STAGE C REPORT

Bewlay House, Jamestown Road - M&E Consulting Services
London and Regional Properties Ltd

CONFIDENTIAL

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CONSULTING ENGINEERS

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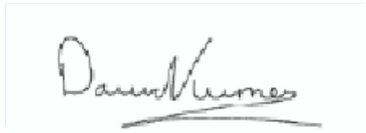


Verification By: - Allen Williamson

Table of Contents

Table of Contents

1. INTRODUCTION

1.1. Overview

Bewlay House,32 Jamestown Road, Camden NW1 7BY is an existing office building located in Camden. The building currently has a basement, ground floor and first to 3rd office floors. It is proposed to refurbish the building to create enhanced office space with increased floor area while creating two additional floors incorporating office space and two residential apartments on the fourth floor and seven residential apartments on the fifth floor.

The modifications include:

- Modifications to all floors.
- Modifying the existing atrium.
- Adding a 4th floor for office space and apartments
- Adding a 5th floor for apartments.
- 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 will be used to service the floor plates, acting as spines through which all services will 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 Bewlay House, Camden, with offices presented as Cat A and fully fitted apartments.

1.3. Authority

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

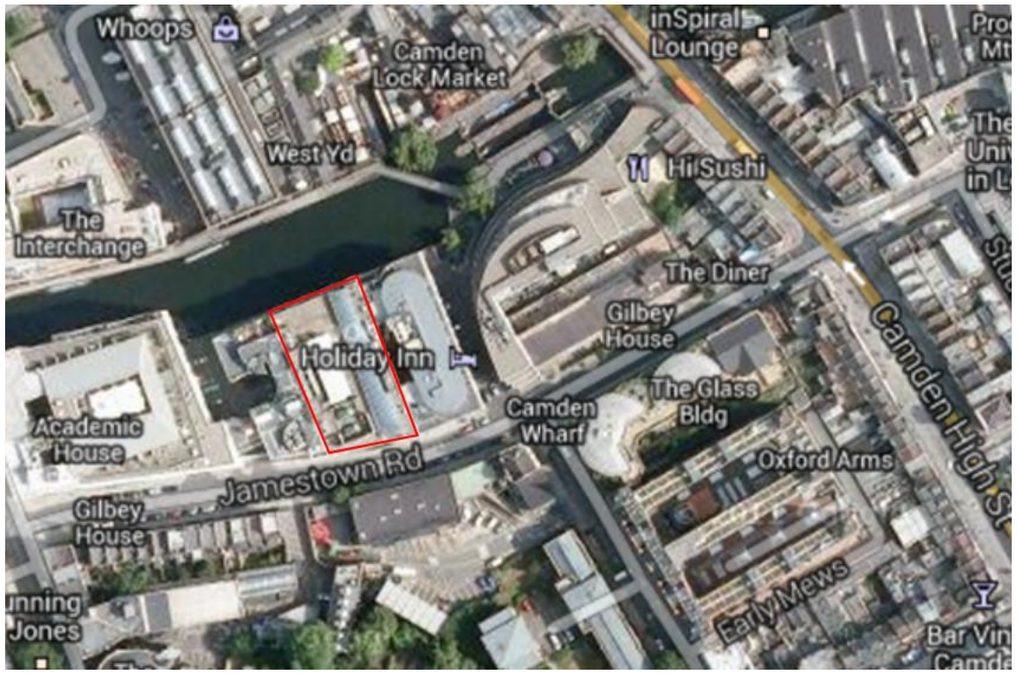
1.4. Revision History

	Date Issued	Comment
P01		

1.5. 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 Bewlay House – 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 Temperature

Displacement System	Minimum 20°C Maximum 24°C
Chilled Beams	Heating 21°C Cooling 24°C

A ±2°C control tolerance applies to the above temperatures.

A displacement ventilation system provides a temperature gradient within the office due to the effects of natural convection and buoyancy. In summer, air will be supplied into the raised floor void at between 18 °C and 19°C. This supply air will then enter the room and will increase in temperature as the room loads are absorbed. The maximum and minimum temperature conditions stated above are at normal seated head height level (i.e. 1.1m).

