environment;
- CIBSE Guide A - Environmental Design;
- CIBSE Guide B - Heating, Ventilation, Refrigeration and Air Conditioning;
- CIBSE Guide C - Reference data;
- Code of practice & guide: Nov 2000 - Legionnaires disease, the control of Legionella bacteria in water systems;
- SI 1999 No.1148 - The water supply (water fittings) regulations;
- SI 1999 No. 1506 - Amendment to- The water supply (water fittings) regulations;
- The Institute of Plumbing - Engineering services design guide;
- The IEE Wiring Regulations - BS 7671: 18th Edition & associated Guidance notes 1-8;
- The IEE - Electricians Guide to the Building Regulations;
- Code of Practice for Earthing BS 7430: 2015;
- Protection against Lightning BS EN 50164: 2008.Basis of Design.

2.2 Building Envelope Performance

Cladding/glazing and external wall thermal performance figures will be equal to or better than those required to meet Part L2A of Building Regulations (Version TBC). The Building Regulations submission (by the Architect) will incorporate the diversified building loads inclusive of any tenant future allowances to be included in the Base Building Definition.

2.2.1 Building Façade Design Criteria

Cladding design, including the selection of glass and extent of solid and shaded areas, will generally restrict maximum perimeter cooling loads (sensible) for standard office height floors to 100-120 W/m^2 inclusive of heat gain allowances for small power, people, lighting and ventilation/infiltration. For south-east/south-west corner zones, these loads may increase. This has been based on the initial thermal model with an assumed g-value= 0.34.

Also, as required under Criterion3 - Part L2A: 2013, the balance of solid glass and glass performance will be assessed on an orientation basis to meet limiting solar load criteria.

System U-Values and g values will be in accordance with the requirements of the Building Regulations as specified chapmanbdsp and confirmed by the architect.

2.3 Mechanical Services

The basis of design has been taken from the following documentation:

- British Standards, Codes of Practice and Building Regulations;
- CIBSE Guides and Technical Memoranda;
- Local and Statutory Authority Requirements;
- Supply Authority Regulations;
- Existing services feasibility report;
- BREEAM for offices 2018,(Version TBC, dependant on any current planning approval conditions).

External Design Conditions:		
Air Conditioning:	Summer:	32°C db, 20°C wb
	Winter:	-4°C 100% RH
Cooling Plant Selection:		Heat Pump/chillers will be selected to achieve design capacity up to 35°C, above 35°C the heat pump/chiller will still operate but at reduced capacity to a functional limit of 45°C
Heating Plant Selection:		Heat Pump/chillers will be selected to achieve design capacity down -4°C, Below -4°C the heat pump/chiller will still operate but at reduced capacity down to a functional limit of -8°C

Internal Design Conditions		
Offices:	Summer:	23°C +/- 1.5°C db during occupied hours
	Winter:	21°C +/- 1.5°C db. during occupied hours
		No humidity control
Reception:	Summer:	24°C +/- 2°C
	Winter:	18°C +/- 2°C
		No humidity control
Toilets / Cycle Storage:		Unheated internal spaces
Stairwells and Circulation:		Unheated internal spaces
Plantrooms and Service Areas:		10°C db. minimum
Plantrooms:		Mechanically ventilated, no heating

Occupancy	
HVAC Design Density:	1 person per 8m² (offices)(One floor at 1: 5m²)
Retail	1 person per 5m²
Cooling Load Densities	As Thermal Model, to be developed at Stage 3
Occupancy:	90 W/person sensible, 50 W/person latent
Lighting:	8 W/m² (net lettable area) @ 350 – 500 lux average
Equipment / Small Power:	25 W/m² (net lettable area)
Base Additional Capacity:	10 W/m² (net lettable area) Risers and Main Plant only

Indicative System Temperatures	
Ambinet Loop/Condenser water:	Controlled between 18 ºC - 25 ºC
LTHW	31ºC flow, 26ºC return

Central Electrical Plant Diversities	
Occupancy:	1.00
Lighting:	0.80
Small Power:	0.60 (At central switchboards)
Additional Capacity:	1.00

Ventilation Rates	
Outside Air:	12 l/s/person[1]
Office AHU Filtration:	BS EN779 Primary G2, Secondary F6
Toilet Ventilation:	10 air changes per hour extract / 8.5 air changes per hour supply
Plantrooms:	2-3 air change per hour minimum
Changing Areas	8 air changes per hour extract / 7 air changes per hour supply
Storage/Lockers Areas:	2-3 air change per hour minimum
Cycling Stores	3-4 air change per hour minimum
Basement Comms	1-2 acph positive prerssure
LV Switchroom	2-3 air change per hour minimum
Reception Lobby	50l/s

Smoke Clearance Ventilation Rates	
All Basement Areas	Min 10 air changes per hour mechanical supply & extract (subject to BCO approval) sized on the largest compartment.

Infiltration		
Offices Floors:	Summer:	0.25 air changes per hour for 4.5m from the perimeter
	Winter:	0.50 air changes per hour for 4.5m from the perimeter
Entrance:	Summer:	1.00 air changes per hour
	Winter:	1.00 air changes per hour

Mechanical Design Criteria

2.4 Electrical

Electrical Loadings

Landlord circulation	20 W/m²
Tenant Lighting	10 W/m²
Tenant Small Power	25 W/m²
HVAC Plant	As required
Lifts	As required
Retail units	250 W/m²

Average Lighting Levels

Open Plan Office	350 - 400 lux on working plane
Cellular Offices/Meeting Rooms	350- 400 lux on working plane
Reception / Entrance Ways	100-150 lux in circulation area, 350 lux on reception desk
Toilets	100-150 lux
Stairways	150-200 lux
Plantrooms	150-200 lux

Electrical Design Criteria

2.4.1 Illumination Levels – Offices (Category A)

Finalised lighting design criteria to be confirmed once the occupancy type confirmed at the next stage.

2.5 Public Health Services

The Public Health services will be designed in accordance with the relevant British Standard Codes of Practice, the Water Supply Regulations 1999 Second Edition, WRAS approval scheme, Building Regulations, 'Institute of Plumbing – Plumbing Engineering Services Design Guide' and HSE Approved Code of Practice L8 for prevention of legionella.

The following British Standards further dictate the basis of design, construction and commissioning.

- BS EN 12056 Gravity drainage Systems inside buildings
- BS EN 806 Specification for installations inside buildings conveying water for human consumption
- BS 8558 Design, installation, testing & maintenance of services supplying water for domestic use
- BS EN 9990 Non-automatic fire fighting systems in buildings - Code of Practice
- BS EN 12845 Fixed fire-fighting systems – Automatic sprinkler systems (commercial)
- BS 9251 Fire sprinkler Systems for Residential and Domestic Occupancies – Code of practice
- BS 1710 Specification for identification of pipelines and services.

General requirements:

- Under the requirements of The Water Supply Regulations, the contractor is required to give notice to the Water Supplier of any planned works for new or alterations to the buildings water systems. No works shall commence before gaining the Water Supplier's consent
- The contractor shall arrange for regular Water Supplier inspections throughout works culminating with the complete sign-off by the Water Supplier of the water services installation prior to Practical Completion
- All plant, fittings, valves, materials and appliances etc, shall be Water Research Advisory Scheme (WRAS) approved. The contractor shall include all WRAS certification and material directory documentation within each contractor Technical Submission. Any of the above found not to be WRAS approved shall be required to be removed and replaced.

Domestic Cold Water:	
Fluid Category 1:	20 l/person based on 1 person per 8m² (net lettable area) – office 100litres per bedroom – residential
Fluid Category 5:	Provision of tank & pump for wash down facilities in refuse areas, window wash & mechanical system fill points
Domestic Hot Water Storage:	Local electric on office floor & storage to serve basement showers Local generation within apartments for residential
Cycle Showers:	Approximately 8 l/min (tbc as per BREEAM requirements)
Rainwater Drainage	
Design Intensity:	0.0693 l/s/m² (250 mm/m²/hour approx.)
Stormwater Intensity:	1 in 75-year storm plus 20% climate change uplift.

2.6 Acoustic Targets

2.6.1 Internal

Internal noise will not exceed typical CIBSE criteria and set down by the appointed Acoustic Consultant.

2.6.2 External

External noise will not exceed the criteria set down by appointed Acoustic Consultant both in normal day & night conditions and during emergency & test conditions as agreed with the Environmental Health Officer.

2.6.3 Plantrooms

The design of both the basement and roof plant rooms will consider the control of excessive noise levels in order to provide a working environment within current safety recommendations. Any external noise breaks out will also be considered, in particular for the rooftop plant in order to comply with any planning regulations and to minimise the disturbance of any adjacent buildings. The packaged standby generator will be specified with dedicated acoustic enclosures in order to limit noise levels as yet to be determined by the acoustic consultant.

2.6.4 Vibration Control

All mechanical equipment will be provided with vibration isolation to ensure that vibration levels at any point on the building structure does not exceed Curve 2, as defined in BS6472 in 8564721: 1992 Evaluation of Human Exposure to Vibration in Buildings.

It is envisaged subject to confirmation by an Acoustic Consultant that the Heat Pump Chillers will be mounted on spring AVMs.

3 Office Base Build Mechanical Services

3.1 Office heating System

Summary Heating Loads	
Ventilation Loads	
Office Ventilation Load (with heat recovery 70% eff)	45 kW
Heating Loads	
Sensible Heating load	137.5 kW
TOTAL	182.5 KW

3.1.1 Office Heating General

Heating to the office floor via VRF high level exposed or ceiling void mounted FCUs or VRF Cassettes. The ceiling void mounted MVHRs will be fitted with a DX coil controlled through the BMS in order to ensure that all required design conditions are met and occupant comfort is achieved. Roof top mounted external VRF condensors will be provided to serve each tenant. Air shall be ducted to the fan coil units for supply to the reception area via a linear slot or swirl diffusers.

Heating to the office basement floosr via VRF high level exposed or ceiling void mounted FCUs or VRF Cassettes. Wallmounted slim line external VRF condensors will be provided located with the cycle stores & car park areas.

Water treatment provisions shall be incorporated into the systems to allow complete cleaning, flushing, treatment, testing and bacteriological cleanliness generally in accordance with BSRIA Guidance BG/29 2012 (including side stream filters, strainers, air/dirt separator, venting, dirt pockets, etc.). A water treatment consultant should be employed to validate, check and monitor the water treatment specialist contractors.

3.1.2 Reception & Landlord Stairs

The reception will be heated via high level VRF high-level exposed FCUs within the lift lobby with localised high-level fan assisted door heaters provided at the entrance to mitigate any instantaneous heat loss due to the opening of doors in the lobby area. The reception desk will be provided with electric under desk heater.
The internal stairs will be treated as unheated spaces.

3.1.3 Refuse / Cycle Storage

The ground floor office refuses areas and basement cycle storage rooms will be unheated spaces . Refuse Cat 5 wash down facilities will be traced heated.

3.1.4 Retail Units

The ground floor office retails units will be provied with capped ambient loop connections with the tenant to provied a water cooled condenser to serve either a 4 pipe FCU or VRF cassettes or FCUs.

3.2 Cooling System

Summary Cooling Loads	
Ventilation Loads	
Office Ventilation Load	46.5kW
Cooling Loads	
Cooling load	196 kW
TOTAL	242.5kW

3.2.1 Office Cooling General

Comfort coiling to the office floor via VRF high level exposed or ceiling void mounted FCUs or VRF Cassettes. The ceiling void mounted MVHRs will be fitted with a DX coil controlled through the BMS in order to ensure that all required design conditions are met and occupant comfort is achieved. Roof top mounted external VRF condensors will be provided to serve each tenant. . Air shall be ducted to the fan coil units for supply to the reception area via a linear slot or swirl diffusers.

Either VRF system will be complete with refrigerant leak detection and pump down facilities, master sequencer (for optimising the efficiency of the multiple condensors) and full acoustic treatment/anti-vibration equipment to meet the noise criteria.

Water treatment provisions will be incorporated into the system to facilitate complete cleaning, flushing, treatment, testing and bacteriological cleanliness in accordance with BSRIA Guidance BG29/2012 (including strainers, air/dirt separator, venting, dirt pockets, etc.).

At a later stage, once a more detailed environmental analysis has been carried out, it may be advisable to review the current VRF selection strategy in order to optimise both resilience and efficiency based on the building's annual usage profile.

Item	No.	Approx Size/Duty	Type	Comments
Air Cooled Heat Pump Chillers	2	TBC	High-efficiency low noise	Multi- Compressor units, complete with acoustic attenuation
Primary Pumps	2	TBC	Inverter driven	Variable Flow (Duty/Standby)
Ambient loop	2	TBC	Inverter driven	Variable Flow (Duty/Standby)
Pressurisation Units, Etc.,	1		Packaged	For CHW Circuit
Side-stream Filtration	1		Packaged	For the CHW system

Space Cooling Plant schedule

3.2.2 Reception

The reception areas will be served by VRF fan coil units to provide comfort cooling. The fan coil units shall be mounted within the ceiling void and waterside control will be via temperature control valve sets. They shall use EC/DC motors and connect to a pumped condensate system, with condensate pipework to run within cores and/or structural column casings. Air shall be ducted to the fan coil units for supply to the reception area via a perimeter linear slot or swirl diffusers.

3.3 Ventilation

3.3.1 Tenant Office Areas

Conditioned primary fresh air will be supplied to the office Category 'A' space via ductwork distribution from floor level lourvers connected to ceiling mounted MVHR. The MVHRs shall comprise of inlet filters, dampers, frost, attenuation, heating, cooling, heat recovery and supply and extract fans. The fresh air supply is ducted to high induction linear slot diffusers around the perimeter or swirl diffusers in the main office areas or ducted to the back of the office FCUs, this will be developed further at a later stage of design. This will be housed within a 550mm service zone.

Extract air will be via a one bell-mouth, located near the MVHR. The AHUs will also be provided with free cooling and nighttime purge intelligent controls, to enable free coolth to be utilised within the mid-seasons. Ductwork and MVHR sizes will be designed so specific fan power does not exceed 1.8 W per l/sec.

Item	No.	Approx Size/Duty	Type	Comments
Office Supply and Extract	8	Various	Packaged Supply and Extract MVHR	Complete with attenuators, coils, access, thermal wheel and inverter are driven fans, associated control panel, filters and dampers

Office Ventilation Plant schedule

3.3.2 Landlord Reception / W/C Cores

The entrance/reception lobby & Landlord Cores areas will be ventilated using the Landlord's ceiling mounted air-handling unit with plate exchanger heat recovery, which provides facilities for filtration, heating and cooling of the fresh air. The MVHR units (AHUs) shall comprise of inlet filters, dampers, frost protection, attenuation, heating, cooling, plate exchanger heat recovery and supply and extract fans.

