STAGE C REPORT

32 Jamestown Road - M&E Consulting Services
London and Regional Properties Ltd

CONFIDENTIAL

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CONSULTING ENGINEERS

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TABLE OF CONTENTS

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Overview

32 Jamestown Road, Camden, London NW1 7BY is an existing office building located in Camden. The building currently has a basement, ground floor and 1st to 4th office floors. It is proposed to refurbish the building to create enhanced office space with increased floor area while creating one additional floor incorporating office space on the 5th floor.

The modifications include:

- Modifications to all floors.
- Modifying the existing atrium.
- Adding a 5th floor for office space.
- Full strip out of the existing Building Engineering Services
- New Building Engineering Services to compliment the refurbishment

The services concept aims to provide the client with a high quality, flexible office building which is robust and energy efficient. Much thought has been given to designing the building to reduce energy consumption.

The overall concept for the building is one of simplicity, designing the services to be uncomplicated and robust, while achieving the optimum internal performance. The two service cores shall be used to service the floor plates, acting as spines through which all services shall run with take-offs at each occupied level. The service risers within each core shall be arranged to allow the floors to be sub divided for split tenancy.

This report provides details regarding the proposed engineering services concepts, prior to this report a number of studies have been undertaken to enhance the building performance. These include:

- Basement plant versus roof mounted plant to minimise planning risk and the impact on NLA.
- Heating & cooling options for the office areas.
- Relocation of the Electrical substation within the basement to the ground floor to maximise the NLA of the basement.

The following sections of the report outline the proposed works for Mechanical, Electrical, Public Heath, Fire Protection and Vertical Transportation services.

1.2. Purpose

This report has been produced for London and Regional Properties Ltd in order to describe the building services scheme design proposals relating to the extensive refurbishment of 32 Jamestown Road, Camden, with offices presented as Cat A.

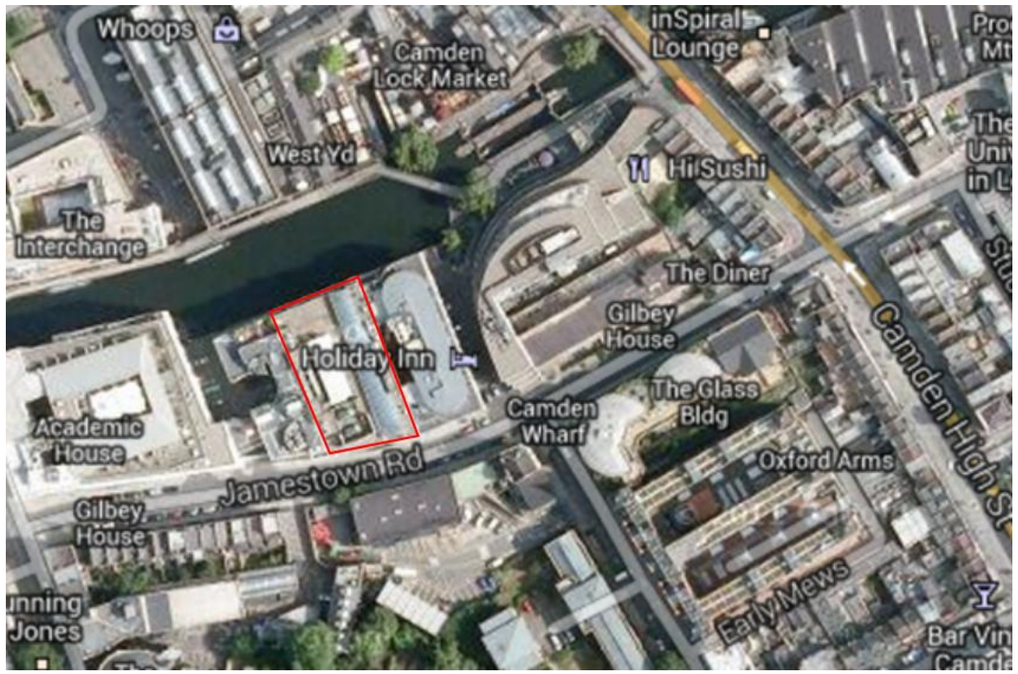
1.3. Authority

Authority to undertake this report was provided by Geoffrey Springer of London and Regional Properties Ltd.

1.4. Information Sources

The design proposals have been based on the following information sources:

- Ben Adams Architect's proposals
- Existing record drawings,` where available
- Expedition Structural Engineer's proposals.
- Project team meetings.
- Pre-assessment BREEAM team meeting for the offices.
- Site Surveys



Map showing 32 Jamestown Road

2. DESIGN CRITERIA

This section summarises the design criteria, parameters and capabilities of the building services systems. All figures contained herein are subject to review and verification in line with detailed design development.

2.1. Office Occupancy

1 person per 10m² for purposes of comfort cooling system design.

2.2. Sustainability / Energy Benchmarking

The building is expected to achieve a BREEAM rating of 'Very Good' based on the BREEAM Pre-Assessment.

2.3. Mechanical Services

2.3.1. External Design Criteria

Winter	-	4°C dry bulb / -4 wet bulb
Summer	-	30°C dry bulb / 21°C wet bulb

Chiller and cooling towers operating ambient temperatures up to 32°C dry bulb, 23 °C wet bulb

2.3.2. Internal Design Criteria

Office	-	22 +/- 2 °C
Toilets	-	19 °C minimum
Reception	-	22 +/- 2 °C (Excluding the vicinity of the entrance doors which may drop below this at times of high door usage)
Plant rooms	-	13 °C minimum

2.3.3. Humidity Control Requirements

It is not proposed to provide humidity control as part of this scheme.

2.3.4. Internal Load Assumptions

Office

Lighting	-	10W/m²
Office Equipment	-	15W/m² base system (plus 10W/m^2 within the central plant and chilled water risers)

2.3.5. Ventilation

Office Areas	-	12 litres per second per person + extra 10%
Toilets	-	10 air changes per hour extract
Basement	-	Mechanical extract ventilation with smoke extract to building regulations Parts B & F requirements
Plant Rooms	-	To suit plant requirements
Fire Fighting Lobby Vent	-	To suite fire strategy

2.4. Electrical Services

2.4.1. Power Supplies

The building maximum demand has been based on the following allowances.

Office

- Lighting 12W/m² (including task lighting and CAT B allowance)
- Small Power 25W/m²
- Mechanical Plant 60W/m² (55W/m2 applied across office & 5W/m2 across the common areas)
- Lifts 10W/m²

2.4.2. Lighting Levels

The lighting to the office and general areas shall be designed in line with CIBSE recommendations as follows:

Commercial

General Office	-	300-400 lux
Staircases	-	150 lux
Entrance/Reception	-	200 lux (generally, 300 lux over the desk)
Circulation	-	100 lux
Toilets	-	150 lux
Plant Room	-	150-200 lux

2.4.3. Life Safety Installation

A roof mounted standby life safety generator and associated switchgear to supply all life safety systems is currently detailed on the drawings. This shall supply power to all items of life safety, namely; the fire fighting lift, fire escape stair-core lighting, smoke extract fans etc.

2.5. Public Health Services

2.5.1. Offices

Rainwater Systems

Rainwater Systems	-	BS EN 12056 Part 3 – Category 2 level of protection to building. Storm return period 1.5 x life span of building.
Natural Gas System	-	Approximate gas pressure available at meter is 21mbar. Maximum pressure loss through system between meter and point of use 1mbar.
Incoming Cold Water Mains	-	Sized to replenish volume of cold water storage tanks within a 1-hour period with maximum velocity of flow of 1.5m/sec. Peak flow rates to include point demand attributable areas served directly from incoming mains.
Potable Water Storage	-	20 litres/person, based on 12 hours storage and 10m2 net internal area per person. - Small volume of non potable for washdown, ancillary items, irrigation and mechanical plant.
Hot & Cold Water Pipework Distribution	-	BS EN 806-4:2012 using the IOP loading unit method. Maximum velocity of flow restricted to 1.5m/sec within plant rooms and risers, 1.0m/s within ceiling voids

Minimum Pressure of Water Services	-	1.5 bar to draw off point.
Above Ground Sanitation	-	BS EN 12056 Part 2 based on a frequency factor of 0.5. Discharge method of occupation.
Hot Water Generation	-	Centralised unvented heaters generated from centralised gas fired boilers. Hot water generation stored at 60°C, hot water service flow 55°C incorporating a secondary return.
Above Ground Sanitation-	-	BS EN 12056 Part 2 based on a frequency factor of 0.5. Discharge method of occupation.
Hot & Cold Water Pipework Distribution	-	BS EN 806-4:2012 using the IOP loading unit method.
Velocity of Water Services	-	Maximum velocity of flow restricted to 1.5m/sec within plantroom and risers, 1.0m/s within ceiling voids.

2.6. Noise Criteria

2.6.1. Building Services Installation

To be advised by the acoustic consultants, WYG.

Office

Internal

Office Areas	-	NR38
Toilets	-	NR45
External	-	Plant and equipment shall be selected such that the background noise level meets the planning conditions.

Plant and equipment shall be selected such that internal noise criteria are satisfied and the background noise level at the nearest adjacent building is not increased beyond that which is stipulated in the planning requirements. Attenuators shall be provided as required to satisfy the requirements of the acoustic engineer.

2.7. Vertical Transportation

2.7.1. Offices

3 x 1000 kg 13 person Passenger lifts shall be provided to meet the BCO recommendations in terms of people moved within a 5 minute period and the occupant waiting time as follows:

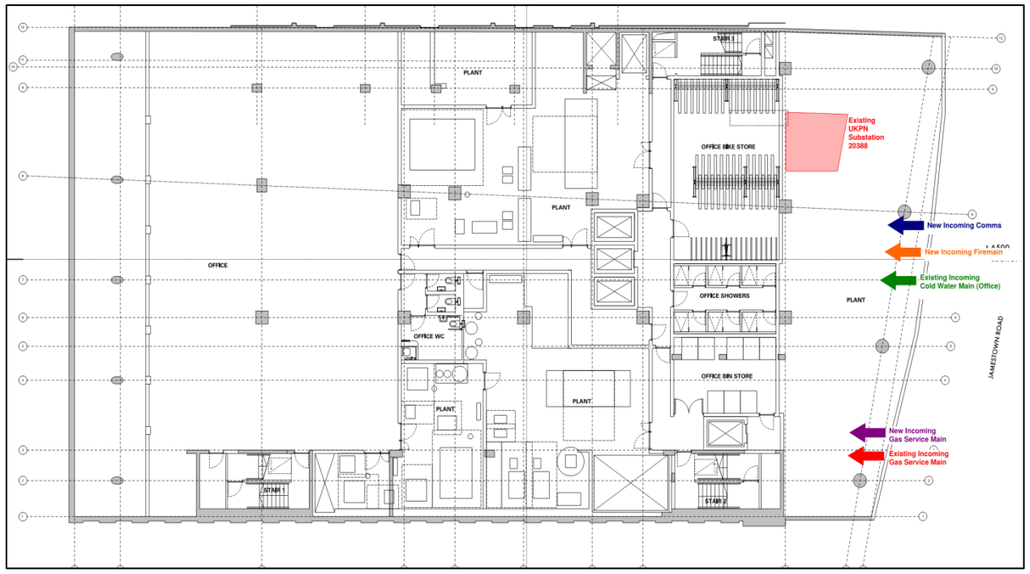
- Less than 30 seconds ‘up peak’ interval
- Handing capacity of greater than 15%
- Based on an occupancy of 1 person per 12m² which is approximately equivalent to an occupancy of 1 person per 10m² with 80% utilisation.