Toilets	19 °C minimum
Entrance Area	18 °C minimum (not in the vicinity of the entrance doors which may drop below this at times of high door usage)
Plant rooms	13 °C minimum

Residential

Lounge/reception room (heating only)	20 °C minimum
Bedroom (heating only)	20 °C minimum
Internal Corridor (heating only)	20 °C minimum
Bathroom/showers (heating only)	22 °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/m² within the central plant and chilled water risers)

Residential

Lighting	To suit final lighting design
Equipment (Living Rooms)	To suit furniture/equipment layouts
Equipment (Bedrooms)	To suit furniture/equipment layouts

2.3.5. Ventilation

Office Areas	12 litres per second per person
Residential	To suit Approved document F requirements
Toilets	10 air changes per hour extract
Lower ground floor	Mechanical extract ventilation with smoke extract to building regulations Parts B & F requirements
Plant rooms	To suit plant requirements

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

Residential

- 3.5kW, 4kW and 6kW for 1,2 and 3 bed apartments respectively

Additional capacity has been provided for the life safety systems.

2.4.2. Lighting Levels

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

Commercial

Offices	
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 Rooms	150-200 lux

Residential

Apartments	
Apartment Entry & Corridors	150 lux
Apartment Lounge	100-150 lux
Apartment Bathrooms	100-150 lux
Apartment Bedrooms	100-150 lux

2.4.3. Life Safety Installation

A roof mounted 110kVA standby rated life safety generator and associated switchgear to supply all life safety systems is currently detailed on the drawings. This will supply power to all items of life safety, namely; the fire fighting lift, fire escape staircore lighting, etc, of the residential building.

An alternative low voltage supply from the local street network is currently under investigation and may eliminate the need for the above Generator installation. This will be subject to approval from Building Control.

2.5. Public Health Services

2.5.1. Offices

Rainwater Systems	BS EN 12056 Part 3 – Category 2 level of protection to building. Storm return period 1.5 x life span of building.
	Rainfall intensities of 225mm per hour are generally applicable.
Natural Gas Systems	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 2 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 9 hours storage and 10m^2 net internal area per person.
Hot and Cold Water Pipework Distribution	BS EN 806-5:2012 & BS 8358-2011 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	1.5bar 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.
	Hot water generation stored at 60°C, hot water service flow 55°C incorporating a secondary return.

2.5.2. Apartments

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 Systems	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 2 hour period with maximum velocity of flow of 1.5m/sec.
Potable Water Storage	Based on 12 hours storage
	Studio – 105 litres per bed space
	1 bedroom – 105 litres per bed space
	2 bedroom – 65 litres per bed space
	3 bedroom – 50 litres per bed space
	4 bedroom – 50 litres per bed space
Non Potable Water Storage	Small volume for washdown, ancillary items, irrigation and mechanical plant.
Above Ground Sanitation	BS EN 12056 Part 2 based on a frequency factor of 0.5. Discharge method of occupation.
Hot and Cold Water Pipework Distribution	BS EN 806-5:2012 & BS 8358-2011 using the I0P 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.
Hot Water Generation	Unvented hot water heaters to each apartment generated from dedicated gas fired boilers.

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 will be selected such that the background noise level meets the planning conditions.

Plant and equipment will 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 will be provided as required to satisfy the requirements of the acoustic engineer.

Residential

Bedroom	NR25 (night time)
Kitchen	NR40-45
Living Area	NR 30
Living Area and Kitchen	NR30

2.7. Vertical Transportation

2.7.1. Offices

3 x 1000 kg 13 person Passenger lifts will 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.

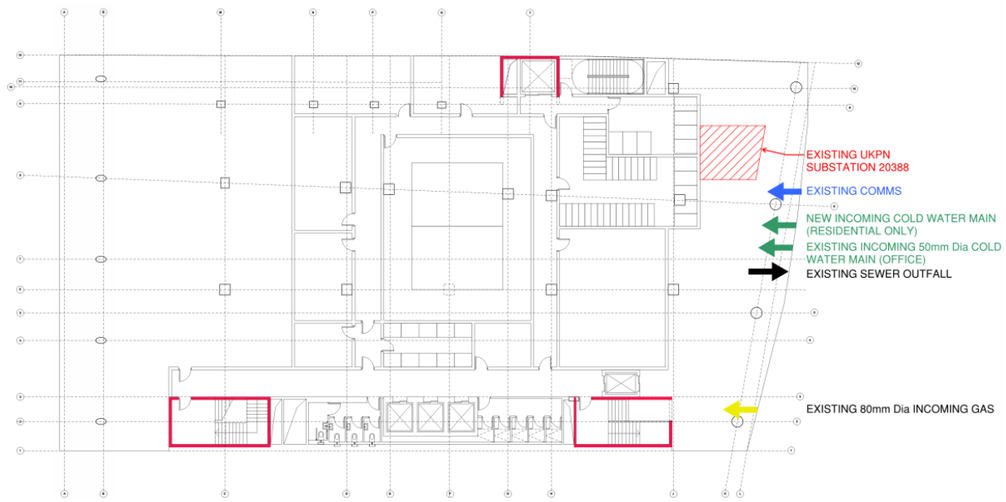
1 lift to transport a minimum of 2 refuse bins from the basement to ground floor.