Item	No.	Approx Size/Duty	Type	Comments
Landlord areas	1	TBC	Packaged Supply / Extract AHU	Complete with attenuators, heat recovery and inverter driven fans, Filters, Dampers and associated control panel

Reception Ventilation Plant schedule

3.3.3 Cycle Shower Changing Facilities

The cycle changing facilities located within the basement will be ventilated dedicated mechanical extract system, with make up air through h/l lourvers ducted to ceiling mounted supply valves, with additional make up air being provided from louvred located within the basement sky lights.

3.3.4 Retail

A ventilation provision has been allowed for, High-level louvres located along the ground floor façade. Future tenants are to provide dedicated ceiling mounts MVHRs to serve their future requirements.

3.3.5 Office Landlord Cores and W/C Ventilation Ventilation

The Landlord core will be natural ventlated with roof mounted extract fans providing dedicated extract, with make up air from the office floor plate.

Air will be extracted from above toilet cubicles via a ductwork system to roof mounted AHU which will discharge directly to the atmosphere. All W/Cs will be kept at a negative pressure in order to prevent the ingress of smells onto the cores and offices.

3.4 HV Switchgear and Transformer Room Ventilation

The supply authority HV/LV intake substation/switch rooms, located at Ground floor, will be naturally ventilated to UKPN standard requirements via louvred doors.

3.5 Fire Fighting Lobby and Basement Smoke Ventilation

The central firefighting lobby required by the fire strategy will be mechanically ventilated utilising a Colt shaft system or equal comprising of dedicated extract fans mounted on the roof ducted to a fire rated smoke shaft.

Each lobby will be smoke vented via motorised louvre smoke dampers activated by smoke detectors and pressure sensors in the firefighting lobby. An AOV at roof level on the stairwell will provide makeup air for the lobby extract. This is a CDP system and the smoke control specialist will need to undertake CFD analysis and gain BCO approval.

The basement will be provided with background tempered air mechanical ventilation and smoke ventilation utilising dual purpose dedicated2-speed smoke rated extract fans mounted in 4hr fire rated enclousres within the basement plantroom, with make up lourvers from the basement offices areas.

This will be ducted to the ground floor car park which will be fire-rated according to the fire strategy. This system will be controlled through motorised smoke and fire dampers located in compartments within the basement will be designed to supply & extract from the fire compartment at min. 10 ACH.

Item	No.	Approx Size/Duty	Type	Comments
Basement Smoke Fans	2	TBC m^3/s	Duty/Standby Rated for 300°C for 2 hr	
Lobby Colt Shaft Fans	2	TBC m3/s	Duty /Standby rated for 300°C for 2hr	

Basement & Lobby Smoke Ventilation Fans

4 Residential- Mechanical Services

4.1 Mechanical Design Criteria

This section details the mechanical design criteria for the residential blocks and associated retail & ancillary area spaces.

4.1.1 External Design Criteria

Summer	32°C db	20°C wb
Winter	-4°C db	saturated

4.1.2 Internal Design Criteria Allowances

Space	Summer Design (Dry Resultant)	Winter Design (Dry Resultant)	Fresh Air Rate	Extract Ventilation Rate	Infiltration Rate a/c per hr	*Noise Level
Residential Receptions	No Control	19°C ± 1.5°C No Humidity Control	Natural Ventilation	---	1.0	NR 40
Bedrooms	Peak Looping Cooling (refer to overheating strategy)	22°C ± 2°C No Humidity Control	Supply air via MVHR unit as per Part F 2019 Draft Guide	---	0.25	NR 25 at the bed head with the en-suite door closed & MVHR at low speed
Lounge/Dining Rooms	Peak Looping Cooling (refer to overheating strategy)	20°C ± 2°C No Humidity Control	Supply air via MVHR unit as per Part F 2019 Draft Guide	---	0.25	NR 30
Kitchen	No Control	20°C ±2°C No Humidity Control	Makeup air from living rooms	13l/s extract (boost) air via MVHR unit	0.25	NR 35
En-Suite Bathroom/Shower Rooms	No control	22°C±1.5°C No Humidity Control	Makeup air from bedroom rooms	8l/s extract (Boost) air via MVHR unit	0.25	NR 35
Utility Cupboards	No control	---	---	8l/s extract (Boost) air via MVHR unit	Internal Space	NR40
Internal Lift Lobby and Staircases	No control	Unheated	Natural	---	Internal Space	---
Bin Store	No control	Unheated	Make-up air through Facade	6 ach	---	NR45
Bike Store	Uncontrolled					
Plant room	No control	Frost Protection	Make-up air	2 ach	---	NR55

'* Anticipated noise criteria noted. Acoustic consultant to confirm.

4.2 Residential Occupancy Period

Plant operation and noise emissions shall be designed to allow 24-hour operation 7 days a week.

4.3 Construction Values

Building thermal performance U and G-values shall be compliant or better than Building Regulations Part L 2013. Reference should be made to their Energy Strategy Report for current values.

Residential

1.	Glazing throughout)	U-value	1.40 W/m^2.K – maximum (low emissivity double glazing
		G-value	0.55 – maximum (solar control glazing on South, West & East Elevations)
2.	Walls	U-value	0.13 W/m^2.K – maximum
3.	Roof	U-value	0.10 W/m^2.K – maximum
4.	Ground floor slab	U-value	0.10 W/m^2.K – maximum

4.4 Noise Criteria – Internal

Internal noise levels shall be as detailed within a separate acoustic report produced by acoutisian (Currently TBC).

4.5 Noise Criteria – External

External noise levels shall comply with the Environmental Health Officers requirements as defined within the separate acoustic report produced by Acoustician

4.6 Smoke Ventilation

Area	System
Apartment Landlord Corridors	Mechanical ventilation (Colt Shaft) Or AOV's
Ground Floor Reception	Via entrance doors
Staircases/External Corridors	Automatic opening vents
Basement plant/ancillary areas	Mechanical/natural ventilation

4.7 Decarbonisation of the National Grid

The National Grid is, over time, seeing an increased contribution in renewable energy technology and as a result, a reduced contribution from fossil fuels. The net result is that the National Grid is becoming cleaner and the 'carbon intensity' is reducing.

The reduction in carbon intensity is now so significant that in the latest consultation to revise the Building Regulations it is proposed that a unit of electricity now has a lower carbon intensity than a unit of gas.

The impact of this is that traditional technology such as combined heat and power (CHP) - which was preferable due to its ability to offset high carbon intensity mains electricity – sees it's benefit diminish to, in the majority of cases, zero. Alongside this, electrically run technology such as heat pumps which previously resulted high carbon emissions, are no longer as carbon intensive and become more preferable.

The GLA has recognised the decarbonisation of the grid and the proposals of the Building Regulations and requires (from January 2018) that all developments base design decisions on a new lower carbon emission factor for mains electricity as shown in the table below.

	Carbon emissions (kgCO2/kWh)		
	SAP2012	SAP10 (Currently used in GLA energy strategies)	SAP 10.1 (not currently required by the GLA)
Mains Gas	-0.216	-0.210	-0.210
Mains Electricity	-0.519	-0.233	-0.136
On-site electricity generation	-0.519	-0.233	-0.136

4.8 Central Heating Plant and District Heating Options

Given the impact of National Grid decarbonisation, the proposed development seeks to achieve compliance with Building Regulations and GLA carbon emissions targets (of 35% better than part L with regards to carbon emissions) via a central or block-by-block Air Source Heat Pump system (ASHP) connected to a 4th or 5th generation (ambient loop) district heating network.

Currently there are no Energy Service Companies (ESCO) operating a District Heating Network local to the development however space will be allocated within the scheme to afford benefit of any future installations should they become available.

The system proposal written herein is on the basis of a similar district heating network solution provided as the systems infrastructure for the development and shall be the developers (landlord) owned installation. Future connection to an ESCO providers system, should this become available and be required, can be readily integrated to the landlord sitewide network to contribute to the overall development energy use. This report describes systems options considered as part of the stage 2 design however a centralised landlord sitewide network has been agreed with the Client and further details are as mentioned further within this report.

The landlord owned sitewide network will follow the same principles as ESCO owned district heating networks. District heating networks have evolved to what are commonly known now as either 4th generation or 5th generation networks. The 4th generation networks typically offer heating only solutions to provide building heating and hot water demands. 5th generation networks can additionally offer cooling solutions when coupled with heat pump installations, using the network as a heat sink for heat rejection from the cooling process due to the lower system operating temperatures which the 5G systems employ. The next sections of the report provide an overview of the 4G and 5G networks.

4.8.1 4th Generation Network

A 4th generation network typically comprises of Low Pressure Hot Water (LPHW) supplied from a central energy centre

A 4th generation low-temperature district heat network which provides the apartments heating and domestic hot water through the use of an instantaneous heat interface unit (HIU) & inline electric water heaters.

The apartment HIUs are served from a central LTHW Network on a 55-30°C F&R which are fed from a central plant room located within the basement. Heat is supplied to each block network via ASHPs which supply heat on 55-49°C primary F&R. The difficulty with this option is that during CIBSE recommended peak winter conditions of -4°C heat can only be delivered at 48°C thus in order to raise the temperature up to 55°C an inline water heater also needs to be specified (Refer to appendix A for a typical schematic).

Advantages:

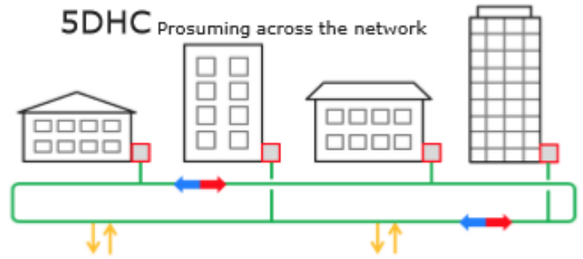
- All electric system, no gas distribution
- Smaller utility cupboards compared to 5G networks due to use of Heat Interface Units (HIU's)
- Smaller Central Pipework
- No Apartment DHW cylinder standing losses, Instantaneous DHW

Disadvantages:

- If cooling is required an independent system will need to be provided
- Typically Lower efficiency Part L compared to 5th generation
- Cannot be connected to 5th generation heat networks
- Corridor overheating risk potential due to higher pipework temperatures
- Additional ASHP will be required on the roof due to the higher temperatures required for the network.
- Additional electrical load from In-line water heater during peak winter conditions to achieve DHWS temperatures.

4.8.2 5th Generation Network

This option provides all the heating, domestic hot water & cooling demands for the project through the use of in-apartment water to water heat pumps with an integrated DHW cylinder connected to a common centrally fed 'ambient' water loop with operating circuit temperatures maintained between -10°C to+30°C through the use of basement located reversible air source heat pumps (ASHPs). The ambient loop then serves apartment heat pumps (Hydroboxes) which work by either adsorbing or rejecting heat from this network thus raising or lowering its temperature within the system operating parameters.



Advantages:

- Highly efficient thermal distribution – 70% below part L as reported by Energist
- Lower corridor overheating risk due to at near ambient temperature within in pipework
- All electric system, no gas distribution
- Can easily be connected to all types of future district heating networks.
- Good flexibility in being able to provide full FCU comfort cooling & heating if required.
- Higher efficiency within the central plant due to ambient temperature requirements
- Retails spaces can be served bywater-cooled-VRF fed from the ambient loop.

Disadvantages:

- Larger central pipework
- Larger utility cupboards within the apartment to house Hydrobox
- Standing losses from apartment water cylinder
- Potentially higher apartment maintenance costs
- The cylinder requires an additional electric immersion pasteurisation heater to store water at 60°C.

Conclusion

Due to the restricted acoustic requirements as detailed with Ion acoustic report is it unfeasible to allow for openable windows to mitgate overheating therefore it solution to be developed further in the stage 3 design.

The stage 2 MEP design also considered Ambient loop / 5th generation with:

a) air source heat pumps block by block and
b) centralised plant options
c) Heating only
d) Heating and peak lopping cooling
e) Heating and peak lopping cooling and potential for tenants to install comfort cooling in the future
f) Heating and comfort cooling on day one

4.9 Landlord ASHP System Options

The following options outline potential mechanical plant solutions utilising Air Source Heat Pumps as the primary energy solution considered for this development.

4.9.1 Centralised ASHP served by Landlord 5th Generation Energy Centre

The ambient loop system provides a source of energy to generate heating, hot water & cooling as required to all residential apartments. The loop comprises of a network of in-apartment water to water heat pumps (hydro-boxes) with integrated DHW cylinders which are connected to a common landlord ambient water loop. Heat is either taken from or rejected to the ambient loop by the apartment water to water heat pump units. The central loop will be maintained between 15-25°c, which is the optimum temperature for hydrobox efficiency. The loop, however, will still work between -10°c- +30°c. Due to this wide operative temperature range, the loop can be warmed or cooled by the systems connected to it depending on whether heating or cooling demands are required. This loop will be controlled to the operative temperature band by two ASHPs.

Centralised reversible ASHPs will provide Low-Pressure Ambient water (LPAW) at 31/26^{O}C during heating mode and 11/16 ^{O}C during cooling mode. These will be located on the roof of one of the residentail blocks and then distributed to a primary energy centre in the basement.

The central plant room will house; the primary & secondary pumps, buffer vessels, plates and ancillaries. This district central plantoom will then distribute LPAW via the external ambient loop district network, as shown in appendix drawings. This network will serves the two residentail and HT-WSHP to serve cycle showers located in the basement.