1 lift to transport a minimum of 2 refuse bins from the basement to ground floor.

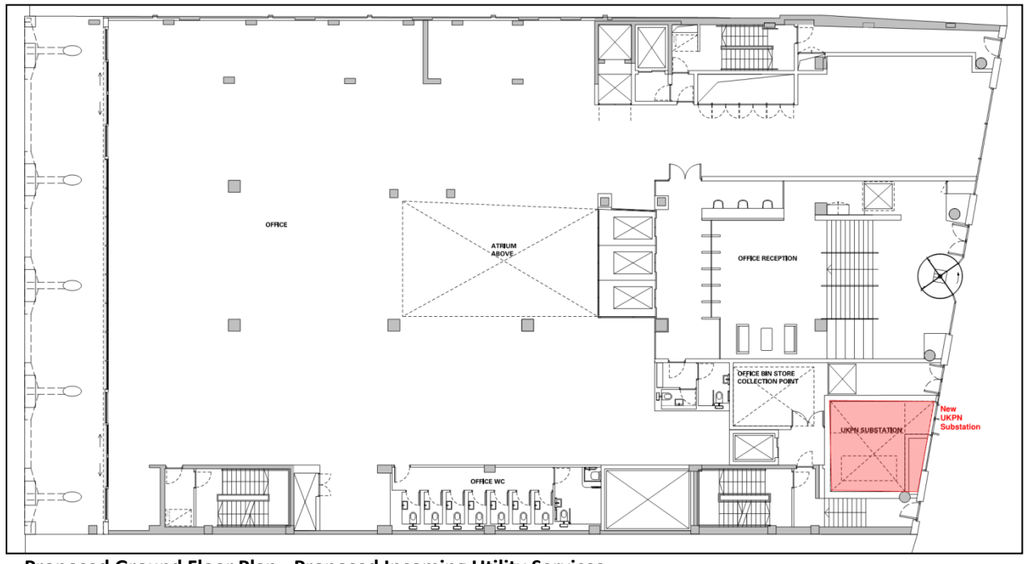
1 x 1000 kg 13 person Passenger lift shall be provided to serve the office. This lift shall be designated a fire lift and shall be connected to the emergency generator for continued operation under mains failure.

3. UTILITIES

3.1. Overview



Proposed Basement Plan



Proposed Ground Floor Plan - Proposed Incoming Utility Services

3.2. Water Services

Offices

The existing 50mm diameter metered mains cold water service that serves the offices enters the building at basement level via Jamestown Road . This cold water main needs to be assessed, condition surveyed and if proved suitable this existing main could be retained and reused to serve the offices. The existing water meter shall be removed and replaced with a new pulsed output meter.

3.3. Drainage

The existing combined foul and surface water sewer outfall is located within the basement slab and is routed to connect to Thames Water Utilities sewer network within Jamestown Road. The design of the below slab drainage is being provided by the Structural Engineer, Expedition.

3.4. Electrical

Existing

Electrical power to the existing building is currently provided at low voltage from the existing on site basement substation.

Substation 20388 is located in the basement floor at the south east corner of the building and accessed from within the building or from Jamestown Road at ground floor level via steps to the basement and a vehicle ramp. The existing UKPN transformer serves the building MEP services as well as the neighbouring wider community network.

There are currently 2No. LV supplies (630A) serving 32 Jamestown Road from the above substation.

Proposed

Plant replacement for the existing UKPN basement substation is via the existing car park ramp to ground floor. The proposed new basement plan does not include the existing ramp and as such compromises this existing plant replacement strategy.

It is proposed that a new substation is constructed within a ground floor location, to enable access direct from the street. The existing substation shall be decommissioned and the network services transferred to the new ground floor substation.

The new substation is to provide 2No new supplies, 1No serving the 1200A Landlord's switchboard and the second serving a new 630A tenant switchboard.

New LV cabling shall be provided on high level containment to a new main switchroom located in the basement area, as indicated on the NDY combined services drawings.

The Landlord and tenant's main utility meters shall be located on the new main switchroom walls but just outside the room. All utility meters shall be labelled to indicate exact supplies being metered.

All other Landlord and tenant building loads fed directly from the main switchboards shall be sub-metered, as indicated on the concept LV Schematic.

Space provision, shall be provided to allow the meters to be read remotely via telephone connections.

A telephone outlet shall be provided adjacent to each utility meter to allow the meters to be read remotely.

Activity	Date
Initial Application made to UKPN	26 Apr 2014
Acknowledgement of application received from UKPN	01 May 2014
Project Designer (Lee Metselaar) appointed by UKPN	09 May 2014
Project referred to UKPN planning department by Lee Metselaar	10 Jun 2014
Re-applied to UKPN	Jul 2014
Full quotation received	15 Oct 2014
Email sent to Lee Metselaar to inform him of new site configuration & new load requirements	15 Apr 2015

UKPN Utility Tracker

3.5. Low Pressure Gas

There is an existing 80mm diameter low pressure incoming gas main that enters the building at ground floor level via Jamestown Road to serve the building's gas meter. The Client shall arrange for this meter to be isolated and disconnected by their gas service provider. The existing 80mm diameter incoming gas service shall be removed in its entirety under the demolition contract.

A new incoming gas service shall be extended from the local authority network within Jamestown Road to a dedicated gas meter room located within the basement to serve the office gas meter.

3.6. Telecommunications

Ducts and containment shall be provided from Jamestown Road to the communications rooms. A secondary intake cupboard can also be provisioned if required to allow a commercial tenant who takes a whole floor to be provided with diverse telecommunications services to their tenancies.

Communications riser space provision of 100mm wide basket per commercial tenancy shall be provided within the horizontal risers (two per floor) to enable commercial tenants to install their required communications cabling from the basement communications room to their tenancy.

3.7. Firemain

A new incoming metered firemain served from Thames Water Utilities mains network within Jamestown Road shall be provided to serve the basement level offices in accordance with the Fire Strategy Report. Flow and pressure test of the mains has been carried out and the main has the capacity to provide a fully compliant sprinkler system direct from the main.

4. MECHANICAL SERVICES

4.1. Introduction

The mechanical services have been designed to minimise the environmental impact and energy consumption of the building as much as possible. Efficient systems have been carefully selected in order to reduce the energy required to support the building loads. Consideration has been given to systems that enhance the working environment whilst requiring lower maintenance.

4.2. Office Ventilation

The general office areas shall be ventilated by 2 air handling units (AHUs) located in the basement. To allow for a future tenancy split on the office floors, the 2 AHUs and their associated risers have been located on opposite sides of the floor plate.

The fresh air intake and exhaust discharge for these systems shall be located at roof level. Intakes and discharges shall be located separately to maximise the separation between supply and exhaust, minimising the chance of any local pollutants from entering the fresh air stream.

Each AHU shall include 10% extra capacity available within the tenant riser for future meeting rooms.

Both air handling units shall consist of the following major components:

Filter Section	-	This section ensures that particulate contamination drawn from outside the building is removed prior to supply into the office areas.
Heat Recovery	-	Thermal wheel Heat recovery components shall be included to recover energy from exhaust air; maximising energy efficiency.
LTHW Heating, CHW Cooling Coils	-	These shall be controlled to temper the supply air temperature supplied to the space.
Supply Fan	-	Fan units with variable speed drive
Office Areas	-	The AHUs shall deliver tempered fresh air to the back of each fan coil units serving the tenancies via exposed supply air ductwork.

Extract air from each tenancy shall be via exposed ductwork with an extract air bellmouth located at high level in each tenancy.

4.3. Office Central Cooling System

Two options were considered for the chilled water arrangement.

- Air-Cooled chiller located at roof level.
- Water-cooled chillers in the basement with a cooling tower at roof level.

Due to space constraints and to minimise plant at roof level it is not possible to progress the air cooled option. Further to this, the selected water-cooled chiller strategy can typically achieve higher energy performances than the air-cooled option; and has been proposed for this development.

Chilled water shall be generated via 2 water cooled chillers located in the basement. Heat rejection for this system shall be via a single cooling tower located on the 5th floor plant area. Due to spatial restrictions at roof level 5, only one cooling tower is being proposed. Reliance on a single cooling tower presents a risk as it carries implications with regards to resilience; preventative maintenance that require the cooling system to be shut down for the building. These activities shall need to be managed during out of hour periods.

Chilled water shall be pumped around the building via variable speed pumps that shall turn down at times of low cooling demand. On-floor take offs shall be metered in compliance with CIBSE design guide TM39. Branch distribution pipework at each level on the tenant chilled water risers shall be sized to include for an additional 10W/m² capacity with valved and capped connections provided for tenant's future use for meeting rooms, etc.

4.4. Office Central Heating Systems

Low temperature hot water (LTHW) shall be generated via gas fired condensing boilers located in the basement. Flues for this system shall discharge at roof level and shall be located to minimise contamination to the fresh air intakes. Flues shall be extended above the roof in accordance with the Clean Air Act; nominally 3m above roof level.

Heating hot water shall be pumped around the building via Variable Speed pumps that shall turn down at times of low heating demand. On-floor take offs shall be metered in compliance with CIBSE design guide TM39.

A variable temperature secondary heating water circuit shall serve the stair core radiators. This LTHW pipework shall rise within the stair cores.

A constant temperature, variable speed secondary heating water circuit shall serve the central AHUs in the basement, frost coils on the AHUs at roof level and the FCUs at each tenancy. This LTHW pipework shall be distributed up the central risers with metered branch connections to each tenancy.

4.5. Heating & Cooling Systems

4-pipe Fan Coil Units (FCU) shall provide heating and cooling to the office tenancies. The fan coil units and associated services are to an exposed to view service strategy.

Low Temperature Hot Water (LTHW) heating pipe work and Chilled Water (CHW) pipework shall be routed from the basement plant room via the main core risers with a metered branch connection serving each tenancy. Exposed branch pipework running at high level shall connect to each FCU.

Tempered fresh air from the central air handling unit shall be ducted up the central risers and out to the back of each FCU via exposed, flat galvanized steel ductwork.

Conditioned air from each fan coil shall be ducted through circular solid galvanized sheet metal to a number of circular S/A grilles where it shall be distributed to the space.