2.7.2. Apartments

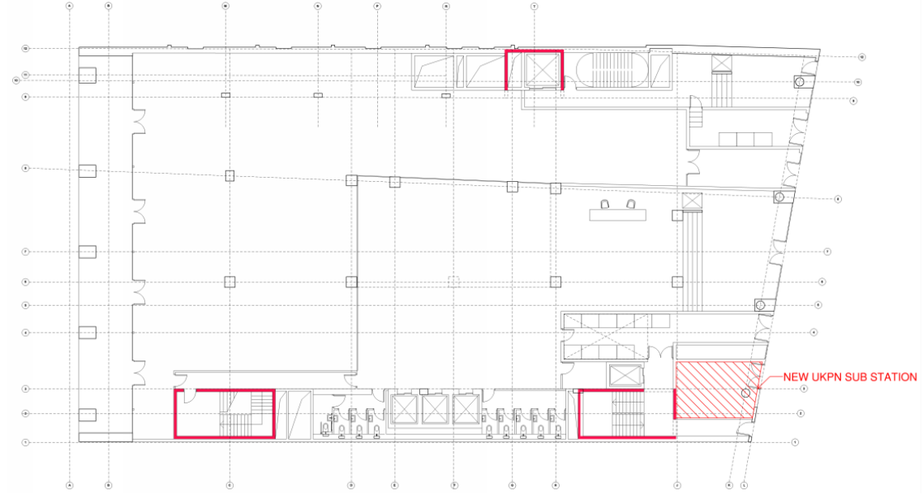
1 x 1000 kg 13 person Passenger lift will be provided to serve the Basement and Ground and the apartments on levels 4 and 5.

3. UTILITIES

3.1. Overview



Proposed Basement plan



Proposed Ground floor plan

Proposed Incoming Utility Services

3.2. Water Services

Offices

The existing 42mm 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 will be removed and replaced with a new pulsed output meter.

Residential

A new dedicated incoming metered mains cold water service will be provided to serve the residential apartments. This new cold water main shall enter the building at basement level via Jamestown Road. The water meter will be provided with a 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 carpark 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 will be decommissioned and the network services transferred to the new ground floor substation.

The new substation is to provide 3No. New supplies, 1No serving the apartments 200A UKPN approved Ryefield Panelboard, 1No serving an 800A Landlords switchboard and the third serving a 400A new tenant switchboard.

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

The Landlord, Tenant and apartment main utility meters will be located on the new main switch room walls but just outside the room. All utility meters will be labelled to indicate exact supplies being metered.

All other landlord & tenant building loads fed directly from the main switchboards will be sub-metered, as indicated on the concept LV Schematic.

The apartments will be metered such that they are directly billed by the Energy Supplier.

The apartment utility meters will be located within the basement also as previously described.

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

UKPN Utility Tracker

Activity	Date
Initial Application made to UKPN	26.4.13
Acknowledgement of application received from UKPN	01.05.13
Project Designer (Lee Metselaar) appointed by UKPN	09.05.13
Project referred to UKPN planning department by Lee Metselaar	10.06.13
Budget price for works/full quotation	Not received

3.5. Low Pressure Gas

There is an existing 80mm diameter low pressure incoming gas main that serves the building and enters the building via Jamestown Road. This main is routed to within the existing gas meter room located at basement level. The load for the new offices and apartments requires to ascertained if this main has the capacity to serve the new development and be reused, this would also be subject to a condition survey and verification.

3.6. Communications

Containment will only be provided from Jamestown Road to the basement communications room.

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.

OFFICE AREAS

4.2. Office Ventilation

The general office areas will 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.

