SQUIRRELS ESTATE
HAYES, UB3 4RY

MEP STAGE 2 REPORT

Issue Date:	15th September 2022
Issue Purpose:	Preliminary
Document Revision:	P3
Project No:	21-8770

Cape House 60a Priory Road Tonbridge Kent TN9 2BL Tel: 01732 350557 Registered in England. No: 2205560

Quality Standards Control

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

Revision	P3
Date	15th September 2022
Prepared by	P. Stroud / J. Prescod
Checked by	C. Collins
Authorised by	C. Fitzjohn

Limitations

Building Services Group Ltd ("BSG") has prepared this report for the sole use of the client in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by BSG.

The conclusions and recommendations contained in this report are based partly upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by BSG has not been independently verified by BSG, unless otherwise stated in the report.

The methodology adopted and the sources of information used by BSG in providing its services are outlined in this report. The work described in this report was undertaken in August 2022 and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Although every effort has been made to provide accurate content within this report, BSG makes no warranty or assumes no legal liability or responsibility for the accuracy or completeness of information contained in this report.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

BSG disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to BSG's attention after the date of the report.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. BSG specifically does not guarantee or warrant any estimate or projections contained in this report.

Copyright

CONTENTS

1. INTRODUCTION

This MEP Engineering Services Stage 2 Report has been prepared by Building Services Group on behalf of Mackenzie Homes (the Applicant) in support of a full planning application, (the Application), submitted to London Borough of Hillingdon (LB Hillingdon) for the comprehensive redevelopment of the former Nestle Factory within the conservation area (in a major part for residential use).

The address of the site is Squirrels Estate, Hayes, UB3 4RY.

The proposed development involves the demolition of the building currently on the Site), as shown within a red line drawing within the planning statement and as indicated on the Architects plans and sections.

The project shall consist of the erection of part 11 storey, part 10 storey mixed use building comprising 116 residential dwellings and ground level commercial premises along with public realm delivery of Green Super Highway with associated landscaping, access, and parking, following demolition of existing buildings.

The Site contains an existing industrial building. An eleven-storey residential building has been constructed to the north side of the Site in 2011 as part of the “High Point Village” style building. The area around the building is covered in hardstanding with car parking within an undercroft.

Access for parking is at ground level. There are a total of 116 apartments over Ground to 10th Floors and roof level.

This MEP Engineering Services Stage 2 Report addresses the Energy Strategy Report from Syntegra dated August 2022 for Hillingdon Council.

2. INCOMING UTILITIES

A new water main shall be established to serve the new development, basement tank and commercial unit.

2.1 Water

The incoming mains cold water service will change material to copper, complete with a stop cock, double check valve, drain cock and check meter with pulsed output to a Building Management System (BMS).

The incoming mains cold water service will serve a cold-water storage break tank, formed of sectional GRP and located on raised piers, with the outlet to the cold-water storage tank routed to a whole building packaged cold-water booster set suitable for wholesome water.

Boosted cold-water supplies will be taken from the cold-water booster set and routed to serve the landlords areas (inc. refuse), commercial spaces and apartments HIU's/meters.

A separate water main may have to be applied for to serve the sprinkler system, subject to specialist input.

2.2 Gas

Any existing mains gas connections to the site shall be disconnected in the street. No new gas supply shall be required to serve the building.

2.3 Electrical

The existing electrical supply arrangements for the site are not fully known however based on an initial load assessment for the new building an upgraded dedicated incoming electrical supply shall be required for the site.

Due to the calculated load the new electrical demand will require a new substation which shall be located within the ground floor mid-section of the building. The final location of the proposed substation together with a cross ventilation shaft to the rear, and fully louvred double doors to the front of the building, shall be outlined by the Architect in accordance with the local supply authority requirements.

An application to UKPN will be submitted to determine supply requirements and arrangements. Following the application, the requirement for a new substation shall be verified.

A new dedicated three phase LV electrical incoming service shall be required to supply the residential demise. A Ryefield Board shall be located within a secure landlord demise within the basement level to distribute power to each residential demise and to landlord services.

From 1st Floor, Ryefield Fuse Boards to be located on each floor, and fed via rising Busbar via fused top-off units (sealed for metering installation).