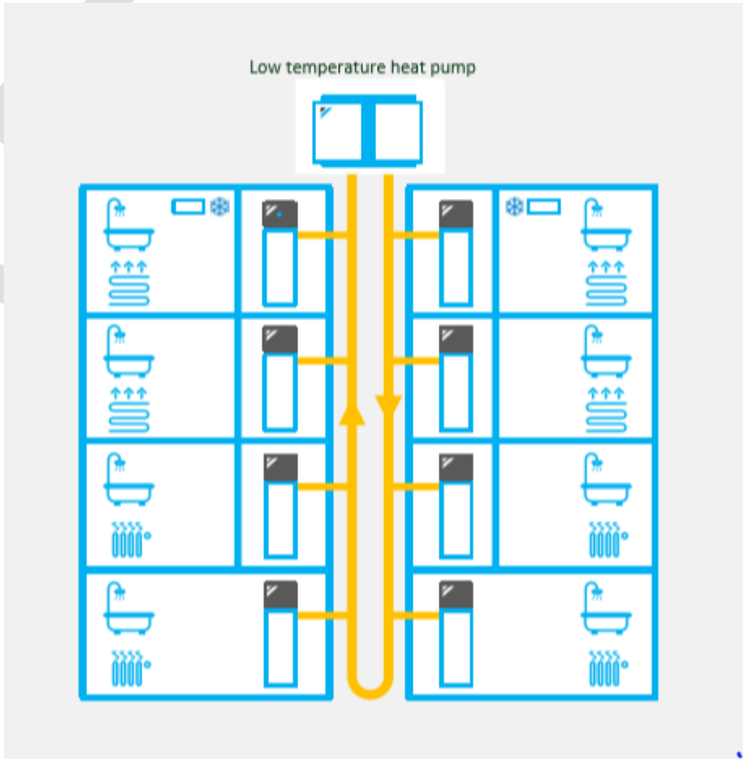
Typical System Operating Temperatures

• Heating F&R To Ambient loop	31°C flow	26°C return
• Cooling F&R To Ambient loop	11°C flow	16°C return
• Ambient Loop F&R To Hydroboxes	25°C flow htg mode	15°C return htg mode
• Ambient Loop F&R To Hydroboxes	15°C flow clg mode	25°C return clg mode
• Secondary LTHW for UFH	40°C flow	30°C return
• Secondary CHW for Coil or FCU	7°C flow	12°C return.

With distribution temperature at near ambient the system heat losses can be reduced by as much over 90% compared to more traditional high temperature systems as seen with Boilers/CHPs.

two rooftops ASHP plant areas will be sized on 2no. units at 100% of the peak heating load, so that in the event that of the non-operational unit there is still resilience within the system. Along with the 2no. units the primary buffer will be fitted with immersion heaters sizes based on the peak electrical output of one heat pump failing again for added system resilience.

Image of typical central rooftop ASHP Plant



Images showing diagrammatic of a Landlords 5th Generation ambient loop system

4.9.2 System Operating Temperatures

▪ Heating F&R To Ambient loop	29°C Flow	24°C return
▪ Cooling F&R To Ambient loop	13°C Flow	18°C return
▪ Ambient Loop F&R To Hydrobox	25°C Flow	15°C return
▪ Secondary LTHW for UFH	45°C Flow	35°C return
▪ Secondary CHW for peak lopping Coil or FCU	7°C Flow	12°C return

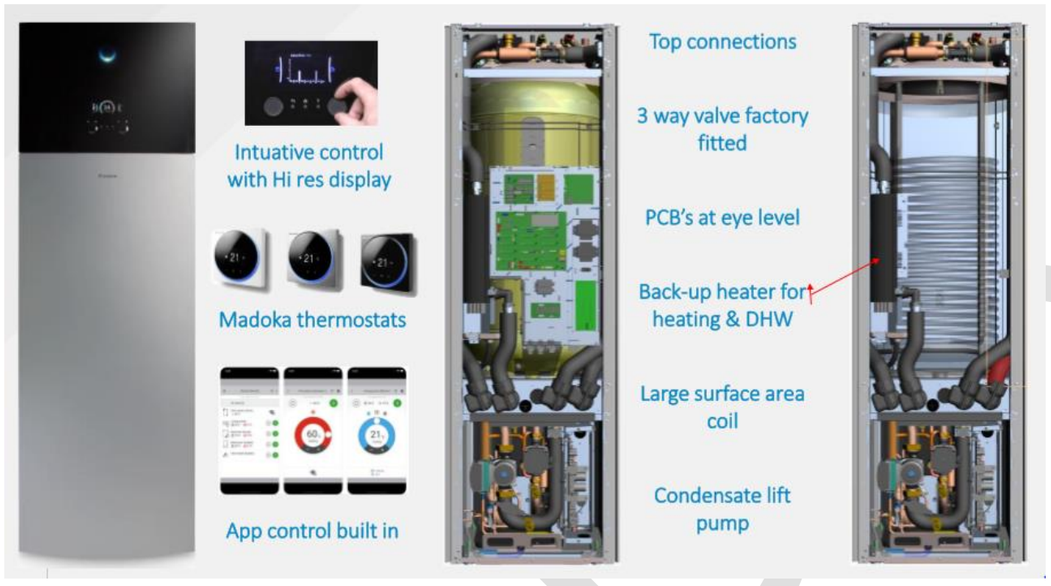
4.10 Apartment Retail Services.

4.10.1 Residential Hydrobox operation

The Ambient Loop Pipework within the buildings will be mild steel and will serve water to water heat boxes ie hydroboxes (HBs) in each apartment.

The hydrobox provides all the apartments heating or cooling and domestic hot water demands by either adsorbing or rejecting heat to or from the ambient water loop thus raising or lowering the ambient loop temperature. The heating or cooling can be provided by connecting to a range of heat emitters including, radiators, underfloor heating (UFH) and fan coil units (FCUs). Domestic hot water is provided by an integrated hot water cylinder which is heated indirectly by the hydroboxes heat pump.

The HBs; are a compact packaged unit containing; a heat pump heat exchanger, expansion vessel, integrated 180 litre hot water vessel, control pump, electric immersion heater for water pasteurisation and associated valves & controls. The HB's will provide hydraulic separation between the Landlord's LPAW and the apartment HWS & LTHW/CHW systems.

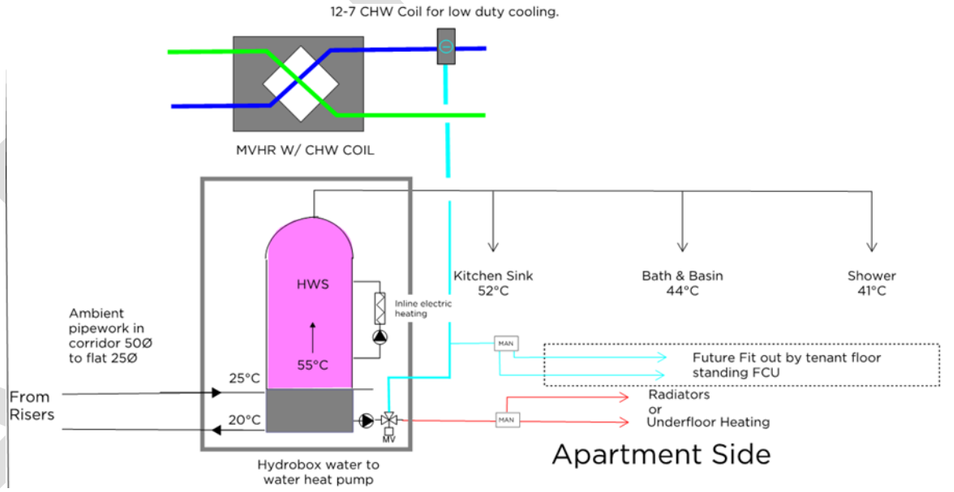


Hydrobox Unit (HB) with & without casing

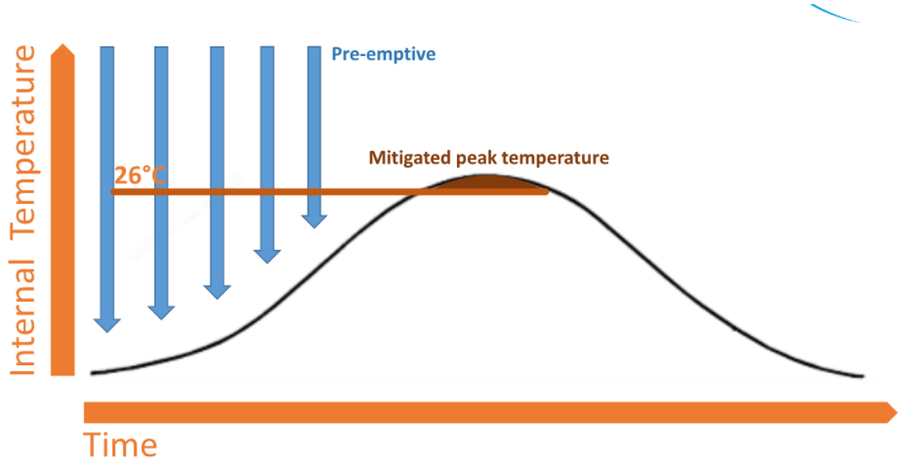
4.10.2 Apartment- Peak Lopping Cooling

All blocks are to be provided with a peak lopping cooling coil connected to the HB which will temper the fresh air supply delivered via the Mechanical Ventilation Heat Recovery unit (MVHR) into all the bedrooms and living spaces. This system will not be able to provide full comfort cooling to a given set point but will be active during the peak summer months in order to meet the requirements of CIBSE TM59. See below graph for example of the standard operation.

In summary, the system works by coming on and staying on at the low part F duty of the MVHR in order to mitigate any peaks above 26 °C. The hydrobox will produce 7/12 °C CHW F&R which will be connected to a small chilled coil (see figure below) located in the MVHR supply ductwork complete with a condensate drain.



Typical schematic for Hydrobox connection to MVHR peak lopping cooling coil

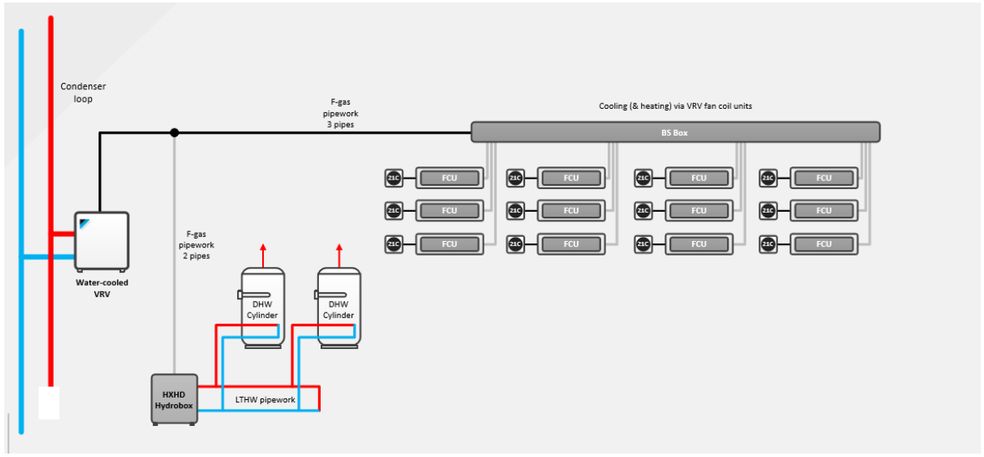


Graph to illustrate the principle of peak lopping cooling

4.10.3 Retail Units Heating & Cooling

Heating and cooling system solutions will not be provided to the retail spaces as these areas will be subject to the incoming tenants requirements and design however an interface can be made available for future tenant connection to the buildings ambient loop system. Either; a water-cooled VRF/VRV or four-pipe water source heat pump could be installed to provide heating & cooling for each unit. They can deliver this heating and cooling to the retail areas through the use of high-level ducted 4-Pipe or VRF FCU's or indoor cassettes.

The ambient loop system enables all spaces to connect to the loop where heating and cooling can occur simultaneously across the system with energy being recovered from one heat pump to another. This approach also promotes good energy efficiency across the system.



Potential retail unit solution for heating and cooling provision using the builidng ambient loop system
Outdoor Unit Indoor Unit

4.10.4 Pre Fabricated Utility Cupboards

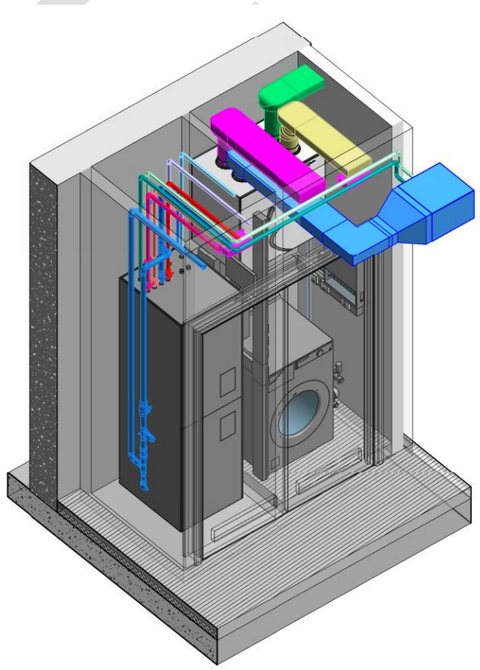
Each apartment will be provided with a pre-fabricated utility plant cupboard which, where possible and dependent on apartment requirements, will be a standard size of 1800 wide x 1000 deep with double door full front access.

Prefabricated utility cupboards have the following advantages:

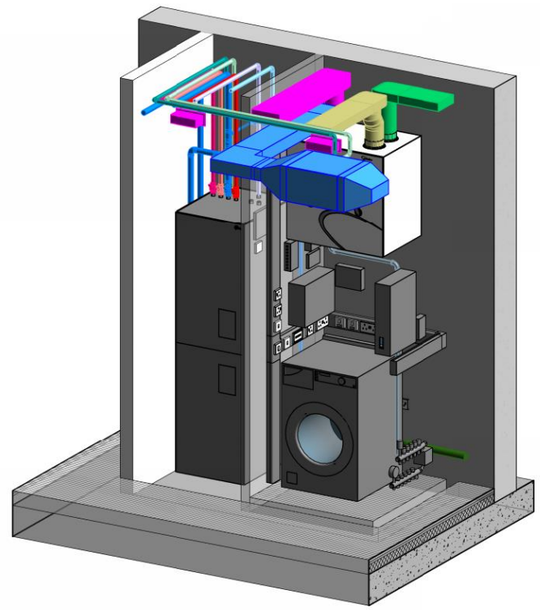
- Reduces on-site trades & labour
- Improved installation programme
- Reduced site waste and greater opportunity for recycling
- Improved & more consistent quality control
- Off-site testing and inspection
- Allows just in time delivery and better protection until required on site.