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

Both air handling units will 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.
LTHW Heating, CHW Cooling Coils	These will be controlled to achieve the desired supply air temperature.
Supply Fan	Fan units with variable speed drive.
Heat recovery	Heat recovery components are not included; however, the energy efficient displacement system benefits from recirculating air and from the potential for free cooling.

Ground level and Levels 1-3

These office areas will be ventilated via an under floor displacement system. This system will also provide cooling to the space. Air will be extracted from the office space via return air bulkheads at high level.

Basement and Level 4

Basement and Level 4 Office areas will be supplied with fresh air via dedicated AHU's with heat recovery and cooled via chilled beams. Extract air from the office space will be via ventilation grilles at high level, with local discharge on-floor.

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 cooling towers 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 strategy can typically achieve higher energy performances than the air cooled option.

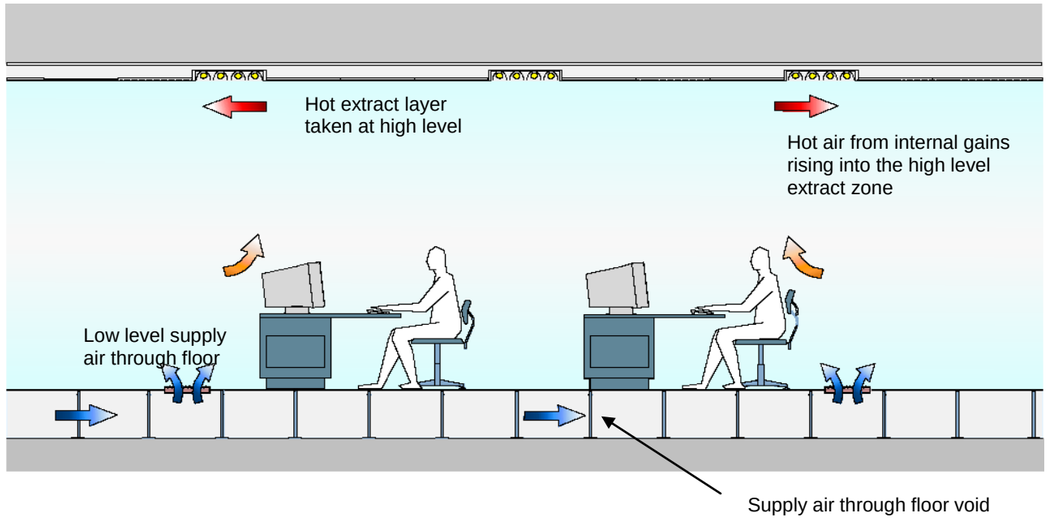
Chilled water will be generated via 2 water cooled chillers located in the basement. Heat rejection for this system shall be via cooling towers located on the 5th floor plant area. Due to spatial restrictions at roof level 5, only one cooling tower is being proposed. Reliance on a single cooling tower presents a risk as it carries implications with regards to resilience; preventative maintenance to the cooling tower will require cooling system shut down for the building which therefore needs to be managed during out of hours periods. There is the potential for allowing for two cooling towers within the current architectural arrangement however this would reduce the area allocated for future tenant plant.

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

A separate pumped circuit will be provided for basement and level 4 whereby the final chilled water temperature will be carefully chosen to prevent condensation occurring on the chilled beams.

4.4. On-floor cooling systems

Ground and levels 1 to 3 will be cooled via a displacement system. Conditioned air from the central air handling unit will be ducted up the central risers and into the floor void. Displacement diffusers, surface mounted in the floor, will release the air into the space.



Indicative Displacement Ventilation System Operation

Office areas in the basement and on level 4 have a shallow floor to ceiling height and smaller floor void compared to the other floor levels, therefore do not lend themselves to the displacement ventilation and cooling strategy. The basement and level 4 areas will be cooled via ceiling mounted chilled beams.

4.4.1. Night Purging

Night purging will be employed using the air handling units introducing cool night air into the building to cool the exposed concrete soffit to the offices. The slabs will then release cooling energy into the space during the day reducing mechanical cooling requirements.

Tenants will have the option to open windows during mid-season periods to allow natural ventilation of the perimeter office areas.