The final arrangements for distribution and metering provision will be subject to Electrical Supply Authority and the building owners metering strategy requirements. Each residential apartment will be provided with an individual single-phase supply with an individual utility Measuring Instruments Directive (MID) meter. MID meters are to be located within a Flowersecure central service area accessible to the tenants or MID meters to be located within the apartments.

A new dedicated three phase LV electrical incoming service shall be required for the landlord and commercial space supplies. This shall be distributed via Main MCCB Distribution Board located within the electrical plant room at basement level. The commercial space and landlord service shall be metered independently via MID compliant meters.

2.4 Communications

Incoming service ducts, containment and risers will be provided for installation of incoming telecoms and fibre services. The final location of the incoming ducts has not been determined but the design shall allow for containment routes into, and through, the building for all fibre optic and copper services to serve the apartments, commercial spaces and landlord services to meet the client requirements. There shall be a dedicated Comms room within the basement (Landlord's demise). An underground duct shall be run between the two cores to provide a link at ground floor level for data services including security and ancillary systems.

Incoming services applications are assumed to be by Client / Developer.

3. MECHANICAL SERVICES

3.1 Design Conditions – External

For a Summer external design temperature of 30°C, outdoor air relative humidity of 40% - 60%, winter -1°C DB, 100% sat.

3.2 Design Conditions – Internal

Room temperatures: the heating systems will be designed to provide the following temperatures and infiltration rates as per Energy Report (To be confirmed in next Stage between Architect and M.E.P. Consultant ref performance of trickle vents and building permeability) and an external ambient temperature of -1°C, saturated:

Apartments:

- Living rooms: Temperature: 21°C
- Dining / Kitchen
- Bedrooms: Temperature: 20°C
- Halls and landings: Temperature: 18°C
- Refuse: 28°C max (by ventilation)
- Plant: 5°C min (no cooling)

Note: humidity is uncontrolled to all areas.

Natural ventilation shall be utilised in apartments as per the environmental modelling assessments that have been undertaken.

Refuse stores shall have 0.2m² opening or 15 air changes per hour extract Bedroom W.C.'s shall have an exhaust rate of 6a.ch/hr.

SFP's shall be 0.5 (inc. kitchen).

3.3 Heating – Apartments

Apartments shall be heated by means of LST wet radiators, and/or underfloor heating complete with thermostatic valves (primary heat will be from dedicated ASHP and buffer vessels feeding Heat Interface Units (HIU) in entrances. There will be no cooling in the apartments unless any future overheating assessment requires it.

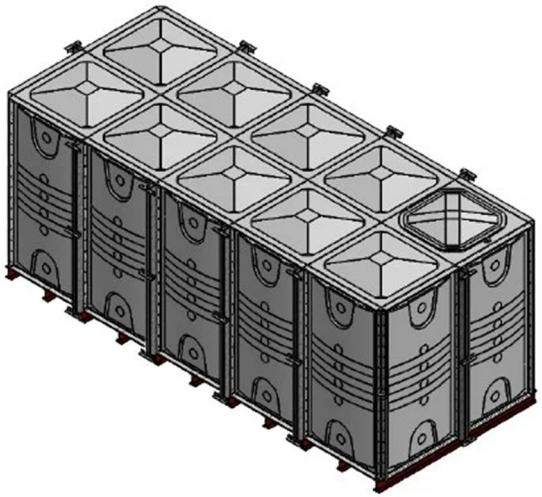
Radiators shall be controlled via individual room thermostats.

3.4 Heating Plant

Community (central buildings) ASHP's will be used to provide the primary heat to the apartments HIU's (with energy metering) and the Landlords spaces. The central ASHP's will be located on the roof and will provide approximately 400kW via buffer vessels, they will be selected as high temperature units.

3.5 Domestic Cold-Water Services

The incoming mains cold water service will be metered and routed to a cold-water storage tank and packaged cold water booster set in the Lower Ground Plant space.



Typical cold water storage tank

The discharge from the packaged cold-water booster set will serve the various areas and the hot water storage, all with appropriate valving.

The boosted cold-water service shall enter the property and be routed to a main stop cock location in the plant area with isolation valve, double check valve and drain cock. From this location boosted cold water shall be routed to the cold-water appliances and outlets complete with local isolation valves inserted within the pipework where required. A separate supply may have to be applied for to serve the sprinkler system and separate tank and pump set. Depending on infill rate.