The pre-fabricated utility cupboards will contain the following:

- MVHR heat recovery fan unit (c/w peak lopping cooling unit outside of cupboard)
- Inlet and exhaust filtration
- NOx filters (as required by the Air Quality Report)
- Hydrobox for heating and hot water
- Underfloor heating manifolds
- Underfloor heating control panel
- Electrical consumer unit
- 7-day multi-zone programmer
- Trace heating thermostat & controller
- Bulkhead light & valve chart
- Intruder alarm un-switched spur and other security interfaces (to be advised)
- Extract Valve
- Pre-payment meter controller if required
- HVAC apartment controls
- Cupboard also has space allowance for a standard washer/dryer installation.



Typical M&E Utility Cupboard - Isometric Type 1
SCALE



1 Typical M&E Utility Cupboard - Isometric Type 1

4.10.5 Hydrobox Billing & Metering options

Typically end-user bills for an apartment connected to a district heat network consist of 2 elements:

1. Fixed standing charge
2. The energy supplied to the apartment from the central plant.

With the Hydrobox there is an additional element:

3. The electrical energy consumed by the in-apartment heat pump paid for as part of the apartments standard utility bill.

There are several options regarding how the second point can be defined:

Option 1
A fixed standing charge to encompass the costs associated (points 1 & 2 as above) with providing heating, hot water & cooling from the central plant.

Option 2 (preferred)
Additional electricity metering is installed to measure the energy consumption of the in-apartment heat pump. The electrical energy is recorded by the energy supply company and used to proportionally bill the apartment owner for the thermal energy consumed from the central plant.

Option 3
Heat meters are installed to meter the thermal energy supplied to the in-apartment heat pump from the central plant. The energy is recorded by the energy supply company and customers are billed based upon the energy consumed.

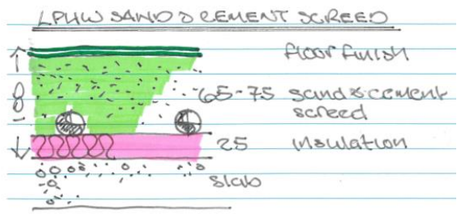
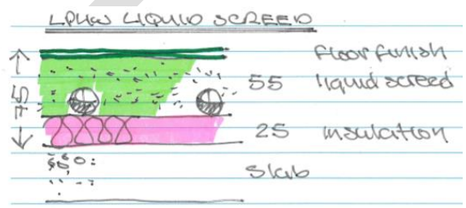
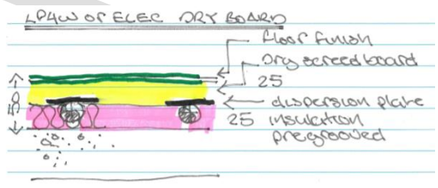
4.10.6 Underfloor Heating

All dwellings will have LPHW underfloor heating systems. Although floor make up may vary depending on the type of floor proposed, a typical overall floor make-up of 105mm would be anticipated.

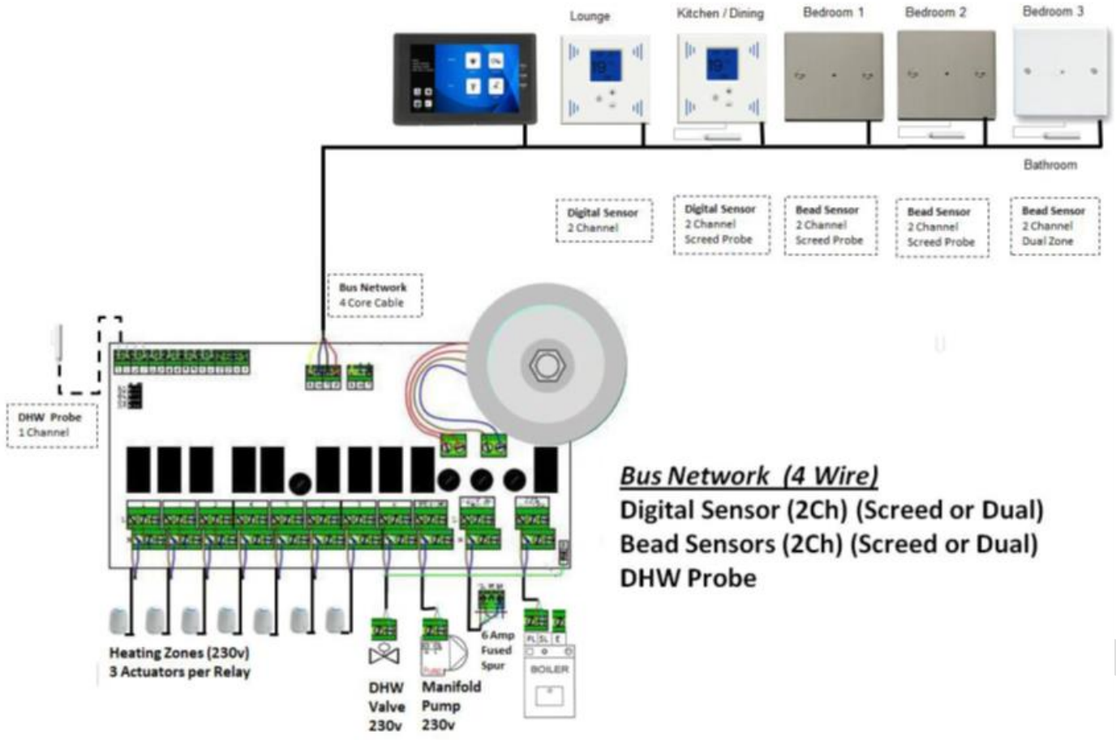
LPHW at 40/30^{O}C will be supplied to the floor via 16mm dia joint less plastic pipe from manifolds in the utility cupboard or remote locations as indicated on the drawings.

Typical underfloor heating manifold installation

LPHW underfloor distribution pipework running through common areas will be insulated.

Floor Make-Up	Output	Response Time	Curing Time	Costs
	85 – 100W/m2	2-3 hours	Std screeds approx 4-6 weeks unless additives used then reduced to 48-72hrs before trades can access	£75/m2 installed c/w floor make-up
	85 – 100W/m2	1-2 hours	Std screeds approx 4-6 weeks unless additives used then reduced to 48-72hrs before trades can access	£70/m2 installed c/w floor make-up
 This is the prefered option due to; • Response time • No curing time • Less site deliveries • Less weight.	85 – 90W/m2	0.5-1 hours	No curing time	£95/m2 installed c/w floor make-up

Note: Insulation thickness to be increased to achieve 105mm total floor make-up.



Touch screen technology will be provided enabling management of temperature, scheduling, boost, system prioritization and weather compensation.

Each room will be provided with an adjustable room sensor with a digital display screen.

Operation of the system will be via a central control unit that will be located in the utility cupboard and have a simple intuitive menu system enabling operation of the underfloor system to be easily configured.

The underfloor total integrated control system (TICS) will have inbuilt exercise programs to run pumps and drive actuators during periods of extended inactivity it will also utilize proportional integration control to ensure rapid and stable control of room temperature eliminating over or undershoot.

4.10.7 Minimising Corridor Overheating

Overheating of internal landlords corridors serving the apartments is a common problem and below is a list of measures that shall be incorporated to alleviate heat build up within.

- LPAW secondary distribution pipework from the riser to the apartments will have minimal heat output due to the ambient loop system operating temperatures
- Corridor LED lighting on PIRs will be used to minimize any unwanted heat gain to the corridor from lights
- All pipework risers will be naturally ventilated top & bottom
- Use of night-time ambient air free cooling via environmental Colt Shaft System and/or corridor automatic openable vents (AOV's).

The corridor smoke ventilation system shall be utilised to provide environmental mechanical ventilation in conjunction with thermostatically controlled AOVs where installed. Operating at the dictates of corridor space temperature sensors located in the internal corridors mechanical supply and extract ventilation and/or AOVs will be initiated to limit temperature build up and offset heat gain within the space.

4.10.8 Apartment Environmental Control

The apartments will have independent room temperature control, between the living room and the bedrooms through the use of individual thermostats and underfloor heating, peak lopping cooling & CHW FCUs.

The dwelling living/day rooms & bedrooms/night rooms will be designed to be capable of having independent temperature set-back control & time clock controlled. For example, during the day the bedrooms can be controlled to a lower set-back temperature, if desired, than the living spaces used during the day.

Living and Bedrooms- apartments – under-floor heating with local wall-mounted control with digital temperature display on a room by room basis

The Apartments & Townhouses will be provided with 105 mm (including floor finishes) raised floor to accommodate underfloor heating, services distribution and shower drainage trap connections.

Electric towel rails will be provided with thermostatic control together with time clock controls for the bathrooms.

4.10.9 Apartment Ventilation

Each apartment and townhouse, therefore, will be served by a whole-house mechanical ventilation unit with heat recovery (MVHR) with ventilation rates in accordance with Part F 2019. Mechanical Extract Ventilation (MEV) is not an option as this system has no heat recovery and therefore does not achieve the required carbon emissions.

Fresh air will be ducted to a low resistance detail in the local façade; with exhaust air passing back through a low resistance louvre hidden, but unobstructed, within the façade panelling detailing or via air bricks.

The MVHRs will utilise the waste heat from air expelled from the bathrooms, WCs & kitchen to partly temper the incoming air which will be filtered and supplied to the lounge and bedroom spaces. Additional tempering is also provided through the use of a peak lopping coil, which has been previously discussed.

The MVHR will operate at 2 speeds, the normal speed will provide background ventilation. When a wet room is occupied which is sensed by light switch activation, PIR detection or a manual pushbutton in the kitchen or bathrooms the MVHR will go to high speed boost for a predetermined time.

A run-on timer switch will be located in the kitchen to also allow MVHR to boost selection.

The MVHR will be part of the pre-fabricated utility cupboard and have in-duct attenuators to achieve the specified noise criteria.

220 x 90 and 204 x 60 flat ducts will provide for the distribution ductwork with inlet and exhaust ductwork connecting to low resistance plastic air bricks, or similar. The fresh air & exhaust ducts will be insulated with 20mm Class O Armaflex type insulation. Generally, 220 x 90 flat ducts with 20mm insulation will be used for the fresh air and exhaust.

Fire-rated collars will be provided to ducts and pipes which pass through fire compartments to maintain the required separation, as determined within the fire strategy.

Plastic flat duct installed tight to soffit

Typical 100dia supply & extract grilles/valves

Low air resistance air bricks & Fire Collars

In addition to the whole house ventilation unit, the kitchen cooker will be provided with a manually controlled mechanical hood recirculation extract system. This will consist of a domestic extraction hood to suit the cooking range specified by the architect.

The hood will be complete with integral grease filters, fan and controls and will be the re-circulating type.

4.10.10 Landlord's Environmental Control

Landlord areas, where required, will be served by direct electric panel heaters and shall be naturally ventilated.

4.10.11 Reception area's

The residential receptions and lift lobby areas will be heated by wall mounted electric radiators.

Natural ventilation will be provided via the main entrance doors and windows.

4.10.12 Landlord's Corridors serving apartments

The buildings internal corridors will not be heated. To mitigate against overheating the smoke extract system will be operated during periods of high temperature to purge & ventilate the corridors, this will involve running the smoke extract & supply fans at a low speed. Environmental motorised volume control dampers & grilles will be provided to each smoke shaft.

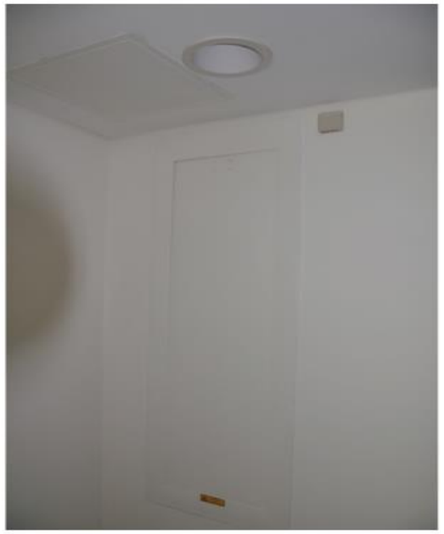
Corridor smoke ventilation will be provided by a extract only ventilation system with run & standby reversible two-speed smoke rated fans located at roof level, with make up air via the stairwell.

The corridor smoke shafts will be designed to BS9999 and associated ductwork shall be installed to DW144 to achieve airtightness.

All other blocks are to be smoke vented via AOVs.

All basement areas will be provided with duty/standby smoke extract fans, which shall be ducted via fire rated ductwork to the basement louvres.

CFD modelling will be required to demonstrate compliance for the Local Authority Building Control & the Fire Officer.



Typical corridor smoke vent grilles

The corridor smoke ventilation systems will be a contractor's design portion (CDP) will involve computational fluid dynamics (CFD) to verify the design. This will be undertaken by the specialist fire contractor during the later stages of design.

5 Electrical Services

5.1 Incoming Supplies

The electrical supply to 13 Blackburn Road will be served via the new 1.5MVA substation located at ground floor.

The present overall power requirement for the entire development has been estimated to be as follows:-

Total Maximum Demand 1500 kVA

All HV services shall be brought to site by a single contractor, including for all the civils and connection works. It is envisaged that this contract will also fit out the substations in the building and provide utility metered LV supplies to the main LV swithroom for the commercial block, the LV switchroom of the residential blocks and dedicated supplies to each apartment.

A single incoming utility meter supply for the commercial block will be provided. This results in a single landlord supply to serve the entire commercial block and as a result each commercial tenant will be charged via a service charge by the landlord.

The two residential blocks will be served by a common utility meter within the dedicated residential LV switchroom. This will serve the landlord areas for both residential blocks. The apartments within each residential block will be served by the IDN0 up to the utility meter point for each apartment.

A 550KVA standby generator shall be provided at ground mezzinine level to supply life safety power only for the site.

5.1.1 Electrical

The on-floor systems will be designed to support the following loadings:

- Landlord circulation 20 W/m²
- Retail 250 W/m²
- Office Tenant lighting 8 W/m²
- Office Tenant small power 25 W/m²
- Residential units 3.325 kW per aparment.

5.1.2 Telecommunications

Dedicated telecommunication rooms will be provided at basement level to facilitate incoming IT services for the commercial block and the residential blocks sharing a common telecommunications room. We envisage that an IT consultant will be brought on board at the next stage to develop an IT strategy. Currently we have allowed for the IT infrastructure within our stage 2 design.

As a minimum, we envisage that 4No 150Ømm incoming sleeves shall be provided to each telecommunication room.

The comms rooms shall house a fibre distribution box to serve the ICT requirements. All comms/ ELV shall link back to the landlord server racks at basement level within the landlord comms room.