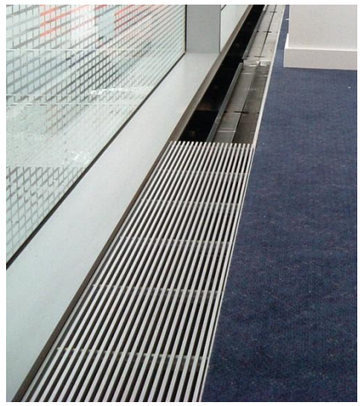
To reduce the impact of solar gains through glazing elements, the provision of internal blinds will be required.

4.5. Office Heating Systems

Low temperature heating water (LTHW) will be generated via 2 gas fired boilers located in the basement. Flues for this system will discharge at roof level and will be located to minimise contamination to the fresh air intakes. Flues will be extended above the roof in accordance with the Clean Air Act; nominally 3m above roof level.

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

The LTHW will be distributed up the central risers and will serve perimeter trench heaters on each floor.



Perimeter Trench Heaters

4.6. Office Toilet Extract Ventilation

Twin extract fans, located at roof level 5, will provide toilet exhaust to the office areas and the basement shower area. Toilet exhaust risers will be located adjacent to the toilet blocks and intake will be via ceiling mounted air valve grilles.

Make up air to the system will be via the office space.

4.7. Bin Store Extract Ventilation

Dedicated extract fans shall serve the basement and ground floor bin stores, discharging at ground floor level through the discharge louvre. Make up air shall be provided via the central AHUs.

4.8. Office Controls

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

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

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

The BMS system will 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 will be provided via capped off connections on each floor for use by future tenants for (e.g.) meeting rooms. Further to this provision, plant area and riser allocation have been provided for future tenant supplementary condenser plant for server/comms room. Levels 2-4 have been allocated future plant areas on the roof and Levels 1, ground and basement have been assigned future plant areas in the basement.

4.10. Ground Floor Reception Area

Heating and cooling will be provided to the ground floor reception lobby area to meet the specified loads. Consideration will be given at the next design stage to an adapted displacement system to serve the atrium area as to where the return air route would be located.

Underfloor heating, local fan coil units and a dedicated air handling system to serve this area will also be considered.

Residential Areas

4.11. Apartment Heating and Hot Water System

It is proposed that each apartment will be served by its own gas-fired high efficiency boiler.

Each apartment will be provided with either underfloor heating or convector radiators in living spaces, bedrooms, bathrooms and internal corridors.

The heating system will be provided with domestic pattern controls to allow timed operation of the heating and hot water systems within the apartment; two time periods per day on a 7 day repeating basis. Each zone will be provided by means of local temperature control.

Where underfloor heating is to be provided, electric towel rails will be provided in the bathrooms for towel heating only, with the underfloor heating system providing space heating.

4.12. Apartment Ventilation

4.12.1. Background Ventilation

Each apartment will be provided with a whole house ventilation (WHV) unit installed to extract air from kitchens, bathrooms and utility/plant areas. The WHV unit incorporates a heat exchanger so that heat from the extracted air can be reclaimed and used to heat the supply air, thereby reducing wasteful energy losses. Outside air will be drawn through the heat exchanger and will 'absorb' the recovered heat such that tempered air is introduced to the lounge/reception rooms and bedrooms. The WHV unit will include a bypass damper that allows the extract air to pass around the heat exchanger at times when the extract air temperature is higher than the outside air temperature during summer.

Kitchen areas will be provided with a re-circulating kitchen exhaust hood located above the cooking hobs. This hood will clean the air of cooking and grease vapours before it is exhausted into the central whole house vent system.

External Discharge and intake locations will be positioned to minimise the recirculation of exhaust air into the air inlet

The distribution of ventilation air throughout the apartment will be via low profile PVC ductwork mounted in the ceiling void. Any cross-over of services that may be required will be kept to corridor, utility and bathroom areas so that ceiling heights in living areas and bedrooms can be kept as high as possible

Supply and extract air within living and bedroom areas will be via linear type supply air grille, whilst bathroom areas will be via circular disc type extract grilles.

Typical Linear Slot Diffuser

4.12.2. Purge and Smoke Ventilation

Windows and balcony doors will be utilised for purge ventilation, i.e. to aid the removal of high concentrations of pollutants and water vapour released from occasional activities (such as painting) and accidental releases (such as burnt food). Windows will also be used for summertime overheating control.

5. ELECTRICAL SERVICES

5.1. Introduction

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

- 3 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 will be decommissioned and replaced by a new substation at ground floor level (refer to Utility Services section of this report).