4.6. Office Toilet Extract Ventilation

An Air Handling Unit with a plate heat exchanger heat recovery unit, located at roof level 5, shall provide toilet supply and exhaust to the office WC areas and exhaust to the basement shower area (makeup air for the shower area shall be from the AHU serving the basement plant room). The toilet supply and exhaust duct riser shall be located in the main Core C riser adjacent to the toilet blocks and extract air shall be via ceiling mounted air valve grilles.

4.7. Bin Store Extract Ventilation

A dedicated extract system shall serve the basement and ground floor bin stores, discharging at roof level 5. Make up air shall be provided via the AHU serving the basement plant room.

4.8. Office Controls

A building management system (BMS) shall be installed to provide automatic control of the services within the building. This system shall comprise a number of standalone BMS outstations connected together via a wide area network.

A user interface shall be provided in the form of a PC located in the basement BMS room. This interface shall provide a point for central monitoring and adjustment of the controls for various systems. The system shall also have the ability to be remotely accessed via a web link.

The BMS system shall include a number of room temperature sensors to allow the control of the heating and cooling systems.

The BMS system shall be flexible to allow incoming tenants to extend it to suit their fit-out, including the addition of new equipment into the system. The BMS system shall be open protocol to allow future additions to the system by alternative control houses and for maintenance contracts to be let out for tender to alternative control houses without restriction to a single supplier.

4.9. Future Office Provisions

An additional 10W/m² of chilled water shall be provided via capped off connections on each floor for use by future tenants for meeting rooms etc. Further to this provision, plant area and riser allocation have been provided for future tenant supplementary condenser plant for server/comms room.

4.10. Ground Floor Reception Area

VRF Fan Coil Units shall provide heating and cooling to the ground floor reception lobby area to meet the specified loads. The dedicated system shall run independently to allow 24/7 operation without the need to run the large central plant.

The condenser unit shall be located in the ventilated space adjacent to the UKPN substation at ground floor. The FCUs shall be concealed within the reception architecture.

4.11. Smoke Management Systems

4.11.1. Basement 2 smoke extract system

A basement smoke extract ventilation system shall serve each fire compartment in the Basement area. The system shall extract 10 air changes per hour, in line with the requirements of Approved Document B, from the affected fire compartment.

The ductwork serving this system shall be fire rated and shall contain a system of mechanical smoke and fire dampers that shall be automated to ensure extract from only the fire affected compartment.

The extract system shall be sized to extract the largest fire compartment and its essential power supply shall be generator backed up and have fire rated cables.

4.11.2. Fire fighting stair ventilation

The fire fighting lobby shall be protected with a mechanical extract ventilation system. This system requires the provision of a 0.6m^2 free area builder's work shaft running from Ground floor to Level 5. Connected to the shaft at roof level are Run/Standby Fans which shall interact with an Automatic Opening Vent at the head of the stairs and an openable panel within the smoke effected fire fighting lobby to ensure that smoke is cleared thus protecting the escape staircase

5. ELECTRICAL SERVICES

5.1. Introduction

The following bullet points summarise the principal aspects of the Electrical Services concept design proposals:

- 2 No. LV Supplies (to be provided from new UKPN transformer substation room)
- New Mains Electrical LV Infrastructure
- Power Factor Correction.
- Surge Suppression.
- Life Safety Installation
- Small Power Distribution
- Utility Metering and Monitoring
- Earthing and Bonding
- Lighting & Lighting Control
- Emergency Lighting
- Disabled Person Alarm & Refuge Systems
- Lightning Protection Systems
- Containment for Power/Comms/BMS/Security/Fire

5.2. Mains LV Infrastructure

The existing UKPN substation No. 20388 in the basement shall be decommissioned and replaced by a new substation at ground floor level (refer to Utility Services section of this report).

The new substation shall provide 2No new LV services to the building, namely: 1No for the Landlord switchboard and 1No for the tenant switchboard. In addition to the above, the new UKPN substation shall provide LV power to the local network.

The Landlord's LV feed shall terminate into a separate 1200A rated LV switchboard. The switchboard shall provide power to common area distribution boards, HVAC equipment, lifts, primary life safety supplies, etc.

The Landlord switchboard for this development shall be a cubicle type Form 4, type 2 segregation with a moulded case circuit breaker (MCCB) incomer and MCCB's protecting the outgoing supplies.

The tenant LV switchboard shall feed mainly lighting and power distribution boards within the office areas. The switchboard shall be rated at 630A and also be of form 4, type 2 segregation.

5.3. Power Factor Correction

Provide a bank of staged & detuned power factor correction capacitors, installed integral within the new switchboards. The PFC installation shall be required to ensure an overall site power factor of at least 0.97 lagging.

5.4. Surge Suppression

Provide surge suppression devices within the main switchboards, namely; Furse ESP415 units to protect the new installation from any surges in voltage due to lightning strikes.

5.5. Earthing and Bonding

A main earthing bar shall be established in the LV switchroom to which main earthing and equipotential bonding shall be connected.

The earthing systems shall be developed further during the next stage and shall be designed in accordance with the requirements of BS 7671 and BS 7430.

5.6. Risers

The building shall consist of electrical risers to provide separate cabling services to the tenant and Landlord areas respectively.

5.6.1. Tenant Electrical Risers

The electrical services have been designed to provide maximum flexibility for incoming tenants. To provide this flexibility, electrical risers have been located to allow a notional office split.

2No dedicated office tenant distribution boards shall be provided on ground to 5th floor. 1No board shall be provided in the basement.

The Cat A fit-out shall include final circuit installation to office lighting and general purpose/cleaners socket outlets. The MCB distribution boards shall be typically 100A 12-way TP&N and shall have spare spaces available for future installation of tenant's small power services. The Lighting & small power circuits ' be metered separately to comply with Part L requirements.

Submains armoured cables with low smoke zero halogen outer sheathing shall be distributed on galvanised steel cable trays, feeding distribution boards and plant items throughout.

Cabling to equipment that is categorized as part of a life safety system shall be suitably fire rated and protected against mechanical damage. Where required, mains and generator supplies to life safety equipment shall terminate into an automatic transfer switch devices in the same fire compartment as the plant and suitably fire protected.

In order to comply with BS 9999 and BS 8519, the mains and generator cabling routes shall be diversely routed throughout the building.

5.7. Life Safety Installation

The conceptual design planning drawings currently indicate an ISO containerised diesel standby generator as a secondary source of backup power to the life safety systems.

The standby generator indicated shall provide back-up power to the life safety services only for a period of 8 hours. The generator shall be called to start by mains failure signals from automatic transfer switches (ATS's) installed throughout the building.

A day tank shall be provided either separately within the container or under the set as a belly tank. The day tank shall be sufficient to provide 8 hours of continuous operation of the life safety generator. Fuel top up shall be by manual delivery via the lift or staircase.

Following an acoustic review of the level 5 external plant, there shall be a requirement to isolate the vibrations of the generator set from the level 4 and 5 offices.

An LV main fuseboard shall be provided within a weatherproof ventilated GRP enclosure on level 5 roof for distribution of generator power. Outgoing fuses shall be cabled to the life safety supplies. Sufficient space shall be provided within the GRP enclosure for it to be maintained from within the enclosure.

ATS's shall be provided at the input to the life safety equipment. The generator shall start upon a mains failure signal from any of these devices.

We are investigating an alternative option to use a separate UKPN LV supply from the local street network. This we envisage would represent cost and time savings for the project but would need confirmation from Building Control and UKPN.

5.8. Metering

UKPN approved utility (MID) metering shall be provided within the basement, mounted external adjacent to the basement electrical switchroom within a dedicated cupboard. Utility meters shall be provided for the Landlords and tenants LV switchboards.

The Landlord shall be billed directly by the Electricity Supplier for the Landlord and office energy usage.

Digital energy meters shall be provided throughout the system to meet the requirements of approved document Part L. These shall be provided on all outgoing breakers at the main Landlord and tenant switchboards. Independent meters shall also be provided integral to the split lighting and small power distribution boards for separate monitoring of energy usage and billing by the Landlord.

5.9. Energy Monitoring & Automatic Data Collection

A standalone energy monitoring system shall be installed with a dedicated PC headend to record 90% of the building annual energy consumption.

This system shall connect up all the building energy meters to allow automatic recording of energy usage split in terms of the end use categories such as:

- Lighting
- Small Power
- Cooling
- Ventilation
- Lifts
- Heating, etc.

5.10. Landlord's Small Power

General small power outlets shall be provided throughout the Landlord areas of the building to serve cleaning equipment, plantroom maintenance, hand dryers, reception desk, security services etc. These outlets shall be fed from local Landlord MCB distribution boards via ring and radial circuits and shall be protected by 30mA residual current devices.

5.11. Tenant's Small Power

General small power distribution to tenant's space shall not be provided as part of the Cat A fit-out, allowing incoming tenants maximum flexibility upon moving into the space.

5.12. Wiring Systems

The wiring system shall be generally three core LSF sheathed, stranded copper cables, installed within tray, conduit and trunking, as required.

5.13. Lighting

5.13.1. General Offices

Office areas shall be illuminated by low energy, electronic, suspended LED luminaires. The lighting shall be DALI controlled to enable the lighting layout to be easily reconfigured for partitioning works without major alterations. Perimeter lights shall be daylight linked through combined PIR/daylight sensors and shall be dimmed when appropriate to maintain the required lux levels.

The lighting shall be controlled by means of a lighting control system in order to comply with the requirements of Approved Document ADL2B of the Building Regulations.

Emergency lighting shall comply with BS 5266.

The office lighting including the reception, atrium, lift lobby and WCs shall be designed in correspondence with the architect and in line with the architecturally proposed ceilings. To maintain the proposed energy efficiency of the building, the lighting shall consist of fluorescents and LED fittings where possible.

An addressable lighting control system shall be installed for the office areas with the PC head end located within the building managers office. Lighting control shall be via PIR and photocell dimming.

Plant rooms, shall be provided with fluorescent heavy duty type battens, IP rated to the degree necessary for each area.

5.14. Emergency Lighting

Emergency lighting shall be provided throughout the building to meet the requirements of BS 5266 and current European Standards. The system shall utilise self-contained battery packs and inverter units integrated within the general luminaires and provide battery autonomy of 3-hour duration.

The emergency lighting system shall be designed to achieve an average maintained illuminance of 1 lux along defined escape routes with a minimum of 0.5 lux at any point on the floor plane for a period of three hours after a break in the mains electricity supply.

Due to the small amount of Landlord office areas it is not proposed to have an emergency monitoring system.

5.15. Lightning Protection Systems

A survey of the existing lightning protection system shall be commissioned with a view to reuse. This system shall be tested to ensure compliance with current standards (BS EN 62305) and modified / extended as necessary in line with the new building configuration.

Surge protection shall be provided within the main LV switch panels.

5.16. Telephone, Communications, Security and Data Systems

A containment system shall be provided for the installation of communication and security wiring both by the Landlord and tenants. Cable trays shall be provided from the communications intake to the comms/security riser and the comms room.