The commercial block will house a dedicated comms risers, containing 600mm basket for tenent comms/ ELV distribution and a fibre splicer at each level for the tenants. The tenants shall fit-out their own comms requirements.

A dedicated landlord comms riser in both residential blocks shall contain a 300mm basket for landlord comms/ ELV distribution.

The incoming Openreach copper multi-pair cabling shall enter the development via underground ducts at basement level and terminate into an Openreach approved termination joint within the comms room. From the termination joint the multi-pair copper shall terminate into a main copper network distribution box frame.

All cables will be run within risers and false ceilings on cable basket sized to carry the required number of cables with spare capacity for future.

All telecoms cabling will be segregated from the LV small power cabling.

Each comms rack is to receive an Openreach Fibre Optic link from the Openreach Fibre Optic Main Distribution Frame terminating into an Openreach Network Termination Enclosure, to facilitate broadband and voice services for the landlord's areas.

Each comms rack shall house, but not limited to the following:

- Optical Fibre Patch Panel
- POE Network Switches
- CCTV Network Video Recorder (NVR).

5.1.3 Cable Television System Infrastructure

Client brief to confirm entertainment requirement for the development. The following strategy is anticipated.

The utilities assessment report has identifed existing Virgin Media infrastructure around the site boundary.

Final confirmation is required to verify the entertainemnt provider for the development but it is envisaged that a CATV system duct infrastructure will be provided with Virgin Media approved cable jointing chambers and feeder pillars in locations required.

The site duct infrastructure will interface with the local Virgin Media infrastructure.

Dedicated Virgin Media ducts will be provided to the main intake comms room for residential services. It would be proposed to distribute Virgin Media Services to residential and commercial premises.

Virgin Media fibre will be provided to each dwelling.

Quad TV outlets with facilities for TV/Audio/Sat1/Sat 2 connected to the IRS TV system infrastructure will be provided in each living room and each bedroom.

IRS Television System

Client brief to confirm television requirement for the development. The following strategy is envisaged.

Residential buildings will be equipped with a 9-wire IRST communal integrated reception system and will be capable of receiving two satellite TV services (Astra and Hotbird), terrestrial digital, FM radio and DAB radio.

TV outlets comprising TV/Audio/Sat 1 and Sat 2 outlets will be provided in each apartment living room and each apartment bedroom.

There will be no provision for viewing/recording of Astra and Hotbird services simultaneously.

5.2 Main LV Distribution (Commercial Block)

5.2.1 Commercial Building

The commercial block LV switch room at basement level will house the main LV switchgear. The LV switchboards will comply with BS EN 60439 Form 4 Type 6.

A 24 way TPN split metered small power & lighting board has been allowed for each tenant for future tenant fit-out. The tenant distribution boards to satisfy the P.F and harmonic requirements of the energy provider.

5.3 General LV Power (Commercial Block)

5.3.1 Reception area

Within this stage of design, we have allowed for a distribution board in the reception areas for general lighting and power requirements and a dedicated board for security services.

The reception will also house the main fire alarm panel and disable refuge alarm panel.

5.3.2 Landlord Circulation Areas

We envisage that general purpose cleaner socket outlets will be provided by means of dedicated wall mounted 13A twin switched socket outlet complete with RCD protection to comply with BS7671 latest edition.

5.3.3 Toilets

We envisage that 13A fused connection units shall be provided to toilets and showers from the local landlord distribution board. An allowance should be made for, but not limited to water heaters, hand dryers, PIR solenoid shut-off valves etc.

5.3.4 Storage and Plant Room Areas

We envisage that 13A twin switched socket outlets will be provided at wall positions for maintenance and general-purpose use. A full Small Power design will be developed in the next stage.

5.3.5 Office Floor

Office Area

There shall be 1 No 24 way TPN split metered small power & lighting distribution board to serve each tenant demise.

It is envisaged that working spaces i.e desks, meeting rooms, booths etc shall be fed by underfloor power tracks where possible. The fly leads from the floor track to be 5m to allow for the option of sit/ stand desks. The electrical contractor to make an underfloor track allowance based on a 1:8 requirement.
General underfloor power distribution shall be via a combination of floor grommets and floor boxes.

The XLPE/SWA/LSF cables feeding the underfloor tracks shall distribute on cable tray within the floor void.

General purpose cleaner socket outlets will be provided by means of dedicated 13A twin switched socket outlet complete with RCD protection to comply with BS7671 latest edition.

High level power requirements shall be allowed for fan coil units, fed by dedicated 13A fused connection unit.

Power and lighting within office areas shall be fit out by future tenant.

5.4 Lighting and Control (Commercial Block)

We envisage the common landlord's corridors will be provided with LED lighting and controlled via PIRs.

Stairways will be illuminated utilising wall mounted low energy luminaires, selected to be compliment with the architectural finishes. These will be controlled by PIR presence detectors.

We envisgae office areas will be controlled by PIR's to operate small local groups of luminaires. Perimeter PIR's will incorporate day light sensors arranged in a way to reduce luminaire output when ambient lighting conditions are suitable.

Back of house circulation and storage areas will utilise linear surface mounted LED luminaires. Plantrooms will utilise sealed fittings, positioned to coordinate with plant and services. All back of house areas will utilise PIR presence detection.

Lighting will be provided at roof top level for the safe maintenance of plant and circulation. These will be via weatherproof linear LED luminaires.

The lighting design is to be carried out at the next stage of design.

5.4.1 Reception Lighting

We envisage that the office reception, entrances and access routes will have a lighting design that enhances the building's architecture and finishes in line with the architects aspirations. The lighting in this area shall be provided with pre-programmed time clock control for a general day to day use.

5.5 IT/Data (Commercial Block)

We envisage that an IT consultant will be brought on board at the next stage to develop an IT strategy. Currently, we have allowed for the IT infrastructure within our stage 2 design.

Each tenent demise will house its own dedicated comms riser containing a 600mm basket for all comms/ ELV distribution. Backbone fibre shall be terminated within the fibre splicer unit in the tenant comms riser for future tenant fit-out.

Underfloor ICT services distribution within the tenant demise via jezzmat.

5.6 Metering (Commercial Block)

It is envisaged that the metering strategy for the office tenants will be a service charge billed by the landlord.

5.7 Disabled Refuge, Accessible Toilet Alarm and Induction Loop (Commercial Block)

5.7.1 Disabled Persons Alarms

The disabled refuge call system shall allow full duplex conversations to take place between the calling refuge and the office reception.

The call station shall comprise of a call push (momentary operation, mushroom head type), reassurance LED, speaker and microphone. The plate shall be engraved <refuge alarm> & <call>.
The operation of the station shall be as a hands free telephone with the caller pushing the call button to initiate the call.

The control panel within the reception shall consist of an intercom master station microphone and speaker re-assurance LCD display.

A disabled person's alarm system will be provided to each disabled WC and shower room.

5.8 Public Address / Voice Alarm System

Please refer to Fire Strategy Report.

5.8.1 Induction Loop

In order to comply with Part M Building Regulations: access to and use of buildings, an induction loop system for the hard of hearing is envisaged to the main reception desk area. Further details to be develop in the next stage of the project.

5.9 Main LV Distribution (Residential Blocks)

5.9.1 Residential

A dedicated utility metered supply will serve the landlords LV switchboard located within the basement. This switchboard will serve all landlord plant, motor control panels, lifts and all landlords power and lighting requirements across both residential blocks.

The MSDB`s serving each apartment utility meters shall be located on the ground floor within accessible electrical riser cupboards. The apartment utility meters are proposed to be within the electrical riser cupboards on a floor by floor basis. All cables serving the apartment consumer units from the apartment utility meter will be XLPE/SWA/LSZH and routed within proprietary electrical riser cupboards and corridor ceiling voids.

Dedicated utility metered supplies to each of the two retail units will serve a cut-out within the retail demise for future tenant fit-out.

All protective devices will be fuses, moulded case circuit breakers or air circuit breakers i.e air circuit breakers for the landlords incoming supply, fuses for utility MSDB`s and moulded case circuit breakers for landlord outgoing ways.

Circuit breakers exceeding 200 amps will be supplied with fully adjustable protective settings as necessary. The covers of protective devices serving life safety equipment will be painted red and labelled as to their use. They will further have devices to lock off in on position.

All switchboards will be equipped with the necessary protective devices and incorporate 25% spare capacity.

Surge protection will be provided at the landlords switchhboard. The main landlords LV switchboard will be constructed to Form 4, Type 6, IP31, 50kA standard.

The transient overvoltage protection will be provided for protection of all phase conductors. The systems will be maintenance free and come complete with local visual indication of status and volt free contacts for remote monitoring facilities.

Sub-main supplies will include but not be limited to the following:

- Switchboards
- Distribution Boards
- Lift Installation
- Fire Alarm Panel Supplies
- Life Safety Panel
- Mechanical Services Motor Control Centres
- Primary supples to sprinkler pumps.

Sub-main cabling to life safety systems such as the fire alarm system will be wired using fire rated cables in accordance with BS 8519. These will be installed using the same method as the sub-main cabling above with the exception of cleats/clips which will be fire rated.

A metallic consumer unit in accordance with BSEN 60439-3 will be provided to each dwelling equipped with BS 60898 miniature circuit breakers and BSEN 61009 residual current breakers and BSEN 62606 RC Fault Detection Devices. A wireless transmitter unit will be provided adjacent to the consumer unit for an energy display device.

Apartments will be wired utilising 6242B LSZH cable.

5.9.2 General LV power

Small power systems will be provided for all items of fixed equipment and general purpose sockets in all areas of the building, utilising 13A switched socket outlets for movable equipment and appropriately sized fused connection units and isolators for fixed equipment.

Cleaners socket outlets will be provided in all landlord common areas, including but not limited to lift lobbies, corridors, main entrance, staircases, plant rooms and other common areas.

To avoid the need for extension leads to be used with cleaning apparatus, consideration will be given to the spacing and location of general socket outlets.

General purpose cleaner socket outlets will be provided by means of wall mounted twin 13A switched socket outlet with RCBO protection to comply with BS7671 latest edition.

Socket outlets will be provided in all plant rooms and will be dual voltage with the appropriate isolation transformer. 230 volts

5.9.3 Metering

Sub-metering shall be provided to meet Part L requirements. Split metering will be provided to the local distribution board serving all tenant areas to monitor lighting and small power load.

Each retail tenant demise will have its own dedicated utility meter within the tenants demise. This shall ensure that the tenant maintains utility provider flexibility.

All metering information will be collated within the BEMS system and made available for analysis and monitoring.

An EcoStructure System shall be provided for the purpose of energy management and power system monitoring. The system shall be integrated with the EcoStructure BMS to provide a simple, single pane user interface to the operations of the building system.

5.9.4 Lighting

We envisage that the residential reception entrances and access routes will have a lighting design that enhances the building's architecture and finishes in line with the architects aspirations.

Artificial illumination within landlord's areas, will utilise low energy compact fluorescent & LED sources.

Stairways will be illuminated utilising wall mounted low energy luminaires, selected to be compliment with the architectural finishes. These will be controlled by PIR presence detectors.

Back of house circulation and storage areas will utilise linear surface mounted LED luminaires. Plantrooms will utilise sealed fittings, positioned to coordinate with plant and services. All back of house areas will utilise PIR presence detection or maunal switching.

Lighting will be provided at roof top level for the safe maintenance of plant and circulation. These will be via weatherproof linear LED luminaires.

Luminaires will be co-ordinated with other services in all areas

Residential dwellings will be provided with a lighting design that enhances the buildings finishes to create a positive visual interest. The system will not target bland average illumination levels but will create visual interest and diversity of image.

Artificial illumination provision will be via the use of high quality LED luminaries to compliment the architectural standards of the apartments. In the absence of a brief, various areas will be assumed to be illuminated as follows;

Lighting to apartments will predominantly be from recessed LED downlights and switched 5 amp lighting socket circuit for table lamps. The lighting will be controlled by wall mounted rocker switches and intelligent lighting control system to provide dimming and scene setting.

Additionally, a dedicated recessed switched fused connection unit will be installed within the wardrobe for a PIR controlled LED strip light installed by the joinery contractor.

The bathroom, any cloakroom and corridor will be illuminated by LED downlights of suitable IP rating and complete with junction box for bathroom mirror lighting.

A utility cupboard will be provided with a surface mounted linear LED complete within integral PIR.

The kitchen will have LED strip lighting mounted to the underside of the high-level cupboards to provide task lighting to the worktop.

The general kitchen lighting installation will be illuminated by LED downlighters.

5.9.5 Lighting Control

Lighting scheme to all areas will be designed to suit the area they are intended to serve and to suit the architectural ceiling plan/ aspirations.

We envisage that the building lighting control system to be based on an Open Protocol fully addressable system utilising DALI protocol (Digital Addressable Lighting Interface)

5.9.6 Lobby Areas

We envisage that the lighting in this area shall be provided PIR detection .

5.9.7 Landlord Circulation Areas

The luminaires are controlled by a combination of PIR detection and time schedule controller which will be developed in the next stage of the project.

5.9.8 Storage and Plantroom

Lighting in the plant, risers, stores etc shall be control via PIR's and a manual override switch. (Absence Detection.)

5.10 Standby Generation

A 550KVA packaged diesel generator will be provided to back up life safety supplies. The Generator will be located at the ground mezzainie level. A main Form 4 Type 6 Life Safety panel will be provided at basement level.

The fuel storage will only be required for 3 hours of life safety supply. The standard belly tank within the generator shall be used and re-filled via manual refill (Jerry cans) by the maintenance team.

The below will be supported by the generator:

- Fire-fighting lifts
- Smoke extract system for landlord corridor
- Smoke extract system for basement.
- Sprinkler system
- AOV.

5.11 Automatic Transfer Switches (ATS)

Automatic transfer switches will be provided for the life safety systems at the load end. Exact location of ATS's will be confirmed at the next stage of design. All primary and life safety supply cables serving the ATS to be a minimum 120min FP rated.

5.12 Emergency Lighting

Emergency luminaires will be provided as required by BS EN 1838, BS EN 50172 and to the Building Control requirements. The emergency lighting system will be designed to operate for a period of 3 hours and will be standalone emergency lights.

The lighting control system shall also be employed to test and monitor the emergency lighting installations throughout the site and generate an automated test report via DALI through the graphical head end.

5.13 External Lighting

External lighting to be developed in the next stage of design.

5.14 Lightning Protection

A lightning protection risk assessment will be carried out to confirm the level of protection the buildings require.