The new substation will provide 3No new LV services to the building, namely: 1No for the landlord switchboard, 1No for the tenant switchboard and the third for the residential panel. In addition to the above, the new UKPN substation will provide LV power to the local network.

The new total estimated maximum demand shared across the 3No building supplies will be approximately 700kVA.

The landlord's LV feed will terminate into a separate 800A rated LV switchboard. The switchboard will provide power to common area distribution boards, HVAC equipment, lifts, primary life safety supplies, etc.

The landlord switchboard for this development will 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 will feed mainly lighting and power distribution boards within the office areas. The switchboard will be rated at 400A and also be of form 4, type 2 segregation.

The residential portion of the building (approx 50% of 4th floor and entire 5th floor) will be fed from a basement located 200A, 10 way TP&N Ryefield fuseboard. The fuseboard assembly will be of a type approved by UKPN.

5.3. Power Factor Correction

Provide a bank of staged & detuned power factor correction capacitors, installed integral within the new switchboards. The PFC installation will 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 will be established in the LV switchroom to which main earthing and equipotential bonding will be connected.

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

5.6. Risers

The building will consist of electrical risers to provide separate cabling services to the tenant, landlord and residential areas respectively. Refer to combined services layouts for location of risers.

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 will be provided on floors ground to third. 1No board will be provided in the basement and fourth floor office areas respectively.

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

Submains armoured cables with low smoke zero halogen outer sheathing will 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 will be suitably fire rated and protected against mechanical damage. Where required, mains and generator supplies to life safety equipment will 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 will be diversely routed throughout the building.

5.7. Life Safety Installation (For residential only)

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 will provide a minimum power capacity of 110kVA, for the purpose of providing backup power to the life safety services only for a period of 3 hours. The generator will be called to start by mains failure signals from automatic transfer switches (ATS's) installed throughout the building.

A day tank will be provided either separately within the container or under the set as a belly tank. The day tank will be sufficient to provide 3 hours of continuous operation of the life safety generator. Fuel top up will be by manual delivery via the lift or staircase.

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

A 200A LV main fuseboard will be provided within a weatherproof ventilated GRP enclosure on level 5 roof for distribution of generator power. Outgoing fuses will be cabled to the life safety supplies. Sufficient space will be provided within the GRP enclosure for it to be maintained from within the enclosure.

ATS's will be provided at the input to the life safety equipment. The generator will 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 will be provided within the basement, mounted external adjacent to the basement electrical switchroom within a dedicated cupboard. Utility meters will be provided for the landlords and tenants LV switchboards and also for each apartment respectively.

The residential apartment tenants will be billed directly by the Electricity Supplier.

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

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

5.9. Energy Monitoring & Automatic Data Collection

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

This system will 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 will be fed from local Landlord MCB distribution boards via ring and radial circuits and shall be protected by 30mA residual current devices.

Provide power to the following services as indicated on the LV schematic;

1. Chillers.
2. Cooling Tower.
3. Motor Control Centres.
4. Passenger and Fire Fighting Lifts.
5. Fire Alarm Panel
6. Bin Lift

5.11. Tenant's Small Power

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

5.12. Apartment Small Power

A single phase consumer unit will be provided within each apartment in an accessible cupboard. This will supply all lighting and power within the apartments.

Electrical accessories will be installed throughout the apartments, similar or equal to MK Edge range. (Architect to confirm) Small Power will be provided as required to suit each apartment layout, including but not limited to general power to kitchen services, AV equipment, bedside table luminaires etc.

5.13. Wiring Systems

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

Installation in apartments, core and service areas will be mostly concealed within ceiling voids wherever practical and surface run when concealment is not practical.

5.14. Lighting

5.14.1. General Offices

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

The lighting will 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 will comply with BS 5266.

The office lighting including the reception, atrium, lift lobby and WCs will 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 will consist of fluorescents and LED fittings where possible.

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

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

In the basement and on the 4th floor lighting will be provided via luminaires integrated within bi-directional multi-services chilled beams.

5.14.2. Apartments

Energy efficient lighting will be installed throughout the apartments to provide a high level finish and a dynamic environment in line with the Code for Sustainable Homes Level 4.

The lighting will be designed in correspondence with the Architect. We propose the lighting is a combination of small diameter LED downlights, wall washers and fluorescent lighting where possible.