5.17. Photovoltaic System (PV)

PV's are proposed to be installed on the office roof.

The system would consist of PV monocrystalline panels which are interconnected together to form an array. The system shall be interconnected via double pole isolators, surge suppressors, inverters and connected to the main Landlord switchboard as indicated on the schematic.

The PV system shall have to comply fully with the requirement of UKPN, G83/G59 protection relays, to allow the energy generated by the PV installation to be utilised and measured via utility meters as required.

An access system would need to be integrated into the proposed PV array zone to allow personal access & maintenance.

5.18. Fire Detection and Alarm

5.18.1. Office and Common Areas

A fully analogue addressable automatic fire detection and alarm system shall be provided throughout the development in accordance with life safety requirements of BS 5839 Part 1 to a category L2+M type system. The fire detection and alarm system shall be an open protocol type.

A category L2+M type fire detection and alarm system shall provide fire detection to the following areas:

- Escape routes and stairways
- All corridors
- All voids greater than 800 mm deep
- Rooms leading onto escape routes
- Other areas forming part of the common escape route
- In rooms or areas which are considered a high fire risk

The following describes the typical fire detection and alarm system arrangements:

- Office floors shall be provided with addressable loops for tenant and Landlord areas.
- The building shall be configured for simultaneous evacuation.
- Sounders shall be installed throughout and sited such as to provide a minimum sound level of 65dB or 10dB above ambient noise levels.
- Manual fire detection in the form of manual call points shall be provided throughout the building, generally adjacent to storey exits and final exits.
- The fire detection and alarm system shall be interfaced with other systems to initiate automatic fire mode control of the following; mechanical services for system shut down, public health services for gas shut off, lift services for automatic grounding, AOV's, and security services for door release.

5.18.2. Disabled Refuge and Fireman's Communication System

A combined disabled refuge and fireman's communication systems shall be designed and installed in accordance with BS5839 Part 9 and BS 9999.

The disabled refuge communication system shall be installed for emergency intercommunication between strategic locations within the building, located within the escape stairs.

The disabled refuge communication system shall operate independently of all other fire systems within the building.

The disabled refuge communication system shall comprise of:

- The disabled refuge communication system control panel.
- Disabled refuge communication remote units only in the escape stair.
- Fireman's telephones shall be provided to each fire fighting lobby.
- A disabled toilet alarm shall be provided in each disabled toilet.

6. COMMUNICATIONS SERVICES

6.1. Introduction

The following bullet points summarise the principal aspects of the Communications and Security Services design proposals:

- Incoming Telecommunications Services
- Structured Cabling System
- Integrated Communications Network
- Television Distribution System
- Voice Services
- Induction Loop
- A minimum 10 minutes UPS backup mounted within rack.

6.2. Incoming Telecommunications Services and Communications Room

A Main Equipment Room and a secondary intake room/cupboard shall be provided for the development. 3 No 150mm ducts shall be provided to each communications intake room/cupboard allowing for fibre, copper and a future spare as well as diverse communications intake.

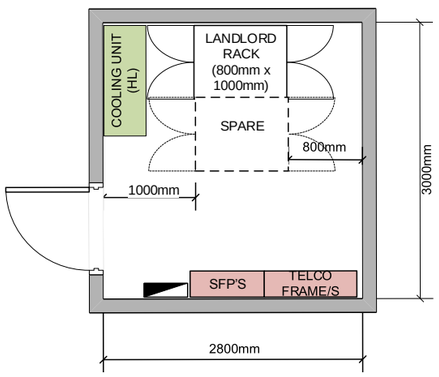
The contractor shall be responsible for organising/ordering all incoming telecommunications lines from the telecommunications provider.

The incoming telecommunications cabling provided by the services provider(s) shall terminate within the communications room

The MER shall services the landlord services of the development and also house the following equipment:

- Space for 2 No. 800mm x 1000mm server cabinet (Landlord cabinet + Future space)
- Wall mounted equipment, ie: Security field panel(s), Telco Frame, etc.
- Refer to Controls section below for servers and system located within the MER

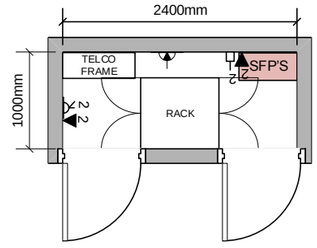
The proposed layout of this room is shown in the below.



Indicative Main Equipment Room (MER Layout)

A secondary intake cupboard shall be provisioned to allow commercial tenant(s) who takes a whole floor to be provided with diverse communications services to their tenancy if required. This secondary intake cupboard shall be size to allow for wall mounted Telco frame and associated wall mounted equipment.

An example of the size required is shown in the following figure.



Indicative Secondary Intake Room Layout

6.3. Structured Cabling System

CAT6 cabling shall be provided for all IP services throughout the development. This cabling shall be terminated within the landlord services rack in the MER. All cabling within the commercial tenancy space shall be provided by the commercial tenants.

From the MER, each reception workstation shall be provide with 3 No. CAT6 cabling. Telephones lines shall also be provided for the following services

- Lifts
- Services metering (ie: Electrical, Gas, etc)

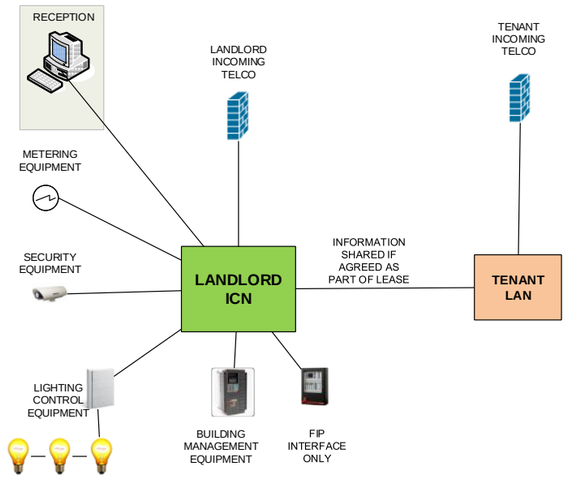
6.4. Integrated Communication Network (ICN)

Traditionally a building would be designed with separate infrastructure for all different services, particularly Building Management System (BMS), security, lighting, guest wireless services etc. This traditional method is a legacy design and is used because not all services were using the same protocols and not all protocols could communicate.

The industry is moving towards an Integrated Communications Networks (ICN) for buildings, where the systems are segregated virtually rather than physically. This allows for a common backbone infrastructure to be shared between building services, security and corporate. This method has a large number of advantages for both landlords and tenants for the future operation and flexibility of the development as well as being the backbone for a “Smart Building”. A Smart Building provides an organisation the ability to monitor, control and manage a building over an integrated infrastructure.

A simple shared network can be provided for the following:

- Building Management System
- Metering
- Lighting Control System & Emergency Lighting Control System
- Security System



ICN Topology

6.5. Television Distribution System

Television services shall be available for all tenants via a shared integrated reception system. The system physical infrastructure shall be provided including all hardware, backbone cabling and satellites to provide Freeview services and the ability to connect to SkyTV if requested by the tenant (via SkyTV with additional hardware). Other TV services (ie: Virgin Media, BT, etc) shall be provisioned and available upon request via the incoming telecommunications cabling.

All TV panels and equipment shall be located within the landlord communications riser cupboard with satellites and antennas located on the roof.

No provision has been made to allow for foreign channels.

Multiswitches shall be sized to allow for 2 No. TV outlets per tenancy. All TV cabling from the multiswitch(s) to the final TV outlet location within the tenancy space shall be provided by the future tenants if they wish to connect to the TV system.

6.6. Voice Services

Telephones shall be provided with independent lines to:

- Reception
- Lifts
- Fire Indicator Panel (including 1 Redcare line)

No voice services to the tenant area shall be provided. All voice services to tenant areas shall be provided by tenants.

6.7. Induction Loop

Induction loop shall be provided only to the reception within the office tenancy space.

6.8. Wide Area Network Services

NDY assumes that all wide area network services, including router, firewall and any external connectivity is provided by the Client or Tenant(s).

7. SECURITY SYSTEM

7.1. Introduction

The security system for the development shall include:

- Security Management System (SMS)
- Electronics Access Control System (EACS) with provision for Visitor Management System
- CCTV Camera System
- Intruder Alarm System (IAS)
- Intercom System
- A minimum 10 minutes UPS backup mounted within rack.

A single Redcare line shall be provided for monitoring of security and fire alarms.

7.2. Security Management System (SMS)

Allowance shall be made for the upgrade of the CCTV or EACS software to a Security Management System (SMS). If implemented in the future, the software shall integrate all security services to present one management interface for the security personnel to use to monitor alarms.

7.3. Electronic Access Control System (EACS)

An electronic access control system shall be provided for landlord areas only, including the exit stairwells on all levels and containment provision to the door for the commercial tenant areas. EACS within the commercial tenancy area shall be by the tenants, however tenants shall be given the opportunity to utilise the landlord security systems as part of their lease agreements.

The landlord EACS must have the ability to be partitioned for tenant access. In addition, the landlord access card shall be capable of being used by the future tenant's system such that only one (1) card is required for both the landlord and tenant system.

It is proposed that MiFare Plus is used as the credential technology throughout the building.

The table below is the strategy summary for access control lock types.

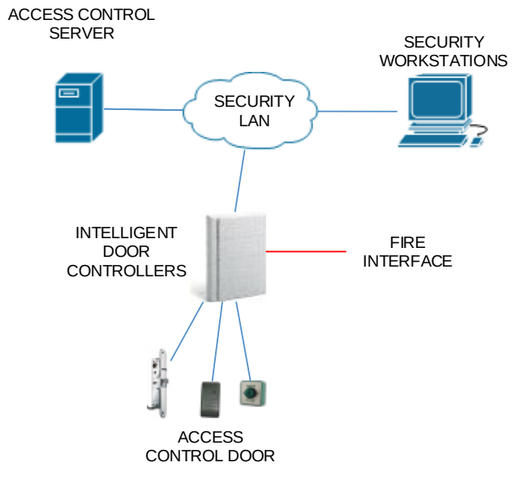
Door Location	Recommended Type of Lock
BOH/BOH	Maglocks
FOB/BOH, including doors to stairwells.	Maglocks, mounted on the BOH side. Z bracket may be required for inward opening doors.
FOH/FOH (single door type)	Electric strike locks
FOH/FOH (double door type)	V Locks
Door(s) with lever handles, location TBC	Solenoids or electric strike for glass doors
Speedstiles on commercial reception area	By architect. Provide containment only.
Tenant entrance/exit doors (internal)	Containment only

All lock types for each door shall be agreed with the architect.