We envisage an appointed specialist to develop the lightning protection system at the next stage.

5.15 Earthing and Bonding

The complete earthing system shall be installed in accordance with the IEE Regulations and British Standard BS7430. All ductwork and pipework shall be connected to earth bar with a green and yellow cable.

Where armoured cables are utilised, either an integral core of the cable or a separate conductor shall be provided as a circuit protective conductor which shall provide earthing supplementary to earthing via the metallic cable armouring.

Earth bars to have a minimum of 25% spare outgoing ways.

A dedicated clean earth system shall be installed within the risers.

5.16 Fire Detection and Alarm System

The classification of the fire alarm system to be in line with the Fire Strategy.

- The standard apartments shall be designed with a minimum LD2 fire alarm system and detection
- system designed in accordance with BS5839 Part 6
- In the case of the open plan apartments an LD1 system is required designed in accordance with BS5839 Part 6
- An L5 smoke detection system should be provided in the common corridors on each floor. The purpose of the detection system is to activate the smoke ventilation system. No sounders or manualcall points will be provided in the common areas
- The fire alarm and smoke detection within the Block C should be designed in accordance with BS5839 Part 1 to an L2 standard.

The fire alarm system shall consist of smoke detectors, beacons, heat detectors, call points and fire alarm interfaces.

The Fire alarm interfaces as a minimum shall be provided for the following systems:

- Access Control
- AV
- Fire-fighting lifts
- Smoke extract system for landlord corridor
- Smoke extract system for basement
- AOV.

5.17 Automatic Opening Vent (AOV)

In each fire-fighting core we envisage that there will be a smoke vent shaft in the corridor with a vent at each floor controlled by an AOV control panel and operated upon activation of the corridor lobby smoke detector.

The final operation and design of the AOV smoke extract system will be carried out in the next stage of the project with agreement/ advice from the fire consultant.

5.18 Security

We envisage that a security consultant will be brought on board at the next stage to develop the security strategy. We anticipate the security strategy as follows.

5.18.1 Closed Circuit Television (CCTV) System

A complete security video surveillance system shall be provided for the landlord areas which shall be in compliance with secured by design requirements. The system will allow the operator to effectively monitor selected areas and to record video images of the quality and format required to be used in the successful prosecution of wrongdoers in a court of law.

The final design and arrangement of the CCTV system are to be advised and developed further by the security specialist.

As part of the electrical installation the associated small power supplies, data outlets, cabling containment systems & CCTV network cabling will be provided & co-ordinated to suit the security specialist's requirements.

CCTV cameras shall be of the POE type installed in the locations as indicated on the drawings.

The system will comprise of cameras to the view the following areas:

- External Entrances & Final Exits
- Internal Entrances
- Reception
- Bin Stores
- Cycle Stores
- Service & Loading Bays
- Lifts
- Lift Lobbies.

CCTV for the commercial offices will be by future tenant fit-out.

The system will deliver both live and recorded video images over the local area network data cabling.

NVR's will be rack mounted and located within the landlord comms room.

The NVR's will be linked to the landlords local area network to facilitate system viewing, administration etc.

5.18.2 Access Control Systems

The access control systems shall be provided to strategic landlords areas including lifts to allow the control of access from public spaces into the private areas and to protect/monitor emergency exits and any other identified points of access both internally and externally.

The final design and arrangement of the access control system are to be advised and developed further by the specialist security contractor.

The access control system for the landlord areas shall be in accordance with secured by design recommendations and shall comply with the EMC Directive and all associated EMC regulations.

A number of areas shall have access control doors to enable regulatory separation of departments.

- Main Entrances (Integral proximity reader within door entry outstations)
- Bike Stores
- Refuse/Bin Stores
- Lifts (Proximity Reader Within Lift Car Only)
- Stair Exits
- Tenant areas.

It is assumed plant rooms will not be access controlled and will be fitted with a mechanical cylinder lock.

Door contacts shall also be provided to each accessed controlled door and fire-exit.

The following will be provided at each access-controlled door:

- Proximity reader tor access fob/card
- Request to exit button
- Green emergency break glass unit
- Door contacts to monitor door status (door left ajar or door forced open)
- Electromagnetic locks.

The system shall be interfaced with the fire alarm system, such that in the event of a fire the electromagnetic locks on the Landlord and Common areas access controlled doors 'Fail Safe' and the doors are automatically released.

6 Public Health Services

6.1 Commercial Office Base Build and Ground Floor Retail

6.1.1 Foul Water Drainage

The commercial office space shall be provided with a system of soil and waste pipework to receive discharges from all sanitary fittings.

The system shall be a secondary ventilated system complete with vented branch connections to each fitting.

A mechanically jointed cast iron pipework system shall be used for the main vertical soil and ventilating stacks.

All branch soil, waste and ventilating pipework shall be installed using uPVC or HDPE pipework.

The system shall vent to the atmosphere at roof level and connect into the authorities sewer network below ground floor level via high level basement sewer outfalls.

Basement drainage shall be collected and pumped to high level (below ground drainage services designed by others) via buried sump pump packages.

One combined tenant and landlord riser will be provided within the central core to serve tenant 1 on levels 0 - 08. The risers will have capped connections for fit-out by others as:

- Soil and Waste – 100mmø
- Vent (ASP) – 50mmø

One combined tenant and landlord riser will be provided within the office space to serve tenant 2 on levels 0 - 03. The risers will have capped connections for fit-out by others as:

- Soil and Waste – 100mmø
- Vent (ASP) – 50mmø

Condensate stacks will be provided within risers as required. These will terminate over floor gullies located within the plant rooms and refuse stores at the ground level / basement level.

Two further drainage risers will be provided to serve toilet rooms located within the core.

The foul water drainage system will be designed in accordance with the criteria set down within the relevant Code of Practise and the Building Regulations.

The main sanitation services ventilation pipes within each block shall terminate to atmosphere at roof level.

The retail units shall be provided with capped drain points connected to the below ground drainage system and vent connections to roof level for future use by the incoming tenant.

Item	Number of fittings	Total discharge units (DU) and provisional foul water sewer discharge rate (l/s)
Anticipated foul discharge from landlord office fittings	4 x WC, 4 x WHB. 1 x SK, 1 x DW, 1 x CL sk per floor. 8 floors in total Assume 6 basement showers	98 DUs or 3.4 l/s (1 K factor)

Item	Number of fittings	Provisional foul water sewer discharge rate (l/s)
Anticipated foul discharge from office and retail space	2 office tenants 2 retail tenants	1 l/s per office tenant 0.75 l/s per retail tenant 3.5 l/s total

6.1.2 Rainwater Drainage

The main roof and lower terrace level will be provided with rainwater outlets suitable for the roof construction and area served (m^2).

From the rainwater outlets, internal pipework will be routed to below ground level for connection to the site infrastructure.

The London Plan requires developments to provide, to some degree an element on stormwater attenuation, this is typically via a buried storage tank or a blue roof system. If a buried storage tank it utilised this should be developed by the civil engineer if a blue roof system is utilised this should be developed by the architect.

The below-ground drainage system will be specified & designed by the civil/structural engineer.

The discharge flow rate will be regulated to the requirements of Thames Water Utilities. (to be determined by the civil engineer)

The rainwater drainage system will be designed in accordance with the criteria set down within the relevant Code of Practise and the Building Regulations.

Item	Total of all office roof areas (m2)	Total rainwater sewer discharge rate (l/s)
Anticipated roof rainwater discharge	340	Approx. 23 l/s (based on no attenuation)

6.1.3 Sprinklers

No commercial sprinklers will be provided.

6.1.4 Dry Risers

The building shall be provided with a dry riser system in line with BS 9990.

The dry riser is currently proposed to be located within the office stair core with the dry riser inlet located at ground floor level.

6.1.5 Domestic Cold Water

The system shall comprise a new bulk metered mains cold water supply from the Local Water Authority's infrastructure network and extended through the building via a combined commercial /residential cold-water storage tank and boosted set arrangement. Pipework shall distribute cold water throughout the building via risers to serve all floors with local meters as required.

We understand that the commercial tenants metering will be centrally managed with the client taking responsibility for payment of the water and sewerage charges to a local water authority. A Thames Water revenue meter shall be provided on the boosted cold water supply to the commercial demise, Tenants shall be provided with a check meter from the Landlords to enable accurate billing.

Combined landlord and dedicated tenant risers shall be provided, Pipework shall be arranged to avoid the creation of dead legs.

The inclusion of an automatic flushing system shall be considered to serve the basement showers, to ensure pipework serving unfavourable showers do not stagnate.

The system shall be designed to ensure compliance with the associated BREEAM assessment, the following shall be incorporated:

- Flow regulators shall be provided at outlets to reduce water consumption.

- A major leak detection system shall be in place capable of detecting a leak on the mains water supply.
- Shut off valves on toilet core water supplies

No allowance for rainwater harvesting or greywater recycling will be required to comply with the current BREEAM assessment or planning requirements.

Item	Number of occupants	Estimated cold water storage volume (litres)
Anticipated cold water storage	Approx. 340 persons	8500 litres for 12 hours (20l/person) – office only Tank fill rate over 2 hours

Item	Number of fittings	Estimated peak flow rate (IOP loading units)
Anticipated cold peak flow rate - landlord	4 x WC, 4 x WHB. 1 x SK, 1 x DW, 1 x CL sk per floor. 8 floors in total Assume 6 basement showers	288 loading units 2.72 l/s 54mm diameter

Item	Number of tenant areas	Estimated peak flow rate (IOP loading units)
Anticipated cold peak flow rate - tenants	TBC	0.5 l/s per individual tenant area 28mm diameter Total tenant flowrate on pumps – TBC

Item	Number of retail areas	Estimated peak flow rate
Anticipated incoming cold water – Ground retail units	2	0.75 l/s per individual tenant area 28mm diameter

6.1.6 Hot Water Services

Domestic hot water shall be supplied to the Landlord's basement showers via 2No water cylinders located within the adjacent basement plant, The primary source of LTHW shall be from the central roof mounted air source heat pump, the cylinders shall also be provided with an electric immersion for back up purposes.

Landlord toilet cores shall be provided with local electric water storage cylinders located in adjacent risers.

Pipework shall be complete with heat regulating temperature maintenance tape.

The hot water supply to all wash hand basins and showers will be limited to 43°C in accordance with the requirements of Approved Document Part M. This will be done through the installation of TMV2/3 blending valves and thermostatic showers.

Item	Number of Showers	Estimated hot water storage volume (litres)
Anticipated basement shower hot water storage	8 tbc by the architect	Circa - 1000 Litres

6.1.7 Fluid Category 5 (Non-Potable) Water Service

A Category 5 water storage tank and associated booster pumps will be provided at a basement level to serve to wash down facilities within the plant rooms and refuse areas. Pipework will also be extended to roof level for general window cleaning and to serve mechanical plant where necessary. External pipework will be trace heated

Item	Cat 5 storage	Estimated cat 5 flow rate
Anticipated cat 5	24 litres	0.6 l/s to serve up to three wash down points

6.2 Residential

6.2.1 Mains Water System Distribution

6.2.2 Apartment Blocks (A and B)

The system be fed from the new bulk metered mains cold water supply from the Local Water Authority's infrastructure network and extended through the building via the combined cold-water storage (office and residential) tank and booster set arrangement. Pipework shall distribute cold water throughout the building via risers to serve all floors with local meters as required.

6.2.3 5.2 Cold Water System Distribution

The tanks shall be insulated to maintain the temperature below 20°C for the prevention of Legionella.

The system pressure within each block shall be generated using a packaged variable speed potable cold water pump set. This shall include duty, assist and standby pumps for ease of maintenance and protection in the event of pump failure. The set shall be sized to provide enough pressure at each outlet; typically, 2.0 to 3.0 bar available head.

The cold-water systems shall be pressure controlled with the use of pressure reducing valves to ensure excessive pressures are not experienced throughout the building, in particular to the lower floors.

To maintain a wholesome water supply, a UV disinfection units shall be incorporated downstream of the domestic water booster set.

The site is within a hard water area and therefore water treatment shall be required to protect the entire domestic cold water system. This shall be achieved using an electro-magnetic physical water conditioner installed downstream of the domestic booster set

Washdown facilities within refuse areas, cycle storage areas and supplies to mechanical plant are identified as category 5 risks and shall be fed from a dedicated break tank and pump set to serve each draw-off point. See commercial section for details

Within the residential blocks each apartment will be provided with a utility water meter located within a dedicated riser cupboard located in the communal corridor on each floor.

All landlord supply connections shall have a utility water meter with secondary meters if required to monitor and record usage on the BMS.

Drain valves shall be provided at all system low points and isolation valves on all connections to appliances.

The whole of the new cold-water systems after the incoming mains shall be chlorinated by the Contractor who shall allow for all necessary injection points as may be required to facilitate such works.

Sanitary fittings including showers and taps shall be selected by the Architect with flow restrictors on the outlets in order to meet the building regulation 105 Litres per day usage.

Item	Number of occupants	Estimated cold water storage volume (litres)
Anticipated cold water storage	Block A – 24 apartments Block B – 30 apartments	Anticipated storage volume 4300 Litres

Item	Number of fittings	Estimated peak flow rate (IOP loading units)
Anticipated cold peak flow rate - landlord	Block A – 24 apartments Block B – 30 apartments	Assume 18 LUs per apartments Block A – 432 LU or 3.71 l/s @ 67mm diameter Block B – 540 LU or 4.33 l/s @ 67mm diameter

Item	Tank details	Estimated incoming peak flow rate
Anticipated incoming cold water	Tank comprised of commercial and residential volumes totalling 13,200 litres	Tank fill over 2 hours = 1.84 l/s Incoming main = 42mm diameter

6.2.4 Domestic Hot Water Systems

Refer to the mechanical sections for the primary heat source description.

Domestic hot water at 60 DEG C shall be distributed to draw off points via insulated pipework water shall be delivered to outlets within 30 seconds to comply with the water regulations trace heating may be required to facilitate this Subject to architectural layouts

Thermostatic mixing valves (TMV3) will be fitted on the supplies to all baths, wash basins and showers in order to limit the outlet temperatures to aid in eliminating the risk of scalding.

Drain valves shall be provided at all system low points and isolation valves on all appliances connections.

6.2.5 5.4 Soil and Waste Installation

Above ground gravity soil, waste and ventilating stacks shall be installed to serve all sanitary fittings within the apartment blocks.