The apartment lighting will be controlled via a combination of switches and scene controllers to provide high energy efficiency and a flexible controllability for end users.

5.15. Emergency Lighting

Emergency lighting will be provided throughout the building to meet the requirements of BS 5266 and current European Standards. The system will 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 will 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.

5.16. Lightning Protection Systems

A survey of the existing lightning protection system will be commissioned with a view to reuse. This system will 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 will be provided within the main LV switch panels.

5.17. Telephone, Communications, Security and Data Systems

A containment system will be provided for the installation of communication and security wiring both by the landlord and tenants. Cable trays will be provided from the communications intake to the comms/security riser and the comms room. Refer to Stage C drawings.

5.18. Photovoltaic System (PV)

PV's are proposed to be installed on the main building roof. The actual capacity of the system is to be determined within the next phase of design.

The system would consist of PV (crystal silicon cells) panels which are interconnected to gather to form an array. The system will be interconnected via double pole isolators, surge suppressors, inverter and connected to the main landlord switchboard as indicated on the schematic.

The PV system will have to comply fully with the requirement of UKPN, G83 protection relays, to allow the energy generated by the PV installation to be utilised and exported via an import/export utility meter as required.

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

5.19. Fire Detection and Alarm

5.19.1. Office and Common Areas

A fully analogue addressable automatic fire detection and alarm system will 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 will be an open protocol type.

A category L2+M type fire detection and alarm system will 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 will be provided with addressable loops for tenant and landlord areas.
- The building will be configured for simultaneous evacuation.
- Sounders will 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 will be provided throughout the building, generally adjacent to storey exits and final exits.
- The fire detection and alarm system will 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.

5.19.2. Apartments

Install within each apartment a standalone mains operated (battery backed) domestic fire detection system in accordance with BS 9991 and BS 5839-6 to achieve a minimum of a category LD2 standard.

A category LD2 fire detection system will consist of interlinked smoke alarms within entrance halls and heat alarms positioned within all risk rooms e.g. Kitchens / Utility rooms.

Smoke and heat alarms will be mains operated, conform to BS 5446-1 and BS 5446-2 respectively and will be provided with battery backup power supplies.

The evacuation strategy shall be based on a defend-in-place philosophy for the residential areas where residents stay in their apartments. Other areas shall be simultaneously evacuated on a fire alarm signal from anywhere in the building.

Sounders shall be installed on balconies of apartments where there are large travel distances. Provide sound pressure levels in accordance with BS 5839.

5.19.3. Disabled Refuge and Fireman's Communication System

A combined disabled refuge and firemans communication systems will be designed and installed in accordance with BS5839 Part 9 and BS 9999.

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

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

The disabled refuge communication system will comprise of:

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

6. PUBLIC HEALTH SERVICES

6.1. Introduction

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

- 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.
- 1 no new domestic incoming water supply from the Authority mains shall be extended to a building water meter and cold water storage tank serving the apartments. The water meter shall have a pulsed output in line with BREEAM requirements.
- Metered tenants domestic boosted cold water service at basement to 4th floors.
- Sanitary pipework installation to serve all sanitaryware and fitments in the offices and apartments, including separate tenants 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 and dedicated meters to the apartments.
- Complete new domestic hot and cold water systems to be provided.
- Category 5 boosted cold water service to serve wash down points.
- Solar hot water to the apartments (subject to Planning Approval).

6.2. Offices

6.2.1. Boosted Potable Cold Water Service

The new incoming mains cold water service will be extended to serve a potable cold water storage tank/booster pump set and category 5 package tank and pump set.

Boosted cold water service will 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.

Dedicated tenants boosted cold water service will 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 will be furnished with an ultra violet purification unit to minimise the risk of legionella and associated harmful bacteria spores. A water conditioner will 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 will be provided to minimise water usage.

6.2.2. Boosted Hot Water Service

Domestic hot water will 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.

6.2.3. Boosted Non Potable Cold Water Service (Cat5)

Packaged non potable Category 5 cold water tank and pump set shall be provided to serve items of equipment which could be subject to backflow contamination such as bib tap wash down points, irrigation points etc.

The Category 5 cold water tank shall be served from the Offices incoming cold water mains service.

6.2.4. Boosted Softened Water

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

6.2.5. 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 fitout. 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 will be provided with capped connections for the discharge of waste water and condensate at basement level for future tenant fit out.