The sprinkler tank shall be as indicated on the Stage 2 drawings.

3.6 Domestic Hot Water

The ASHP will provide space heating as well as primary heating water to domestic hot water. A buffer vessel of approx. 1300L capacity located in the L Ground plant space will provide some standby capacity, sized to achieve the required heating and hot water duties whilst also ensuring low return water temperature on the primary LTHW.

3.7 Ventilation

Each bedroom window shall be openable (for summertime), plus trickle vents for permanent ventilation. Mechanical extract will air from each bathroom, kitchen / wet area to atmosphere via local air bricks in the façade.

Mechanical extract will be provided as follows:

Bathrooms 6a.ch/hr

Laundry and Changing 10a.ch/hr

Kitchen 40a.ch/hr

SFP's 0.5 w/l/s

All fans will be at roof level.

3.8 AOV's – Automatic Openable Vents

Smoke control ventilation will be provided in accordance with the requirements of Building Regulations Approved Document Part B and the Fire Engineering Consultant/Architects drawings. This shall comprise of

mechanical smoke vent shafts (2 No) for corridor sections and AOV's at the top of staircases. Smoke shaft fans shall be located on the roof directly above the smoke shafts.

We understand from the Architect that carpark smoke ventilation will be natural, cross flow. In accordance with the Architects layout plans.

Where this is not practical, mechanical smoke ventilation will be designed to comply with the requirements of BS EN 12101 part 6.

3.9 Above Ground Drainage

New soil and waste drainage shall be installed as necessary to serve all sanitary fittings and appliances.

The works shall comply with BS EN 12056 and Building Regulations Approved Document Part H.

The above ground foul drainage shall be designed to provide quick, quiet and complete, self-cleansing in normal use, without blockage, crossflow, backfill, leakage, odours, noise nuisance or risk to health. A minimum water seal of 25mm is to be retained in all traps (minimum).

All soil vent pipes shall terminate to atmosphere in a 'safe' location. The use of air admittance valves will not be permitted.

3.10 Sprinkler System

The sprinkler installation, shall be designed and installed by a specialist sprinkler contractor and shall be fully in accordance with the requirements of BS EN 12845, the Loss Prevention Council Rules and amendments including the latest LPC bulletins and any Insurance Company regulations (this is not a residential only building and so the commercial spaces also need protection).

The appointed contractor shall have third party certification as FIRAS scheme or IFC scheme. Upon completion of the installation, a "Certificate of Conformity" shall be issued, thus verifying compliance with the defined installation standards.

A central tank and pump set, with separate zone valves will supply each zone of all floors. The plantroom size indicated has to be acknowledged as an estimate (To have 160M^3 tank) as this volume depends on the make-up rate (a flow vs pressure test is required).

Final design according to retail hazard classification OH1, OH2 or OH3 shall be determined at a later stage. The requirement indicated on the drawings considers OH3 classification hence the current volume indicated. This shall be determined in due course.

3.11 Building Management System

A new Building Management System (BMS) shall be installed to monitor and control all main items of plant and equipment serving the residential areas. The new BMS system shall be able to support open protocol two-way communication to enable full integration and shall be accessible via web interface front end graphical management applications. Final details and extent of the BMS shall be determined.

The BMS shall include a mechanical control panel located within the lower ground floor plant area providing control of the ASHP's, interface with the cold-water booster set, extract fans, and interface with the HIU heating systems to each office floor.

A specialist controls contractor shall be employed to develop the detailed design of the system, provide wiring diagrams and a description of system operation.

4. ELECTRICAL SERVICES

4.1 Electrical incomer & Switchgear

Residential Demise

A new dedicated three phase LV electrical incoming service shall be required to supply the residential demise. A Ryefield Board shall be located within a secure landlord demise located within the Basement and/or ground floor of the building. The Ryefield Board shall distribute power to each residential demise and for the residential landlord general services such as corridor lighting and power. Surge protection shall be provided as required.

The final arrangements for distribution and metering provision will be subject to Electrical Supply Authority and the building owners metering strategy requirements.