These shall be secondary ventilated systems with the soil and vent stacks located within or adjacent to the bathrooms, kitchens and utility cupboards and aligned vertically through the apartment floor levels. Sanitary fittings on the lowest residential floors shall connect to stub stacks and all vent pipes shall terminate to atmosphere above roof level (with wire balloons or cowls).

All drainage discharges from plant rooms and mechanical equipment shall be connected to the foul water drainage system.

A mechanically jointed cast iron pipework system shall be used for the main vertical soil and ventilating stacks.

All branch soil, waste and ventilating pipework shall be installed using uPVC or HDPE pipework.

The above ground foul water drainage system shall be installed to meet the performance requirements stated in BS EN 12056 (Part 2), the Building Regulations and all other applicable technical manuals and guides. The system pipe sizes shall be based on the discharge unit method. The discharge units used are those identified as System III table 2 of BS EN 12056 (Part 2).

The system shall be installed using the minimum pipework, fittings and accessories necessary to carry away all discharges from the various sanitary appliances quickly, quietly and with freedom from nuisance or risk to health. It is essential that air from the foul drainage system is prevented from entering the building. All pipelines shall be identifiable in accordance with BS 1710.

All drainage pipework will be installed to convey discharges without cross flow, back fall, leakage or blockage and it is essential that the system is adequately tested, always cleaned and maintained throughout the construction process.

Condensate drains shall connect to the drainage system via Hepvo waterless traps. (subject to termination procedure)

Gradients of all foul drainage pipework shall be in excess of the minimum requirements stipulated in BS EN 12056, but shall typically be 18mm/m for soil pipes serving WC's and 22mm/m for all other waste pipes.

All drainage stacks in risers and apartment ceiling voids shall be provided with acoustic insulation to the Acoustic Consultant's specification.

In blocks A & B the SVPs which are located above refuse stores and retail units on the ground Floor shall collect at high level over these areas and drop in a suitable location to connect to the below ground drainage system. Alternatively, this will drop to high level in the basement and connect to the below ground drainage outfalls through the perimeter retaining walls.

Note that the below ground drainage system, both externally and beneath the buildings will be designed by others. This will include the foul/wastewater lifting pumps to serve the basements levels.

The pumped deliveries from basement sumps will be routed at high level basement to discharge into the suspended gravity drainage. Sump pump ventilation pipework will discharge at roof level.

In all area's drainage pipework shall be accessible for rodding. Access shall be provided at all branches, changes of direction and at connections to the suspended drainage system. Where pipes pass through fire compartments all penetrations shall be fire sleeved.

Item	Number of fittings	Total discharge units (DU) and provisional foul water sewer discharge rate (l/s)
Anticipated foul discharge from residents	Assume 2 x WC, 2 x WHB. 1 x SK, 1 x DW, 1 x WM, 1 x SH and 1 x bath per apartment	206 DUs or 7.2 l/s (0.5 K factor) – Block A 258 DUs or 8 l/s (0.5 K factor) – Block B

6.2.6 5.5 Rainwater

The roof areas shall be drained via a conventional system of roof outlets and gravity rainwater pipes to discharge into the drainage system. Terraces and balconies shall be provided in line with the architects proposals, all pipework located within the façade will be metallic.

The rainwater pipes will drop through the building in risers accessed from the communal corridors on the apartment floor levels. Access hatches will be provided to all internal stacks for rodding purposes, generally on at least every fourth floor on vertical pipes and at every change of direction.

All rainwater pipes in blocks A & B will drop vertically down and run at high level in the basement to the below ground drainage connections through the retaining walls.

The London Plan requires developments to provide, to some degree an element on stormwater attenuation, this is typically via a buried storage tank or a blue roof system. If a buried storage tank it utilised this should be developed by the civil engineer if a blue roof system is utilised this should be developed by the architect.

The gravity rainwater system, including all pipework, fittings and accessories, shall be installed to meet the performance requirements stated in BS EN 12056 (Part 3), the latest applicable versions of the Building Regulations and all other technical manuals and guides which may be applicable. The system shall be installed using the minimum pipework and fittings necessary to carry away all rainwater from the building to the below ground drainage system, quickly, quietly and with freedom from nuisance or risk of injury to health.

A mechanically jointed cast iron steel piping system shall be used.

The rainwater pipework shall be installed without back fall, leakage or blockage and it is essential that the system is adequately tested, always cleaned and maintained and throughout the construction process.

Where rainwater pipes are to be exposed, they shall be installed true to a high standard, true to line and level and supported in accordance with BS EN 12056 (Part 3) and the manufacturer's recommendations.

The rainwater system shall be installed through out to avoid condensation.

Item	Total of all roof areas (m2)	Total rainwater sewer discharge rate (l/s)
Anticipated roof rainwater discharge	Block A = 471 m2 Block B = 384 m2	Approx. 23 l/s (based on no attenuation)

6.3 Networks Engineering Base Building Services

6.3.1 BMS/Controls

The automatic control and building management system will be specified as a Network Server/Controllers (NSC's) edge server utilising the distributed intelligence concept to provide a complete and operational control system. Intelligent, computerised Automation Server BMS panels will be distributed throughout the building, generally in the plant control enclosures within the plant rooms. These Automation Server panels will carry out the monitoring and control functions of the base building engineering services. The system will likely be an EcoStruxure system or similar and designed to be capable of expansion and being linked in with Scada type system.

A network of data cables to a central monitoring station will link each Automation Server panel and the system supervisor, located within the Building Control Centre. The desktop system supervisor will be provided with a graphical user interface connected to a web-based browser used to gather data, determine the status of engineering services plant and equipment, amend control strategies or alter control set points. A graded access system will be provided for security purposes. The design of the BMS network will permit additional Automation Servers to be added to the network or the network to be expanded. Each local area network will be provided with spare capacity to enable further Automation Server BMS panels to be installed to allow flexibility and expansion of the base building system to serve the tenant's fit-out.

The BMS will control and/or monitor the base building plant systems. The Automation Servers will execute all necessary optimisation, time, temperature, safety interlocking and energy control requirements of the mechanical and electrical plant and equipment, ensuring that the engineering services systems can operate safely and efficiently via specialist software. Independent switching of the base building and the fit-out plant systems will be via the BMS to achieve start-up, normal operation, shut down and fire mode requirements. An open network architecture system will be specified to allow fit-out plant and terminal controllers to be software programmable by the BMS system. Interfaces with the life safety system will be provided, together with a web link to allow remote connection or for supervision in the case of alarm detection.

6.3.2 Hardware

An array of sensors, temperature, humidity, air quality, pressure and velocity along with utility metering devices shall monitor the various system conditions such as:

- High and low-level alarms for tanks and sumps;
- Internal and external Ambient temperatures;
- Air Handling System Supply and Return temperatures;
- Volume control of air handling plant;
- LTHW system including flow and return temperatures;
- Chilled Water System flow and return temperatures;
- Water-cooled chiller temperatures;
- Fault alarms from major items of plant and equipment;
- Fire alarm system fault status;
- Fire alarm active;
- Mains power and generator status;
- Incoming mains water flow rate;
- Metering of power consumption for the major plant, including the refrigeration systems, air handling units and fans, etc;
- kW/hr consumption of designated LV switchboards ways.

The BMS will have the facility to control the following plant functions:

- Start/stop all air handling plant and fans;
- Enable/disable CHW system;
- Enable/disable LTHW system;
- Enable/disable chilled water and associated condenser water systems;
- Provide the sequence operation of LTHW and CHW plant;
- Start/stop toilet ventilation and other miscellaneous systems;
- Reset chilled water and LTHW flow temperatures.

6.3.3 Software

The following software will be provided to supervise system operation:

- Graphics system display with dynamic update of system parameters;
- Monitor and log any combination of control/sensor points;
- Intelligent optimum start and stop of all thermal control systems;
- Time program stop/star;
- DDC control algorithms;
- Intelligent indication only of lead/lag and duty/standby plant cycling;
- Password access to various security levels of BMS facilities;
- Power failure restart schedule (limited to plant items that BMS can enable);
- Trend logging of incoming water flows with alarm.

In addition, the software will be capable of accepting the following system management tools:

- Software for preparation of energy consumption reports;
- Maintenance management software;
- Trend logging/historical data functions;
- Energy usage monitoring;
- Maintenance scheduling;
- Load shedding.

6.3.4 Main Plant Drives

Fans and pumps to be provided with inverter drive located adjacent to the associated plant. The motive power will be derived from plant power centres (PPC's) located in plantroom areas.

BMS Automation Server panels will be distributed throughout plant rooms to monitor and control the M&E services.

7 Vertical Transportation

7.1 Introduction

The aim of this section is to define the Vertical Transportation (VT) strategy for Blackburn road and ascertain if the analyses results are in line with the British Council for Offices 2019 (BCO) for Block C.

We have used the latest architect's NIA area schedules dated 17th June 2019 and completed the lift traffic analyses based on 1 person per 8m^2 NIA @ 80% utilisation throughout. Our studies consider an 10% entry bias via the basement level for cyclists travelling to the upper floors. We can confirm that the current arrangement with 2 x passenger lifts meet the desired British Council for Offices (BCO) targets, however, the number of passenger lifts cannot be reduced.

The two residential blocks are provided with 1 x passenger lift in each. As the number of apatemnts are between 26 and 27 the population is low and a traffic analysis does not provide us with accurate figures to demonstrate the perfoamnce.

7.2 Design Concerns

- Each residentail block is provided with a single passenger lift. There is no redudancy when the lift is out of service for routine maintennace or brokendown so passengers will need to use the starirs
- The lifts in the office block are not drawn to our recommended dimnesions outlined in this report due to space constraints. Therefore the currently proposed lifts can only accommodate 1100mm wide lift cars with side openingdoors as opposed to centre opening doors. The main reason wider lift cars are recommended in offices are to provide ease of movement of passengers, a better user experience in and also centre opening doors which require less long term maintenance than side opening doors.

7.3 Glossary of technical terms

Term	Meaning
FMHC (Five Minute Handling Capacity)	The percentage of the effective population that can be transported by the lift systems in a 5-minute period.
AWT (Average Waiting Time)	The period of time when a passenger either registers a call or joins a queue until the responding lift opens its doors at the boarding level.
ATTD (Average Time to Destination)	The period of time when a passenger either registers a call or joins a queue until the responding lift opens its doors at the destination level.
Rated Speed	Speed for which the lift car has been built and at which it is designed to operate.
Utilisation Factor	This is a factor applied to the NIA to arrive at the 'effective density' of occupation. Taking into account areas such as circulation spaces that are not occupied.

7.4 Design Criteria

The following criteria (British Council for Offices) is used to analyse block C.

	BCO 2014	Cambridge Heath
Density of Occupation		
High Density	1 person per 8m^2	1 person per 8m^2
Low Density	1 person per 10m^2	
Car Loading	≤ 80%	≤ 80%
Car Loading area per person	0.21m^2	0.21m^2
Morning Arrival		
Incoming traffic	85%	85%
Outgoing Traffic	10%	10%
Inter-floor Traffic	5%	5%
5-minute Handling Capacity	12%	12%
Average Waiting Time	≤ 25 seconds *1	≤ 25 seconds *1
Average Time to Destination	≤90 seconds *2	≤90 seconds *2
Lunchtime		
Incoming traffic	45%	45%
Outgoing Traffic	45%	45%
Interfloor Traffic	10%	10%
5-minute Handling Capacity	13%	13%
Average Waiting Time	≤ 40 seconds	≤ 40 seconds

*1 AWT of up to 30 seconds can be considered acceptable when coupled with an ATTD of 80 seconds or less.

*2 ATTD of up to 110 seconds can be considered acceptable where AWT is less than 25 seconds.

7.5 Lift Parameters

The following base parameters have been employed when undertaking the calculations. In certain instances, these have been adjusted (within reasonable and achievable limits).

Parameter	CIBSE Guide D	Cambridge Heath
Acceleration m/s^2	up to 1.4m/s^2	0.8m/s^2
Jerk m/s^3	up to 2.0m/s^3	1.2m/s^3
Entrance Opening Time	1.8 Seconds	1.8 Seconds
Entrance Closing Time	2.9 Seconds	2.5 Seconds
Passenger Transfer Time	1.2 Seconds	1.1 Seconds
System Start-Up/Delay	0.5 Seconds	0.5 Seconds

7.6 Area Schedule

Level	Building A	
	Residential	
	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2
Basement Floor	-	-
Ground Floor	157	-
Level 1	399	323
Level 2	399	323
Level 3	399	323
Level 4	399	323
Level 5	265	210

Area Schedule Building A

Level	Building B	
	Residential	
	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2
Basement Floor	-	-
Ground Floor	111	-
Level 1	322	252
Level 2	322	252
Level 3	322	252
Level 4	322	252
Level 5	322	252
Level 6	217	159

Area Schedule Building B

Level	Building C	
	Commercial	
	Gross Internal Area (GIA) m^2	Net Internal Area (NIA) m^2
Basement Floor	391	-
Ground Floor	531	401
Level 1	314	233
Level 2	314	233
Level 3	314	233
Level 4	218	148
Level 5	218	148
Level 6	218	148
Level 7	218	148
Level 8	218	83

Area Schedule Building C

7.7 Analysis Results

7.7.1 Analysis Assumptions

Our studies are based on the following assumptions:

- During Morning peak, 90% of the population enter at Ground and 10% via Basement level.

7.7.2 Convential control results

Conventional Control								
Population density	Control System	Number and capacity	Speed	Calculation	Levels served	Handling Capacity	(AWT) s	(ATD) s	Achieves Criteria
1 person per $8m^2$ @ 80% utilisation	Conventional Control	2 x 13 person/1000kg	1.6m/s	Morning Peak	B, G, 1-8	12%	21 (30)	65 (80)	Yes
				Two-Way Lunchtime		13%	30 (40)	n/a	Yes

BCO Benchmarks in orange

The results above indicate that BCO targets are achieved with 2 lifts based on a population density of 1 person per $8m^2$ @ 80% utilisation with a the convention system.

7.8 MRL Lifts

All lifts within the development shall be Machine Room-Less (MRL) units. Unlike traditional electric traction drive lifts, MRL electric traction lifts do not require a separate machine room. Equipment such as the drive machine and controller are located within the confines of the lift well.

The lift control panel shall be located on the top level served or one level below and can be housed behind the landing architrave.

All lifts are provided with regenerative variable speed, variable voltage and variable frequency drive controllers.

The dimensions given in the following section are based on MRL units.