The following assumptions have been made:

- The EACS shall interface with the fire system to the automatic release electrically locked doors in the event of an emergency.
- All doors on a fire egress route shall fail safe or fail open and have a green break glass override on the activation of a fire alarm for the relevant zone.
- The EACS shall interface with the lift control system for access control to specific floors.
- The intelligent door controllers shall come with an onboard memory and shall be capable of remaining operable in the event of the main server failure.
- Battery backup (minimum 2 hours) shall be provided to maintain operation of the access control equipment on the loss of mains power.
- Reception desk shall have a wireless button for the release of entry gates by receptionist/security.
- The system selected shall have the ability to be adapted to be a visitor management system in the future if required without requiring a completely separate system.

The proposed topology of the EACS is shown in the following figure:



EACS Topology

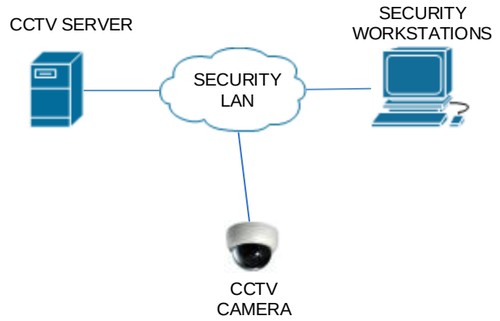
7.4. Closed Circuit Television System (CCTV)

An IP CCTV system shall be provided within the landlord area only, including all external doors, cycle room, BOH corridors and shared corridors, and shall be used for general surveillance for safety and security. CCTV layout has been reviewed and was agreed in principal at the meeting. This shall be used to further develop the CCTV strategy.

The following assumptions have been made:

- Recording are to be 24/7 at a frame rate of 4fps with 12fps during alarm conditions using video motion detection. All recordings shall be kept for a minimum of 30 days. Storage shall be RAID 5 configured.
- CCTV cameras shall have a minimum resolution of 1Mpx
- CCTV camera shall utilise Power over Ethernet (PoE) where possible.
- Recognition quality footage throughout with minimum identification at entry/exits to building.
- The CCTV system shall be provided with minimum 10 minutes battery backup via network UPS, rack mounted.
- Colour of ¼ inch CCD video cameras inclusive of mountings and lenses.
- Any external cameras to come with housing to suit the external environment (minimum IP66 rating) and with IR.

The proposed topology of the CCTV system is shown in the following figure:



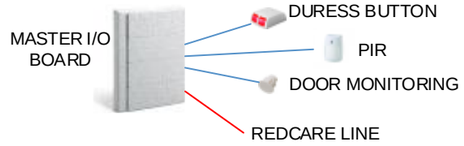
CCTV System Topology

No provision has been made for CCTV video analytics.

7.5. Intruder Alarm System (IAS)

An intruder alarm system shall be provided with a Grade 2 wired system as discussed at the meeting on 22 September 2014. IAS shall be provided to the commercial main entry door where the system shall be able to interface with the SMS for event monitoring if required.

The proposed topology of the IAS system is shown in the following figure:



IAS Topology

No provision has been made for panic alarms.

7.6. Intercom System

An IP audio only intercom system shall be provided as follows:

- Master intercom location at the commercial office reception
- Slave audio intercom panel located at the entrance/exit doors of the commercial area
- Interface with the EACS to enable remote door release by the commercial office reception
- No remote release from the commercial tenant floors,

CAT6 cabling shall be provided to each tenancy space to allow tenants to connect to extend the intercom within the tenancy space.

8. CONTROL SYSTEMS

8.1. Introduction

The landlord control systems for the development shall include:

- Automatic Metering Reading and Billing System
- Building Management System
- Lighting Control System and Emergency Lighting Control System

8.2. Automatic Meter Reading and Billing System

In order to align with Part L requirements and because there is shared plant for commercial tenancies, an Automatic Meter Reading and Billing system shall be provided for the development. This shall only monitor the commercial areas of the development.

Meters shall include:

- All utilities incoming connections shall have a landlord meter, include electricity, gas and water.
- Tenant distribution boards shall be split load lighting and small power distribution boards, and shall be supplied with 2 No integral MID approved meters for Part L conformity and to allow the client to bill the commercial office tenants for their usage.
- Heat meters shall be provided as part of the mechanical services installation within each applicable office tenant riser to allow billing of chilled water and low temperature hot water (LTHW) usage, the Modbus ports on all tenant meters (electricity, CHW, LTHW) shall be networked together and terminated into an Ethernet gateway to allow for the components to communication over the ICN.
- Water meters with pulsed outputs shall be provided as part of the public health services installation for hot and cold water to the toilet facilities on each of the floors.
- Gas meters with pulsed outputs shall be provided as part of the public health installation in line with the requirements of BREEAM and Building Regulations Part L.
- All Ethernet components of the metering shall utilise CAT6 Cabling and the ICN

The system shall be capable of 30minute interval readings (adjustable) and shall be connected to the Derwent London centralised monitoring system.

8.2.1. Building Management System

A Building Management System shall be provided to allow control and monitoring of all mechanical systems within the development. The BMS system shall be an open protocol system and shall utilise the ICN backbone for communications. The system shall have a high level interface with the security and energy management system.

8.2.2. Lighting Control System and Emergency Lighting Control

The lighting control system shall be provided as part of the M&E design. It is understood that all lighting fittings within the commercial office space shall be Dali control.

8.3. LANDLORD EQUIPMENT

The following sections outline the equipment provided by the Services Contractors.

Office Reception Desk

The reception desk is to have the following equipment:

- 2No, 13A twin socket + 3 data outlets per desk position (assumed 3No positions)
- Main entrance disabled pass door override button (software)
- Computer for access to Security, BMS monitoring, Lighting Control and general internet.
- Wireless keyboard and mouse
- Master intercom headset
- Below desk panic alarm
- Below desk heater
- Main Office Telephone (By Client).
- Reception (generally)
- Main Fire Indicator Panel

Landlord MER

- CCTV system, monitors and controls (19" rack mounted)
- Access Control system head end (19" rack mounted)
- Building Management System (BMS) PC (19" rack mounted)
- KVM (share one set of keyboard/monitor/mouse for all systems)
- Networking equipment (19" rack mounted)
- Intercom server
- Lighting control server (19" rack mounted)
- Metering server if not integral to BMS (19" rack mounted)
- Incoming telecommunications lines for landlord and tenants
- WAN equipment (By Client)
- 1 x 42" Rack with dual power supply
- 10minute UPS

8.3.1. Scope summary

Please refer to the table of NDY's summary of ELV services and assumed scope.

System	LL-Office	Tenant Office	Shared System	Comments
Security Management System	P			Provision only
CCTV ▪ System ▪ Cameras	✓	P	✓	
Access control ▪ System ▪ Locks	✓	P	✓	
Intercom	✓	P		Separate intercom system with cabling to commercial tenancies.
Intruder Alarm	✓			Grade 2 system to reception area
BMS	✓			
Metering	✓			Can be controlled as part of BMS for landlord areas
Lighting Control	✓	✓		Office lighting to be Dali Control. Common landlord areas shall have a minimum PIR control. Lighting to plant areas to be mains on/off switching.
Communications Cabling	✓			Cat6 minimum recommended
LAN	✓		✓	
WAN	C			Provided by Client

System	LL-Office	Tenant Office	Shared System	Comments
Servers/Workstations	C			The exception is servers/workstations for the systems provided by the Contractor (security, metering, BMS, lighting control, etc)
Two/way Radio or VoWLAN				None provided
IRS Television	✓	P	✓	Cabling from multiswitch to office tenancy space to be provided by tenants.
Home Automation				None provided
Induction Loops to Reception	✓			

Key

✓ - Required to be provided by Main Contractor
P - Provision only
C - Provided by Client

9. PUBLIC HEALTH SERVICES

9.1. Introduction

The Public Health Services installation shall comprise of the following elements:

- 1 no incoming metered sprinkler firemain from the Authority mains shall be extended to serve the basement sprinkler system.
- 1 no domestic incoming water supply from the Authority mains shall be extended to a building water meter cold water storage tank serving the offices. Utilisation of the existing supply connection to be considered. The water meter shall have a pulsed output in line with BREEAM requirements.
- Metered tenant's domestic boosted cold water service at basement to 5th floors.
- Sanitary pipework installation to serve all sanitaryware and fitments in the offices, including separate tenant's soil and vent pipes with capped branches at each floor. Below ground drainage connections (as detailed by the Structural Engineer).
- Gravity rainwater system from the roof and hard standing areas.
- 1 no incoming gas supply from the Authority mains external infrastructure to serve a dedicated meter to the offices.
- Complete new domestic hot and cold water systems to be provided.

9.2. Boosted Potable Cold Water Service

The new incoming mains cold water service shall be extended to serve a potable cold water storage tank.

Boosted cold water service shall be routed to supply potable drinking outlets, cold water connections to the sanitaryware and fitments, centralised hot water heaters and softened cold water storage tank, and secondary supply to the rainwater harvesting tank.

Dedicated tenants boosted cold water service shall be provided to supply a potable cold water service to each office floor demise terminating with an isolating valve, double check valve, pressure reducing valve and cap end. Each branch connection shall be provided with a pulsed sub check meter.

The boosted cold water service shall be furnished with an ultra violet purification unit to minimise the risk of legionella and associated harmful bacteria spores. A water conditioner shall also be provided to minimise scale formation within the domestic hot and cold systems.

Water conservation devices to accord with BREEAM such as a dual flush WC's, flow restrictors and leak detection shall be provided to minimise water usage.

9.2.1. Boosted Hot Water Service

Domestic hot water shall be provided by high efficiency centralised hot water heaters generated from the centralised gas fired boilers. The hot water service shall be routed to supply hot water connections to the Landlord's sanitaryware and fitments.

The hot water system shall be provided with a secondary return to maintain the design temperature of the system to 55°C to minimise dead legs and water wastage.

Thermostatic blending valves shall be provided on all hot water services serving the wash hand basins to limit the maximum supply temperature to prevent scalding.

9.2.2. Boosted Softened Water

Boosted softened cold water service shall be provided to serve the cooling tower and LTHW heating system. The softened water shall be provided from a base exchange water softener which shall supply a cold water storage tank. The softened storage tank shall serve a dedicated booster pump and the softened boosted cold water service shall be routed through the building to serve the cooling tower and LTHW heating system.

9.2.3. Rainwater Harvested Boosted Cold Water Service

Boosted harvested rainwater cold water service shall be provided to serve all WC's, washdown points, irrigation points and chilled pressurisation units. The rainwater harvesting tank shall be served primarily from the rainwater disposal system from the roof with a secondary supply provided from the boosted cold water service. The harvested rainwater cold water storage tank shall serve a dedicated booster pump and the harvested boosted cold water service shall be routed through the building to serve the WC's washdown points, irrigation points and heating/chilled pressurisation units.

The harvested boosted cold water service shall be furnished with an ultra violet purification unit to minimise the risk of legionella and associated harmful bacteria spores. A water conditioner shall also be provided to minimise scale formation within the domestic cold water systems.

Water conservation devices to accord with BREEAM such as dual flush WC's, flow restrictors and leak detection shall be provided to minimise water usage.