Each residential apartment will be provided with an individual single-phase supply with an individual utility Measuring Instruments Directive (MID) meter. MID meters are to be located within a secure central service area accessible to the tenants or they shall be located inside the tenants' apartments. The CU circuits in each apartment shall comprise AFDD's.

A landlord supply shall be required to supply the residential communal areas, corridors and stairwells.

Mechanical plant located on the roof to serve the residential apartments shall be supplied from local MCP's and/or Distribution Board subject to the detailed design. Boards shall eb located on the roof with GRP Weatherproof enclosures or internally within the riser.

Landlord and Commercial

1 No new independent electrical incomer will be brought into the Basement electrical intake room. The electrical utility providers service head, CT Chambers and distribution equipment shall be located within the electrical intake room in accordance with the local authorities' design criteria and installation standards.

The landlord and commercial area main incoming MCCB type switchboard shall be located within the basement electrical plant room. The main switchboard shall provide power to all services throughout the building (other than the residential demise). The switchboard shall feed a number of sub distribution boards located throughout the property in suitably identified rooms and designated electrical riser cupboards/spaces. The switchboard will also serve the main mechanical plant (MCP's as required), lifts and all power requirements to external areas within the property demise.

Provide integral MID complaint metering to all outgoing supplies to sub main distribution boards and MCP's.

Sub mains supply cabling to each distribution board shall be ran within dedicated electrical riser with appropriate EMC segregation from other services. Standby Power (Fire protection)

Provision within the site will be made for an emergency generator to serve the fire sprinkler system and any other services identified as either life safety services or critical essential services throughout the property. A local life safety rated auto transfer switch will be provided adjacent to sprinkler plant, fire fighter lifts and other relevant life safety distribution equipment as required. The generator shall be sized adequately during the detailed design stage to accommodate the above.

A suitable location at roof level has been identified but shall require confirmation and co-ordination by the architect. The generator could be located at ground level external area or the roof location. However, this would require further design to ensure adequate fresh air and exhaust air systems were to be installed to comply with building regulations, relevant British standard and to be in accordance with the manufacturers recommendations.

Note – the provision for any generator backed life safety system will need to be determined during detailed specification of all MEP services including

the sprinkler system and shall be dependent on Building Control and fire consultant requirements.

Assessment of the incoming water service pressure shall also be considered as a factor during the design of the sprinkler system.

4.2 Sub Main Distribution & Cabling

New multicore armored cabling will be installed to serve local distribution boards, lifts, motor control panels, and mechanical plant items. Cabling will be distributed via cable trays both within ceiling voids and within the electrical service risers.

Fie life safety secondary power supplies shall be distributed in a diverse route to the primary supply. Fire rated cabling shall be used for both primary and secondary power supplies.

4.3 Small Power

British Standard socket outlet plates will be installed throughout the building as required within all apartments, commercial areas and communal areas throughout the building. Architect shall confirm compliance with Part M requirements.

White plastic / metal clad / IP type will be provided in plant or external areas, as required. Power supplies to all mechanical plant will be provided via separate circuits, where required.

All installations will be designed and installed to comply with BS 7671 18th Edn Amd2.

Earthing and bonding will be provided, in accordance with BS7671 & BS7430.

There should be an allowance for Electric Vehicle Charging Points (EVCP's) to be installed within the underground car parking bays. Quantity, final locations and specification of EVCP's to be determined by the local authority planning conditions and the client brief. Allowance for providing data connectivity and app-based connectivity for billing and monitoring shall be provided.

4.4 Lighting

All lighting shall be energy efficient (95 LM/Circuit).

A new LED lighting installation will be provided throughout the apartments compromising of LED downlights and pendant style decorative fittings where required. Lighting to be switched from wall mounted local switches within all apartments/bedrooms.

LED lighting shall be provided within all landlord and communal areas (stairwells and corridors). LED fittings installed throughout communal stairwells and corridors shall be switched via astronomical timeclocks, PIR presence detectors or microwave sensors and an override retractable push buttons as required. The switch shall activate a run-on timer that will allow the lighting in the corridors to be on for a maximum pre-set time. A manual override key switch shall also be provided adjacent to the supply DB to override the PIR sensors and run-on timer switch.

LED weatherproof type fittings shall be provided in the ground floor car park area, internal plant spaces and riser cupboards. All lighting in these areas shall be switched via wall mounted light switches.