7.9 Goods Lifts

BCO states that a service lift should be provided where the office area exceeds 10,000m^2 and should also be considered for areas greater than 5000m^2. The total office area served is less than 5,000m^2 however we recommned that one of the passenger lifts operates a a dual passenger/goods lift.

One of the passenger lifts shall operate as a dual purpose passenger/goods lift in each residentail block.

7.10 Firefighting Lift

BS 9999:2008 states that buildings, or parts of buildings, where either the height of the surface of the topmost level (excluding plant rooms) exceeds 18m, or the depth of the surface of the lowermost level exceeds 10m, should be provided with a fire-fighting lift.

These distances should be applied from the fire service access level (FSAL), which is typically at Ground level. The fire-fighting lifts must serve all levels and reach the furthest level served from the FSAL within the 60s.

As this building exceeds 18m, a dual purpose passenger/firefighting lift is provided.

The firefighting lifts shall be within a firefighting shaft, the requirements of which are governed by BS9999. These requirements are specific so should be considered in the early stages.

7.11 Dimension Schedule

Recommended dimensions – All blocks

Location	No. of lifts & Function	Type	Single Entry / Open Through	Capacity	Floors served	Speed (m/s)	Lift Well		Pit (mm)	Headroom (mm)	Internal Car			Entrances		
							W (mm)	D (mm)			W (mm)	D (mm)	H (mm)	W (mm)	H (mm)	Type
Block A - Residential	2 x lifts (1 x Passenger + 1 x Goods/Passenger)	Machine Room Less	Single Entry	17-person/1275kg	G - 5	1.0	2050	2700*	1500	4000 to u/s of capping slab	1200	2300	2300	900	2100	2PCO
Block B - Residential	2 x lifts (1 x Passenger/FF + 1 x Goods/Passenger)	Machine Room Less	Single Entry	17-person/1275kg	G - 6	1.6	2050	2700*	1700	4200 to u/s of capping slab	1200	2300	2300	900	2100	2PCO
Block C – Office **	2 x lifts (1 x Passenger/FF + 1 x Goods/Passenger)	Machine Room Less	Single Entry	13-person/1000kg	G - 8	1.6	2450	1900*	1700	4200 to u/s of capping slab	1600	1400	2300	1000	2100	2PCO

*** An additional 200mm lift well depth is required for dual entry (front and rear) lifts**

The above schedule is based on concrete construction lift wells. Where drylined additional space is required for guide support steel work

Dimensions are per lift well, allow 150mm for each division wall.

Building tolerances have not been included in the dimensions stated
2PCO - 2 panel centre opening doors

** The above office lift dimensions above are recommended to provide ease of movement of passengers, a better user experience in offices and also centre opening doors which require less long term maintenance than side opening doors.

7.12 Office Lifts - Currently Drawn – Block C

Location	No. of lifts & Function	Type	Single Entry / Open Through	Capacity	Floors served	Speed (m/s)	Lift Well		Pit (mm)	Headroom (mm)	Internal Car			Entrances		
							W (mm)	D (mm)			W (mm)	D (mm)	H (mm)	W (mm)	H (mm)	Type
Block C - Office	2 x lifts (1 x Passenger/FF + 1 x Goods/Passenger)	Machine Room Less	Single Entry	13-person/1000kg	G - 8	1.6	1700	2500	1700	4200 to u/s of capping slab	1100	2100	2300	900	2100	2PSO

*** An additional 200mm lift well depth is required for dual entry (front and rear) lifts**

The above schedule is based on concrete construction lift wells. Where drylined additional space is required for guide support steel work

Dimensions are per lift well, allow 150mm for each division wall.

Building tolerances have not been included in the dimensions stated

2PCO - 2 panel centre opening doors

8 Plant Replacement

It is proposed that the heating/cooling plant will be installed with resilience in mind to ensure the operation of the building in the event of plant failure.

Where possible all main plant has been designed for a run and standby set up whereby in the event of plant failure to a single pump, chiller or PHX there is sufficient capacity in the remaining plant to cover the total site-wide heating/cooling load. The plant being installed will have a 15-20years service life.

At the end of their serviceable life, due to the size and weight of the major plant, it is proposed to crane these items onto or off of the roof from surrounding roads.

The strategy for major plant replacement has been detailed below:

Unit	Location	Replacement Strategy
Heat-pumps/ Chillers	Roof	Via Crane from surrounding roads
Plate Heat Exchangers	Roof/floor	On skid through external plantroom doors
LTHW Distribution Pumps	Roof	On Skid to Passengers Lift to Roof Level
CHW Distribution Pumps	Roof	On Skid to Passengers Lift to Roof Level
Ambient Loop Pumps	Roof	On Skid to Passengers Lift to Roof Level
AHU's	Roof/Basement	On-site disassemble, Via Goods Lift to a ground floor
Pressurisation Units	Basement/Roof	On skid through ground floor exit
Smoke Extract Fans	Roof	Via Goods Lifts to a ground floor

Major Plant Replacement Strategy

8.1 Life Expectancy

Plant	Service Intervals	Service Life (Yrs)
Air Handling Units	6 Monthly	15
Heat/Pump Chillers	6 Monthly	20
Plate Heat Exchangers	6 Monthly	20
Distribution Pumps	6 Monthly	15
Water Heater	12 Monthly	25
Extract and Supply Fans	6 Monthly	15
Cold Water Booster Pumps	6 Monthly	15
Cold Water Booster Tanks	6 Monthly	20
Expansion Vessels	6 Monthly	20
Buffer Vessels	6 Monthly	20
Pressurisation Units	6 Monthly	15
Smoke Extract Fan	6 Monthly	10
LV Panel	6 Monthly	20
MCC Panels	6 Monthly	20
Lifts	6 Monthly	20

Major Plant Life Expectancy

9 Utilities

Existing water, gas & power supplies will need to be disconnected and removed as part of the proposed demolition works, excluding any services that may be retained as a temporary network or building supplies.

New supplies will be provided for water, drainage, IT/data and power supplies.

We have based this report on information received from the relevant authorities. This information has been extracted from the record information for their services, in the proximity of the site and has been / will be used in order to establish:

- Sizes of supplies available in the area to serve the development
- Details of any services to be relocated or abandoned to suit the scheme
- Any diversions or upgrade necessary to suit the final scheme
- Applications for new utility supplies.

Most of the statutory bodies provide record information in diagrammatic form, relating only to the OS map of the site and its environs. In general terms, as would be expected, the mains are generally routed under the carriage way, with secondary routes of communications and electrical supplies under the pavement.

Details vary from authority to authority on the depth, and capacity of the services, all of which is required for the detailed design stage of the development.

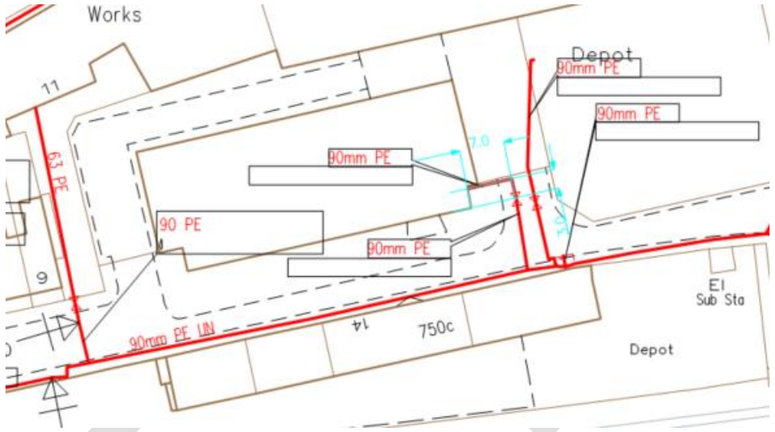
It is important to note that although updated regularly, these records may not represent all the present plant installations. The position of plant shown on drawings must be taken as being indicative only. We have contacted the agencies, which we have reason to believe may have plant or equipment in the vicinity of the site. Although we have no reason to suspect that there are additional underground services on site (e.g. street lighting cables belonging to the local authority) care should be taken when carrying out any excavation works on site. Reference should be made to HSE publication HS(G)47 'Avoiding Danger From Underground Services'. In addition, we would recommend, prior to any excavation works being undertaken, that a CAT scan survey is carried out to identify the position of the known services and to confirm the existence of services other than those shown on the drawings.

The record information received from the different utility providers indicates that there may be sufficient utilities within the vicinity of the site to service the proposed development. *(We would note that, in compiling this information, we have relied upon information given to us in good faith by various third parties that have indicated that they accept no responsibility for errors or omissions contained therein.)*

9.1 Gas

The record information received indicates that a low pressure main runs in the footpath of Blackburn Road, Please see below drawing from Candent.

No application will need to be made for a new gas connection, as gas services will not be required for the new development.



9.2 Foul Drainage & Water Sewerage – Thames Water Utilities Ltd

The record information received indicates a foul water sewer along the development within Blackburn Road, Please see right for drawing from Thames Water.

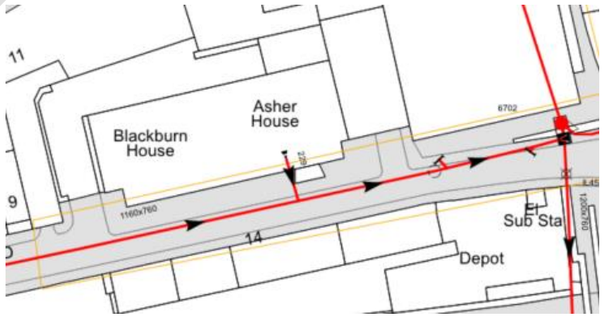
An application will need to be made to Thames Water for new sewer outfall connections.

A minimum of 2No connections are envisaged due to the external terraced area and the low floor to ceiling heights associated with the building.

The connections will serve both the foul and surface water associated with the site.

To comply with the london plan surface water would require a form of attenuation to limit surface water discharge from the site. The flow rate should be agreed with the local authority.

We envisage 2No combined 150dia sewer outfall connections will suffice. It should be noted the final sizes will largely be dictated by the agreed surface water discharge flow.



9.3 Mains Water – Thames Water

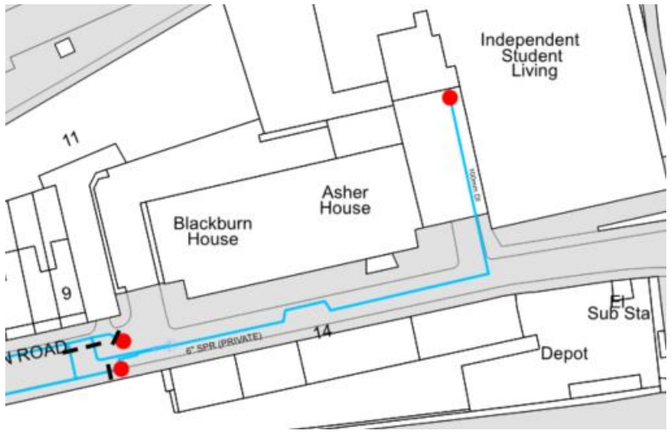
The record information indicates that the mains water runs in the footpath of Blackburn Road. Please see below drawing from Thames Water.

An application for a new mains water connection will need to be made to Thames Water.

The supply should be complete with a local authority revenue meter located externally to the site boundary.

The supply should be complete with a major leak detection system capable of detecting a major leak on the mains supply within the building and between the buildings site boundary.

The mains water supply would serve both the domestic water system and the fire suppression system, a blue 90mm MDPE supply will suffice to serve both systems. The mains water supply material shall be of a construction which ensures that any ground contaminents cannot permeate into the water supply.



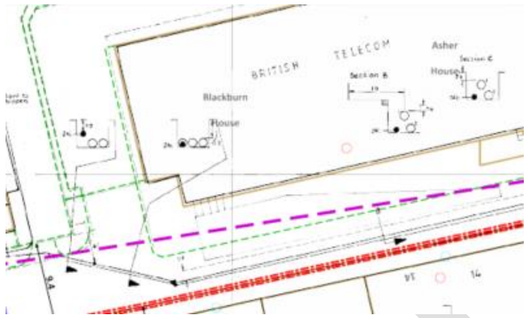
9.4 Elecrtricity – UK Power Networks (UKPN)

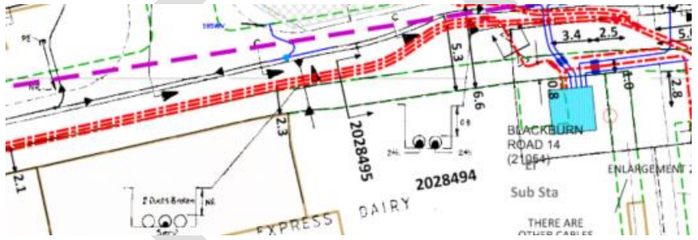
The record information received indicates that an existing HV main runs across Blackburn Road. Please see the below UKPN drawing.

An application will need to be made to UKPN. It is anticipated that the approximate electrical demand for the development will be circa 1500KVA.

The supply and installation of a new dedicated 1500KVA UKPN substation will be provided at ground level.

It is anticipated that UKPN shall provide all HV cabling and point of connection from the existing UKPN HV network (pictured below) to serve the new IDNO substation (subject to UKPN confirming available capacity on the existing HV infrastructure)





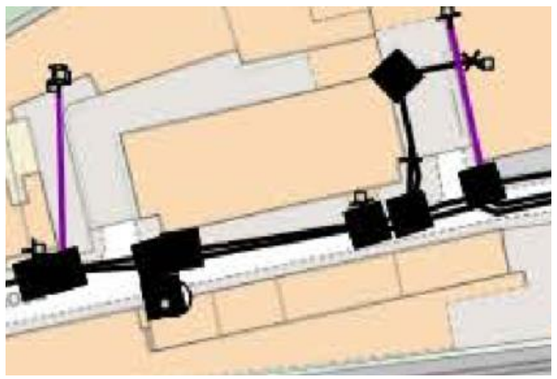
9.5 Telecommunications – Openreach British Telecommunications (BT)

The record information received indicates that BT cables and BT Joint Boxes (chambers) are present to the perimeter of the site within the local authority footpath.

An existing BT Distribution Point and BT connection appears to be serving the existing building along Blackburn Road. Please see the BT drawing below.

An application will need to be made to BT for new incoming Fibre and Copper services to the new development and terminate within the comms room.

The new incoming Fibre and copper services shall serve the development.



10 Appendix A – Mechanical & PH Sketch Drawings

11 Appendix B – Electrical Sketch Drawings