9.2.4. Above Ground Foul Water Drainage

Primary ventilated and modified secondary ventilated soil and waste systems shall be provided to take the discharge of foul and waste water from all the sanitaryware and fitments and shall be routed to connect to the suspended gravity foul water drainage at basement level.

Stub stacks shall be provided at ground level to connect to the suspended gravity foul water drainage at basement level. The foul water drainage shall be routed at basement level to connect to existing and new below ground drainage connections (as detailed by the Structural Engineer) Sanitaryware and fitments located at basement level shall connect direct to new/existing drainage connectors via stub stacks (as detailed by the Structural Engineer).

Dedicated modified secondary ventilated waste vent pipes and anti syphon pipes shall be provided with capped branch connections at high and low level for the discharge of waste water and condensate on levels ground to fourth floors for future tenant fit-out. The waste vent pipes shall connect to the gravity suspended drainage at basement level and connect to existing and new below ground drainage connections (as detailed by the Structural Engineer).

Dedicated stub stacks and anti syphon pipes shall be provided with capped connections for the discharge of waste water and condensate at basement level for future tenant fit out.

9.2.5. Rainwater Disposal

A rainwater disposal system shall be provided to take the discharge of rainwater from the roof and hardstanding areas. The rainwater shall be drained via propriety gutters, roof outlets, floor grilles and channels. The rainwater disposal pipework shall be routed to connect to common vertical stacks. The stacks shall be extended down the building within agreed locations to connect to the suspended gravity rainwater drainage system at basement level. The rainwater drainage system shall be routed to connect to the existing and new below ground connections (as detailed by the Structural Engineer), along with the rainwater harvesting tank.

The vertical rainwater stacks and outlets shall be trapped to prevent foul air escaping into populated areas.

9.2.6. **Low Pressure Gas**

A new incoming gas service shall be provided within the basement via Jamestown Road to serve the office gas meter. The new gas supply shall be routed through the basement to serve the centralised gas fired boilers.

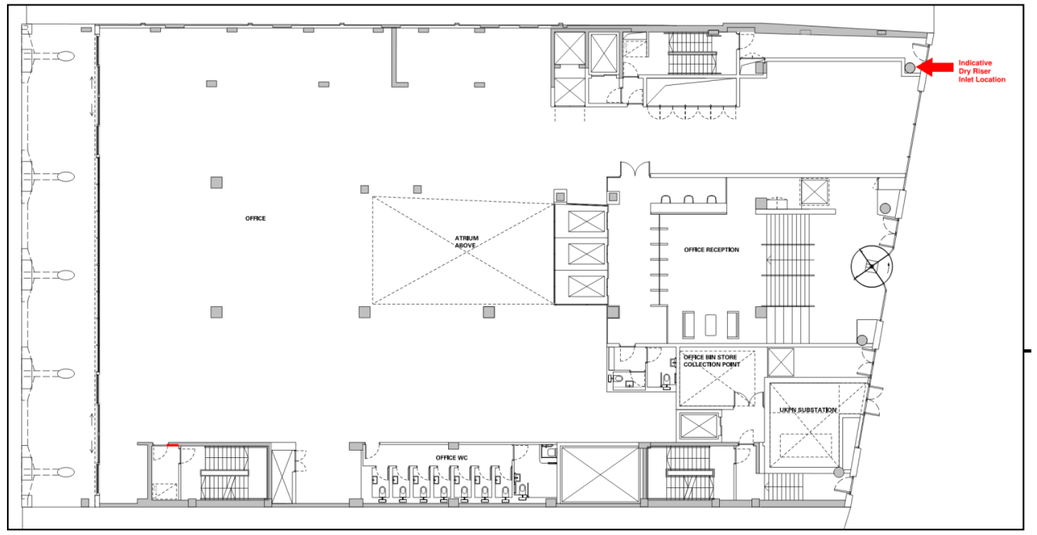
10. FIRE PROTECTION SERVICES

The following fire protection measures may change with the development of the fire strategy by the Fire Consultant.

10.1. Dry Riser System

The building shall be provided with a single dry riser system. This shall incorporate a dry rising fire main to the fire fighting stair in accordance with the requirements of BS9990 and BS9999.

The system shall be provided with fire brigade quick infill breeching points located within Jamestown Road. The breeching points shall be located on the external facade of the building at ground floor level and within 18m (line of sight) of a suitable fire service vehicle hard standing. The dry riser landing valves shall be located at all above ground levels served by the fire fighting shaft within dry riser cabinets.



Dry Riser Inlet Point

10.2. Sprinkler System

The basement in its entirety cannot be naturally ventilated and therefore shall be mechanically ventilated. Therefore a sprinkler system shall be provided in accordance with BSEN 12845 and LPC requirements.

11. VERTICAL TRANSPORTATION

11.1. Passenger Lifts

This advice has been produced to establish the optimum lift configuration in terms of size, number and type of Passenger lifts required to provide the desired operational quality of service for the proposed offices.

In order to provide the smallest possible lifting core whilst retaining a good vertical transportation service as well as creating the impression of space, it is proposed that 3 x 1000 kg 13 passenger lifts, travelling at a speed of 1.0 m/s, be provided.

Additionally 1 x 1000 kg lift shall be provided as a fire fighting lift.

The lift car sizes shall be as follows:

Floors Served	Entrances	Type	Population	Usage	Capacity	Speed	Doors
Office = B, G – 1st to 5th	Front	Machine Room Less	Varied	Passenger	1000 Kg - 13 Persons	1.0 m/s	Centre Opening

The lift shaft sizes shall be as follows, per lift shaft:

Door (mm)		Internal Car (mm)		Internal Shaft (mm)			
Width	Height	Width	Depth	Width	Depth	Pit	Overhead
900	2100	1600	1400	2200*	1850	1200**	3600***

* Allow for 100 mm shaft trimmer between common lift shafts.
** Dimension from the finished slab in the pit to the finished floor level of the first floor served.
*** Dimension from the finished floor level of the last floor served, to the underside of the lifting beam or eye in the shaft slab.

11.2. Machine Room-Less Lifts

Although the existing lifts in the building have a machine room which is located at the top of the lift shaft, the new lifts shall be manufactured from the Lift Contractor's standard range of machine room-less lift equipment. This of equipment shall be more cost effective that the traditional lift equipment with a machine room located at the top of the shaft.

With this type of lift, the hoisting machinery is located within the confines of the lift shaft, removing the need for a discrete machine room. The benefits of this system are related to the space and cost implications resulting from the reduced space required for locating the motor (no separate machine room) and the relative speed of installation.

11.3. Bin Lift

A dedicated lift shall be provided for the bins. This lift shall serve the basement and Ground floors only. The lift should be sized, so that at least two bins can be put into the lift at one time.

The speed of this lift shall be a maximum of 0.63 m/s, this shall ensure that the smallest pit depth in the basement and headroom heights at Ground floor can be achieved.

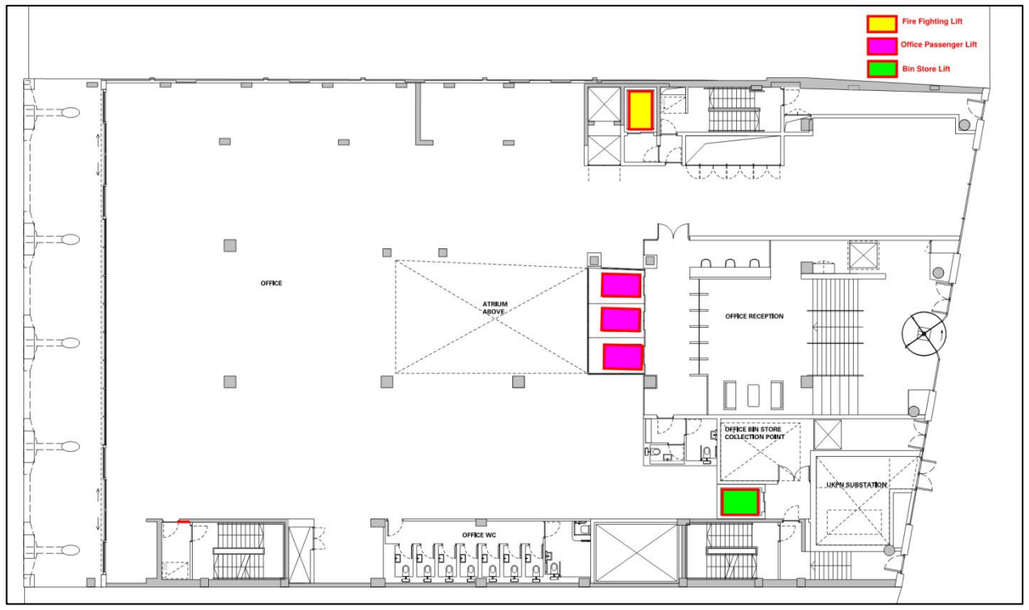
11.4. Lift Car Finishes

Office Passenger Lifts

The lift car finishes for the office lift should reflect the interior of the building and the lift lobbies in particular. To this extent the same floor covering used on the Ground floor should be used in these lifts. Back painted glass or coloured patterned stainless steel should be used with a mirror on the rear wall to create the impression of space.

11.4.1. Bin Lift

This lift should have robust internal finishes with a non slip stainless steel or aluminium patterned floor. The walls should be heavy duty stainless steel.



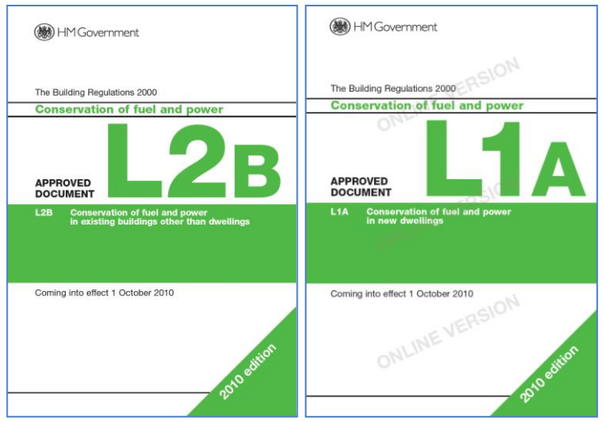
Vertical Transportation Location

12. PART L REGULATIONS

12.1. Regulations

The following Part L approved documents and their associated tier two documents apply to the Jamestown Road development:

- Part L2B – Conservation of fuel and power in existing buildings other than dwellings (2013)



The regulations stipulate:

- Reasonable provision shall be made for the conservation of fuel and power by:
- Limiting heat gains and losses;
- Providing efficient building services and controlling them correctly;
- Providing sufficient information to the building owners or occupiers to enable them to operate the building as efficiently as possible.

12.2. Tier 2 Documents - Building Services Compliance Guides

The following tier two documents shall be used to determine minimum performance, efficiencies and controls for the building services:

- Non-Domestic building services compliance guide
- Where the building services are serving only Landlord areas

12.3. Works Triggering Compliance with Building Regulations Part L2B

The proposed extension is less than 25% of the existing building floor area and is less that 1000m^2 and as such the development shall be considered under Part L2B.