Lighting on the roof shall be by weatherproof IP67 bulkhead luminaires. All gantries and walkways shall be lit. Lighting on the roof shall be controlled via manual switch located at the entrance to each roof space.

IP65 Rated LED Battens shall be installed throughout the cycle store and refuse areas. Fittings to be controlled via PIR presence detectors/microwave sensors and via retractable override push buttons located at the entrance points to these areas. The switch shall activate a

run-on timer that will allow the lighting to be on for a maximum preset time. A manual override key switch shall also be provided adjacent to the supply DB to override the PIR sensors and run-on timer switch.

All external lighting on the building (façade), landscape areas, pathways and communal garden areas will be supplied from dedicated landlord's distribution boards controlled by means of astronomical time clocks and photocells. Fittings shall be a combination of LED wall mounted bulkheads, LED decorative fittings and LED bollards for illumination of pathways.

4.5 Emergency Lighting

Emergency light fittings will be installed to provide coverage to meet BS 5266 throughout the building.

Self-contained, 3-hour emergency lighting fittings will be provided throughout the residential corridors, communal areas, plant and communal spaces including residential stair core areas. Fittings will also be provided at each external exit location and the roof plant space.

Emergency fittings will be dedicated emergency fittings. Within residential corridors there shall be high output miniature LED type downlights mounted within a plasterboard ceiling. All emergency fittings shall be selected to suit installation type. Surface mounted bulkheads and high-powered surface mounted fittings to be installed in all other areas where plasterboard ceilings are not installed. Fittings to be selected specifically for the area of use.

Maintained self-contained emergency exit signs to be installed to illuminate all emergency exit routes and escape doors throughout both demises. Note this shall be subject to building control advice during the detailed design period where it may be acceptable for non-maintained and/or non-illuminated signage to be installed.

Local key test switches will be provided where required within landlord service cupboard. Note: consideration for self-testing wireless networked system shall be determined during the detailed design stage and confirmed by the client.

4.6 Fire Alarm

The Premises shall be installed with a Fire Alarm detection and alarm system to comply with BS 5839 (Commercial) and with BS 5829 Part 6 (Residential fire alarm system standards).

Final agreement of system category and grade will be agreed with Building Control prior to system selection and design. The location of the fire alarm panels shall be determined in conjunction with the fire strategy and building demise (Commercial and Residential).

Smoke detection devices will be selected to suit location and include optical smoke, carbon monoxide and heat detection. Electronic sounders will be provided throughout the building with evacuation designed to suit phasing required by Building Control. The fire alarm system shall be designed, installed and commissioned in line with the buildings fire alarm cause and effect as approved by building control.

Manual call points will be provided in accordance with BS 5839 throughout.

Interface between the building demises (i.e. Commercial and Residential) shall be determined by the fire strategy and outlined within the cause and effect. During the detailed design stage of the project the interfacing between the systems shall be incorporated.

Fire Alarm Interfaces to be provided as required throughout to other services including but not limited to:

- Mechanical Plant
- Lift
- AOV
- Security Equipment (i.e. Access Control)

4.7 TV / Telephone / Data

The Client shall make an application to BT Openreach for provision of a mains incoming fibre broadband connection to the building which shall provide fibre broadband services to the commercial areas and the residential demise independently of each other.

Each apartment shall be supplied with a dedicated incoming broadband service to be terminated within a BT Master Socket inside of the apartment.

Within the landlord riser there should be a fibre termination point. All cabling shall be run within trunking or cable basket. Locations and routes shall be determined during the detailed design phase.

A dedicated Comms intake area will be provided for the residential and commercial area. It shall be located at ground floor level within the landlord demise.

Containment will be installed from this location to the apartments for the incoming fibre and broadband services. A designated data and communications cabling service riser has been incorporated into the design for the residential demise. Appropriate containment will be installed as required for distribution throughout the building and into each apartment via the ceiling void of the corridors.

Final outlets in each apartment will be wired in Cat 6 cables.

A dedicated copper telephone line to the lift and a dedicated Redcare line for the fire alarm panel for use as an emergency Auto-dialer (Fire Brigade Service).

It is proposed that TV services are provided by Satellite and Aerial services.

All apartments within the scheme will have shared satellite dishes and UHF Freeview antenna farms. Satellite antenna(s) and UHF aerial(s) will be installed on the roof of each building. A full site survey and signal integrity test will need to be undertaken prior to the final quantities and positions being agreed.

The systems will allow access to both satellite TV services from Astra 2 satellite co-location (Sky services), and Digital Terrestrial DTT feeds to all apartments.

In the case of any restrictions to locating dishes and aerials on the roof then TV services will be provided by the incoming broadband / fibre services.

4.8 Security

A Video Intercom System shall be installed to provide a video and audio link between the residential apartments and the entrance to the building/entrance to the residential demise (location of intercom system to be confirmed by the architect).

The handset in the apartment shall have two-way audio communication and 1 way video communication only (resident to view visitor at front entrance). The handset shall be capable of remote door release from each apartment. There shall be no interlink between the commercial demise and the residential demise.

FOB readers or suitable electronic access control devices shall allow access for residents to gain access to the building and residential demise and for operation of the passenger lifts.

Similar electronic access control i.e., FOB reader or Keypad PIN locks shall allow residents to designated areas for residential access only i.e. the cycle store and bin store. FOB controlled gates to the lower ground floor car park shall also be provided.

Final security strategy shall be coordinated with the architect and door schedules shall accommodate electronic locking and relevant access to power and data connections.

The commercial units shall have a similar video intercom system installed to reflect the residential intercom installation and access control system. In addition, the commercial units shall have an intruder detection system comprising door / window contacts and PIRs. The commercial demise shall have independent alarm system. The Intruder alarm panel to be located in suitable lockable service cupboard and will be provided with power supply and telephone connection for future use if required (auto-dialer).

4.9 CCTV

A CCTV system shall be installed throughout the building and external areas. Full coverage of the property shall be achieved via a combination of bullet/dome cameras in internal areas (not internally to the residential apartments or commercial areas), external areas, bicycle storage, bin stores, car park and any other locations as required.

The system will comprise of a central NVR with integral data storage, HD cameras suitable for each location. Location of the central equipment shall be within a secure landlord demise. Central equipment shall have a data/internet link such that remote monitoring and management is possible if required.

4.10 Vertical Transportation

There will be 4 No lifts installed within the buildings core's A & B.

2 No passenger lift shall be provided to run from the ground level to the10th floor, within core A.

1 No passenger lift above (core A) shall be designated as a (Fire Fighting Lift) shall run from the ground floor level to the 10th Floor. Note this lift shall have a secondary power supply.

2 No passenger lift shall be provided to run from the basement level to the10th floor, within core B.

1 No passenger lift above (core B) shall be designated as a (Fire Fighting Lift) shall run from the basement floor level to the 10th Floor. Note this lift shall have a secondary power supply.

Dedicated phone lines will be provided to each lift.

Auto-dialers shall be provided to each lift.

Lifts to be interfaced with the fire alarm system to operate in conjunction with the buildings fire strategy and cause and effect.

Access control shall be provided to all lifts in accordance with the overall access control and security strategy for the building.

Overall lift strategy shall be developed by a specialist lift consultancy if/as required.

4.11 Generator (Life Safety System)

As detailed above a generator will provide a standby power supply to the building. The generator should be located at roof level as detailed above. Alternative locations to be investigated if necessary. The final location shall be agreed in conjunction with the Architectural layouts. Final location to be agreed with building control and in conjunction with any local planning restrictions.

Requirement for the generator shall be subject to confirmation from Building Control that a secondary incoming power supply from UKPN is not an acceptable form of secondary life safety power for life safety services.

The standby system as a minimum will provide a secondary power supply to:

- Firefighting Lift

- Sprinkler Pump(s)

- Smoke systems (AOV and Smoke Extract Systems – if required)

All primary and secondary supplies will follow diverse routes and be run on separate trays as per BS 8519.

All Life Safety Auto Transfer Switches (ATS's) will comply with the requirements set out within BS 8519 and IEC Standards. If the primary supply to each ATS should fail the ATS will automatically transfer to the secondary supply (generator).

All proposals will be subject to approval by Building Control.

4.12 Lightning Protection System

A lightning protection specialist shall be employed to carry out a survey and study on the proposed development/building to determine the requirement for a lightning protection. The specialist shall provide a full report, calculations, risk assessment and design as required.