Aspects of the proposed works require actions to be taken in order to comply with the Building Regulations Part L2B. The major elements are:

- The extension at 4th floor and new 5th floor.
- The installation of a new building services HVAC and lighting systems.

The scope of these works w shall trigger 'Consequential Improvements' to be made.

12.3.1. New and Replaced Thermal Elements

New, extended or replaced thermal elements should have thermal properties no worse than those set out in Table 4 opposite.

Table 4 Standards for New *Thermal Elements*	
Element[1]	**Standard (W/m^2. K)**
Wall	0.28[2]
Pitched roof – insulation at ceiling level	0.16
Pitched roof – insulation at rafter level	0.18
Flat roof or roof with integral insulation	0.18
Floors[3]	0.22[4]
Swimming pool basin	0.25[5]

Notes:

1. 'Roof includes the roof parts of dormer windows, and 'wall' includes the wall parts (cheeks) of dormer windows.
2. A lesser provision may be appropriate where meeting such a standard would result in a reduction of more than 5% in the internal floor area of the room bounded by the wall.
3. The U-value of the floor of an extension can be calculated using the exposed perimeter and floor area of the whole enlarged building.
4. A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels.
5. See paragraph 4.14.

Table 4 from Approved Document L2B – Standards for new thermal elements

12.3.1.1. New Controlled Fittings (e.g. Windows, Rooflights)

The area-weighted average U-value of any new windows or rooflights should not exceed those stated in Table 3 of part L2B, namely 1.8W/m2K and their area should not exceed those stated in Table 2, namely windows should be less than 40% of the external wall.

Table 3 Standards for Controlled Fittings	
Element[1]	**Standard (W/m^2. K)**
Windows, Roof windows and Glazed Roof lights[1]	1.8 for the whole unit
Alternative option for windows in buildings that are essentially domestic in character[2]	A window energy rating[3] of Band C
Plastic rooflight[4]	1.8
Curtain Walling	See paragraph 4.28
Pedestrian doors where the door has more than 50% of its internal face area glazed	1.8 for the whole unit
High-usage entrance doors for people	3.5
Vehicle access and similar large doors	1.5
Other doors	1.8
Roof ventilators (including smoke extract ventilators)	3.5

Notes:

1. Display windows are not required to meet the standard given in this table.
2. For example, student accommodation, care homes and similar uses where the occupancy levels and internal gains are essentially domestic in character.
3. See Approved Document L1B for more detail on window energy rating.
4. The relevant rooflight U-value for checking against these limits is that based on the developed area of the rooflight, not the area of the roof aperture.

11 EN 1435 1-1, *Windows and doors – Product standard, performance characteristic,* 2006

Table 3 from Approved Document L2B – Standards for Controlled Fittings

Table 2 Opening Areas in the Extension		
Building Type	**Windows and Personnel Doors as % of Exposed Wall**	**Roof Lights as % of Area of Roof**
Residential buildings where people temporarily or permanently reside	30	20
Places of assembly, offices and shops	40	20
Industrial and storage building	15	20
Vehicle access doors and display windows and similar glazing	As required	N/A
Smoke vents	N/A	As required

Table 2 from Approved Document L2B – Opening Areas in the Extension

12.3.1.2. Retained Thermal Elements

Any thermal elements that are to be retained and have a U-value worse than that in column (a) of Table 5 below should be brought up to the standard given in column (b) provided this is technically, functionally and economically feasible.

Table 5 Upgrading Retained Thermal Elements		
Element[1]	**U-value (W/m^2.K)**	
	(a) Threshold	**(b) Improved**
Wall – Cavity Insulation	0.70	0.55[2]
Wall – External or Internal insulation	0.70	0.30[3]
Floors[4,5]	0.70	0.25
Pitched Roof – Insulation at ceiling level	0.35	0.16
Pitched Roof – Insulation at rafter Level[6]	0.35	0.18
Flat roof or roof with integral insulation[7]	0.35	0.18

Notes:

1. 'Roof' includes the roof parts of dormer windows, and 'wall' includes the wall parts (cheeks) of dormer windows.
2. This applies only in the case of a cavity wall capable of accepting insulation. Where this is not the case it should be treated as for 'wall-external or internal insulation'.
3. A lesser provision may be appropriate where meeting such a standard would result in a reduction of more than 5% in the internal floor area of the room bounded by the wall.
4. The U-value of the floor of an extension can be calculated using the exposed perimeter and floor area of the whole enlarged building.
5. A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels.
6. A lesser provision may be appropriate where meeting such a standard would create limitations on head room. In such cases, the depth of the insulation plus any required air gap should be at least to the depth of the rafters, and the thermal performance of the chosen insulant should be such as to achieve the best practicable U-value.
7. A lesser provision may be appropriate if there are particular problems associated with the load-bearing capacity of the frame or the upstand height.

Table 5 from Approved Document L2B – Upgrading Retained Thermal Elements

12.3.1.3. Retained Controlled Fittings

Any existing windows or rooflights with U-values worse than 3.3W/m^{2}K should be upgraded to achieve at least 1.8W/m^{2}K as detailed in Table 3.

12.3.1.4. Replacement Building Services

All replaced building services shall be specified in accordance with Non-Domestic Building Services Compliance Guide 2013. This includes minimum performance standards for:

- Lighting;
- Heating and cooling plant;
- Ventilation systems;
- Pumps.

12.3.1.5. Extensions

There are a number of ways to demonstrate compliance for the extension. The basic method is referred to as the 'Reference Method' and uses elemental U-values. Tables 2, 3 and 4 are applicable. Due to the higher level of glazing proposed, a whole building method shall be used as described in 4.9 of Part L2B.

Consequential improvements with a value of at least 10% of the cost of the principal works must be undertaken for works on an existing building over 1000m^2 include:

- An extension;
- The initial provision of a fixed building service;
- The increase in capacity of a fixed building service.

The full list of improvement works that are normally practical and economically feasible is given in Table 6.

Table 6 Improvements that in Ordinary Circumstances are Practical and Economically Feasible	
Items 1 to 7 shall usually meet the economic feasibility criterion set in paragraph 6.5. A shorter payback period is given in Item 8 because such measures are likely to be more capital intensive or more risky than the others.	
No	**Improvement Measure**
1.	Upgrading heating systems more than 15 years old by the provision of new plant or improved controls.
2.	Upgrading cooling systems more than 15 years old by the provision of new plant or improved controls.
3.	Upgrading air-handling systems more than 15 years old by the provision of new plant or improved controls.
4.	Upgrading general lighting systems that have an average lamp efficacy of less than 40 lamp lumens per circuit-watt and that serve areas greater than 100 m^2 by the provision of new luminaires or improved controls.
5.	Installing energy metering following the guidance given in CIBSE TM 39.
6.	Upgrading ***thermal elements*** which have U-values worse than those set out in column (a) of Table 5 following the guidance in paragraphs 5.12 and 5.13.
7.	Replacing existing windows, roof windows or roof lights (but excluding display windows) or doors (but excluding high-usage entrance doors) which have a U-value worse than 3.3 W/m^2.K following the guidance in paragraphs 4.23 to 4.28.
8.	Increasing the on-site low and zero carbon (LZC) energy-generating systems if the existing on-site systems provide less than 10% of on-site energy demand, provided the increase would achieve a simple payback of 7 years or less.
9.	Measures specified in the Recommendations Report produced in parallel with a valid Energy Performance Certificate.

Table 6 from Approved Document L2B – Improvements that in ordinary circumstances are practical and economically feasible

Works falling within the scope of the project can be included as consequential improvements. Works that shall qualify as such and are already proposed include:

- Upgrading existing building fabric elements. (See table 5);
- Upgrading of existing building service installations;
- Upgrading of lighting services;
- Installing energy meters and setting out a metering strategy at an early stage.

12.4. Refurbishment of Other Areas

Because the works to remaining areas of the building involves the provision and extension of controlled building services, they are governed by the regulations. Necessary actions are as follows:

- All proposed building service items shall be designed following the guidance provided in the Non-Domestic Building Services Compliance Guide 2010;
- New building services shall have efficiencies not less than the efficiency of those being replaced;
- HVAC systems shall have appropriate controls to enable efficient operation. This includes the inclusion of separately controlled zones;
- Energy meters shall be installed to enable the monitoring of the performance of new plant.

12.4.1. Building Services Replacement

For the replacement of the building service system, ADL2B requires that the following items are included in the design to demonstrate compliance:

a)	Replacement fixed building services meet reasonable standards of energy efficiency not less than set out in the non-domestic heating and ventilation compliance guidance AND any replacement fixed building service is not less efficient than the system it is replacing.
b)	HVAC systems should be provided with appropriate controls to achieve reasonable standards of energy efficiency.
c)	Demonstrate the new services have been effectively commissioned.
d)	Demonstrate that reasonable provision of energy meters has been made for effective monitoring.
e)	Demonstrate that the relevant information had been recorded in a new log book.

Items (b) to (e) shall be incorporated into the design and construction accordingly.

Replacement lighting systems must meet the lighting efficacy levels as follows (extract from ADL2B):

Internal Lighting	Lighting Efficacy
General Lighting in Office, Storage and Industrial Areas	55 luminaire lumens per circuit-watt
General Lighting in other types of space other than office areas	55 lamp lumens per circuit-watt
Display Lighting	22 lamp lumens per circuit-watt

Highly efficient lighting solutions shall need to be considered to meet the above criteria for office areas.

12.5. Part L2B Compliance Methodology

The compliance of the proposed development shall be shown using the Whole Building Method described in section 4.9 of Part L2B, which states

“Where ever greater design flexibility is required, reasonable provision would be to use an approved calculation tool to demonstrate that the calculated CO_2 emissions from the building and proposed extension are no greater than for the building plus a notional extension comply with the standards of paragraphs 4.3 to 4.5.”

Two thermal simulations shall be undertaken, the existing building and the proposed building. The simulations shall be used to demonstrate that the proposed building design shall result in a reduction in CO2 emission, compared against the existing.

Given the age of the existing building and the incumbent installed services, the new installation is likely to deliver higher energy efficiencies, compared to the original systems, across all new Mechanical & Electrical services.