4.13 Photovoltaic Panels

The Photovoltaic Panels will be installed on the roof of building as indicated on the architects' layouts.

45No PV Panels shall provide renewable energy to the development and contribute towards the landlord electricity demand. The PV installation will be connected to Landlords distribution system. The rating of the installation on the building is subject to further design by the Sustainability specialist and in line with the BREEAM energy strategy report.

The Photovoltaic Panels will be installed on the roof of building as indicated on the architect's layouts.

It has not yet been determined if the installation will be capable of exporting energy to the local network, however the installation will be subject to G99 and Feed in Tariff (FITS) agreements with the DNO and energy supplier.

4.14 Electric Vehicle Charging Points

2No Twin Electric Vehicle Charging points can be accommodated on the site within the allocated 4No disabled parking bays at ground floor level. (The final quantity is to be confirmed by the local planning authority). The infrastructure to supply the EVCP's is to be detailed during the detailed design stage including the specification of the EVCP and passive charging point for future connection of EVCP's. EVCP's to be EV Open Charge type to allow pay per charge for multiple users via Mobile Smartphone App and/or RFID card/fob authorization through a chosen OCPP back-office management system.

4.15 Earthing and Bonding

There shall be a new earthing system installed within the building consisting of new main earthing, bonding and circuit protection. Earthing shall be installed to meet BS 7671 & BS 7430. The system shall be designed and installed to provide new main earth rods and bars and connect all main distribution equipment. New main bonding to all incoming services shall be installed. All distribution boards shall be connected to the earthing system.

4.16 Installation

All installations shall comply with the Building Regulations.

All incoming electrical supply works shall be in accordance with UKPN requirements or other local supply authority as required.

Installations will be designed in accordance with all applicable British Standards, with particular reference to the below:

- BS7671 Wiring Regulations, 18th Edition
- BS 5839 Fire Alarms (Part 1 – Non-Domestic premises and Part 6 – Domestic premises)
- BS 5266 Emergency Lighting

4.17 Testing and Commissioning

Commissioning and testing of individual electrical services shall be carried out in accordance with BS 7671 (Wiring Regulations) and BS 5839 (Fire Alarms). Where additional input is received from Building Control or other official body, the Contractor shall incorporate requirements as necessary.

5. MEP PLANT SCHEDULE

ASHP outdoor units for commercial spaces (VRF)	4.5m x 3m for 2 no VRF Outdoor Unit at roof
Automatic AOV Smoke Vent	1.5m x 1.5m at roof for each core
ASHP outdoor units for domestic hot water and heating	5.2m x 13m at roof
Water tank and booster and hot water vessel and DHW Storage Tank	50 m² at Basement
Passive ventilation via openable windows	As per assessment
Sub Station (Located at ground floor level)	4.5m x 4.5m Located at Ground Floor -
Electrical Incomer Room – UKPN Head/CT's and Switchboard	Approx 3.3m x 4.2m within Basement
Electrical Riser – Ryefield Board and segregated route for Comms/Data and TV Services	Approx 1.4m x 3m (to run from ground floor to top floor) – decision on location of Smart Meters (Riser or Inside Apartment). Separate section or segregation for Data/Comms and TV Services.
Incoming Data/Telephone/TV Services Cupboard	Approx 2m x 4m located on the ground floor
Generator	Approx 3.5m x 5.5m – located on the roof or located externally within landscape. TBC by architect.
TV/Satellite Aerials	Located on Roof – Allow 2m x 3m area (flexible on location subject to signal strength and orientation required)
Sprinkler Tank	Approx 125 m² (L Shaped – Floor Space – 2m in height) at Basement with clear space and pumps. Space allowance around tank for installation/maintenance/inspection in accordance with BS/Building regulations & CDM 2015
Cupboards within apartments:	Heat Interface Units (HIU's) are approx. 577mm wide x 711mm high x 280mm deep and should be at mid high level with at least 600mm clear in front. Pipes entering/leaving at high level and distributing horizontally. These are for hot water and heating. Kitchen Extract ducts off hoods in each apartment to external facade terminals (Air brick vents) Distribution boards approx. - 350mm wide by 200mm deep x 400mm high and should be at mid/high level with at least 600mm clear in front