13. PLANT REPLACEMENT

13.1. Plant Replacement Strategy

Plant	Location	Replacement
Cooling Tower	5th Floor	Craned to and from the roof.
Future Condensers	5th Floor	Lifted to and from the roof via the Landlord's passenger lift.
Air Handling Units	Basement	The air handling unit shall be in sections for replacement and transported to ground by the Landlord's passenger lift or stairs.
UKPN Transformer	Ground	Existing UKPN access shall be maintained.
Switchboards	Basement	Broken down into small parts and transported to ground by the Landlord's passenger lift or stairs.
Water Tanks	Basement	The tanks are demountable sections and transported to ground by the Landlord's passenger lift.
Life Safety Generator	5th Floor	Craned to and from the plantroom.
Life Safety Generator Switchboard	5th Floor	Lifted to and from the roof via the Landlord's passenger lift.
Smoke Extract Fan	Fire Fighting Stair Core	Craned to and from the rooftop.
Toilet Extract	5th Floor	The extract fan unit shall be in sections for replacement and transported to ground by the Landlord's passenger lift or stairs.
Cold Water Booster Pumps	Basement	The pumps can be disassembled and transported to ground by the Landlord's passenger lift or stairs.
Water Softeners	Basement	The softeners can be disassembled and transported to ground by the Landlord's passenger lift or stairs.
Hot Water Heaters	Basement	Lifted to and from the plantroom and transported to ground by the Landlord's passenger lift or stairs
Chillers	Basement	Soft spot within concrete slab of the bin store.
Smoke Extract Fans	Basement	Lifted to and from the Plantroom and transported to ground by Landlord's passenger lift.
PV Panels	Roof	Lifted to and from roof via Landlord's passenger lift.
Satellite Antennas	Roof	Lifted to and from roof via Landlord's passenger lift.

14. STANDARDS

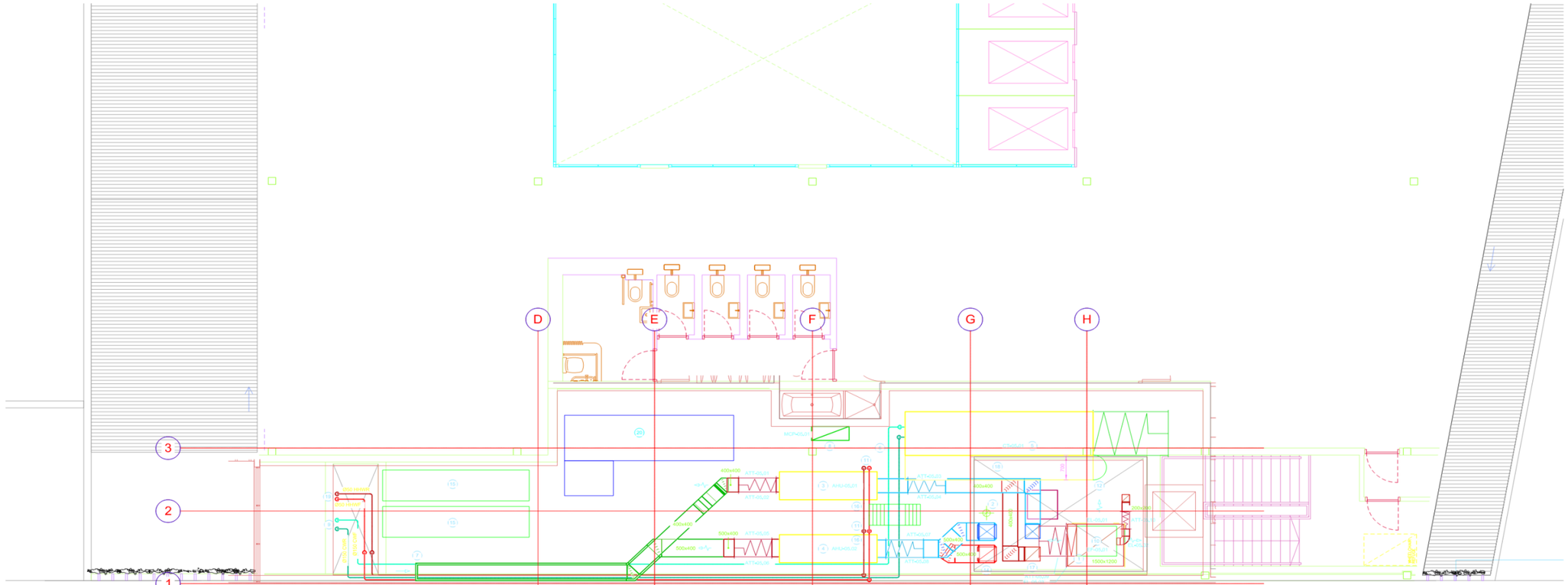
All works to be carried out shall comply with the following design standards, recommendations and guidance:

- Relevant British Standards and European Norms
- The Building Regulations
- Building Services Research & Services Association (BSRIA)
- Non-Domestic Building Services Compliance Guide 2010
- Electricity at Work Regulations
- CDM Regulations 2014
- Health & Safety at Work Act
- The Water Regulations
- CIBSE Guides
- IEE

15. SERVICE ENGINEERS DRAWINGS

Combined Services

Document No	Revision	Description
SK-007	1.0	5th Floor Roof Plant Area
SK-008	1.0	Roof Plant Spaces

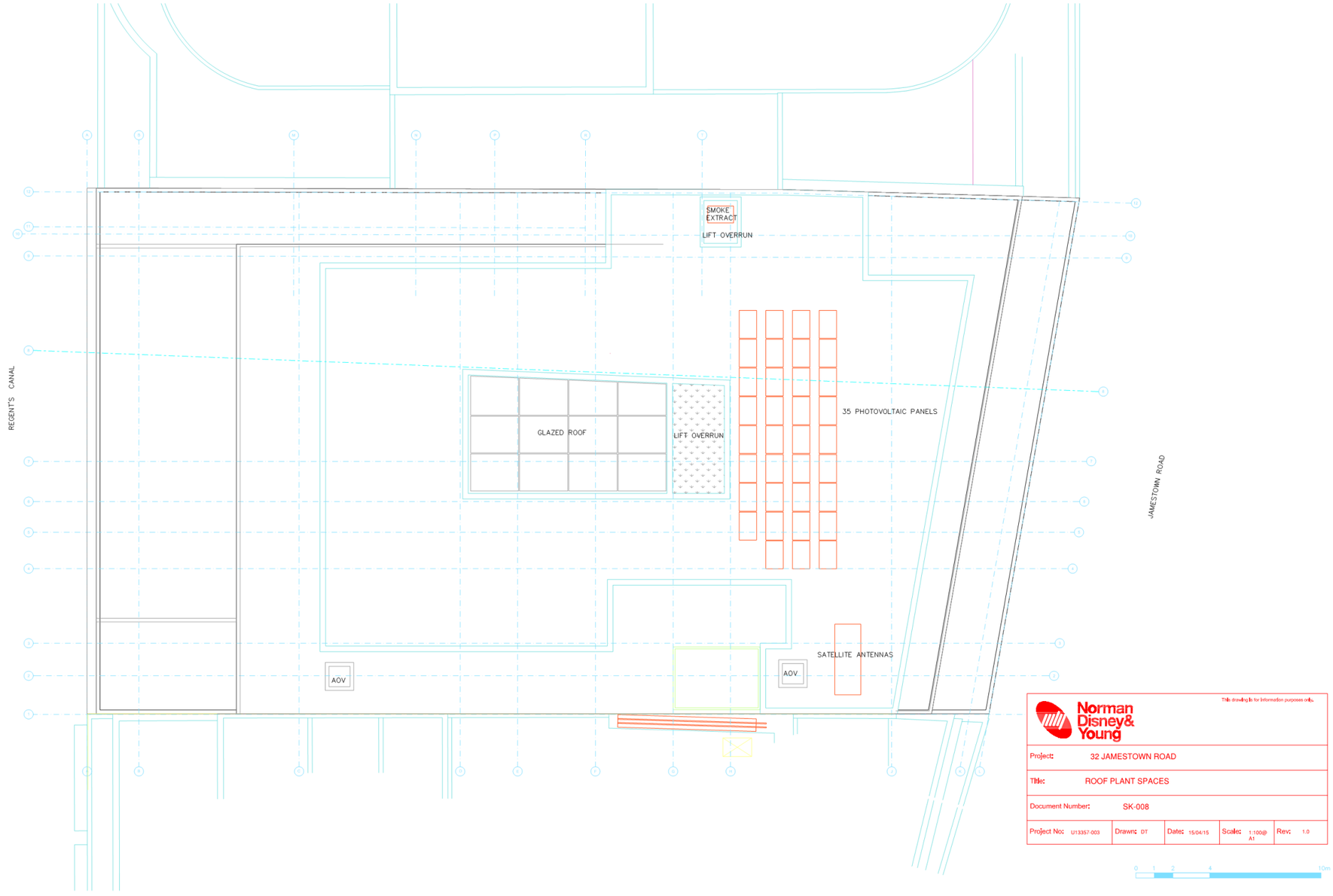


No.	DESCRIPTION
1	MAIN AHU EXHAUST AIR RISER AND DISCHARGE
2	BOILER FLUE DISCHARGE
3	BASEMENT PLANTROOM AHU WITH PLATE HEAT EXCHANGER
4	WC AHU WITH PLATE HEATER EXCHANGER (VERTICAL STANDING)
5	LOW PROFILE COOLING TOWER WITH ATTENUATOR PACKAGE
6	CONDENSER WATER F&R PIPEWORK AT LOW LEVEL
7	AHU INTAKE DUCTS MINIMUM 10m FROM EXHAUST DISCHARGE AND BOILER FLUE
8	MECHANICAL CONTROL PANEL LOCATED IN GRP ENCLOSURE
9	CONDENSER WATER RISER
10	BIN STORE EXTRACT FAN LOCATED ON TOP OF EXHAUST AIR RISER
11	LTHW F&R PIPEWORK CONNECTION TO AHU HEATING COIL
12	ACCESS LADDER TO COOLING TOWER ACCESS PLATFORM
13	STEPS OVER CONDENSER WATER PIPEWORK
14	WC SUPPLY AND EXTRACT DUCTS
15	FUTURE TENANT PLANT SPACE ALLOCATION
16	LTHW FLOW & RETURN PIPEWORK RISES FROM LOW LEVELTO RUN OVER AHU
17	PLANTROOM SUPPLY AND EXTRACT DUCTS
18	COOLING TOWER ACCESS PLATOFORM AT HIGH LEVEL
19	LTHW PIPEWORK RISER
20	LIFE SAFETY STANDBY GENERATOR 4.5(L)*1.3(W)*2.6(H) WITH ATTENUATION PACKAGE

This drawing is for information purposes only.

Norman Disney & Young

Project: 32 JAMESTOWN ROAD				
Title: FIFTH FLOOR ROOF PLANT AREA				
Document Number: SK-007				
Project No: U13357-003	Drawn: DT	Date: 15/04/15	Scale: 1:50@A1	Rev: 1.0


SMOKE EXTRACT
LIFT OVERRUN
REGENT'S CANAL
GLAZED ROOF
LIFT OVERRUN
35 PHOTOVOLTAIC PANELS
JAMESTOWN ROAD
SATELLITE ANTENNAS
AOV
AOV
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This drawing is for information purposes only.
Project: 32 JAMESTOWN ROAD
Title: ROOF PLANT SPACES
Document Number: SK-008
Project No: U13357-003
Drawn: DT
Date: 15/04/15
Scale: 1:100@ A1
Rev: 1.0
0 1 2 4 10m