6.2.6. 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).

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

6.2.7. Low Pressure Gas

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

It should be noted that the existing 80mm incoming gas service serving the building could be considered to be re-used but this is dependent on the condition and capacity this service can provide for the new development.

6.3. Apartments

6.3.1. Boosted Potable Cold Water Service

New dedicated metered incoming cold water main will be extended to serve a dedicated potable cold water storage tank and booster pump set. The boosted cold water service will be extended through the building to provide a dedicated metered boosted cold water service to each apartment furnished with an isolating valve, double check valve and pressure reducing valve. The boosted cold water shall be routed within each apartment to supply potable drinking outlets, cold water connections to the sanitaryware and fitments and cold feed to the hot water heaters.

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

Water conservation devices to accord with the Code for Sustainable Homes such as a dual flush WC's, flow restrictors will be provided to minimise water usage.

6.3.2. Boosted Hot Water Service

Boosted hot water service shall be provided to each apartment from dedicated unvented hot water heaters within each apartment generated from dedicated gas fired boilers.

To accord with the requirements of Code for Sustainable Homes Level 4, the hot water heaters shall be primarily generated from solar panels located on the roof. The solar hot water system shall be subject to Planning Approval based on the fact that the panels will be located on the roof and could exceed a height of 2.0m.

The boosted hotwater service shall be a single pipe system and shall be extended from the hot water heaters to supply hot water connections to the sanitaryware and fitments.

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

6.3.3. 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.

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).

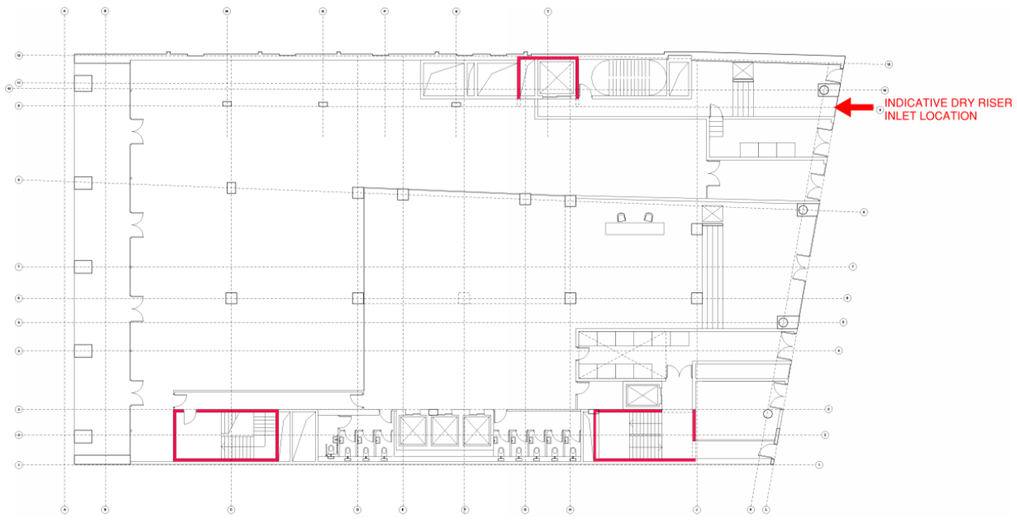
7. FIRE PROTECTION SERVICES

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

7.1. Dry Riser System

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

The system will be provided with fire brigade quick infill breeching points located within Jamestown Road. The breeching points will 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

7.2. Sprinkler System

Consideration shall be made for basement smoke exhaust in the basement. The basement is presently mechanically ventilated and sprinkler protection serving the basement may be required. This will be subject to the Fire Strategy Report provided by BB7 and Building Control approval.

8. VERTICAL TRANSPORTATION

8.1. 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 and apartments.

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 13 person lift should be provided for the service of the apartments on the 4th and 5th floors. This shall also be utilised 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 Apartments =B, G, 4th and 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.

8.2. 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 will be manufactured from the Lift Contractor's standard range of machine room-less lift equipment. This of equipment will 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.

8.3. Bin Lift

A dedicated lift will be provided for the bins. This lift will 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 will be a maximum of 0.63 m/s, this will ensure that the smallest pit depth in the basement and headroom heights at Ground floor can be achieved.

8.4. Lift Car Finishes

8.4.1. Office Passenger Lifts

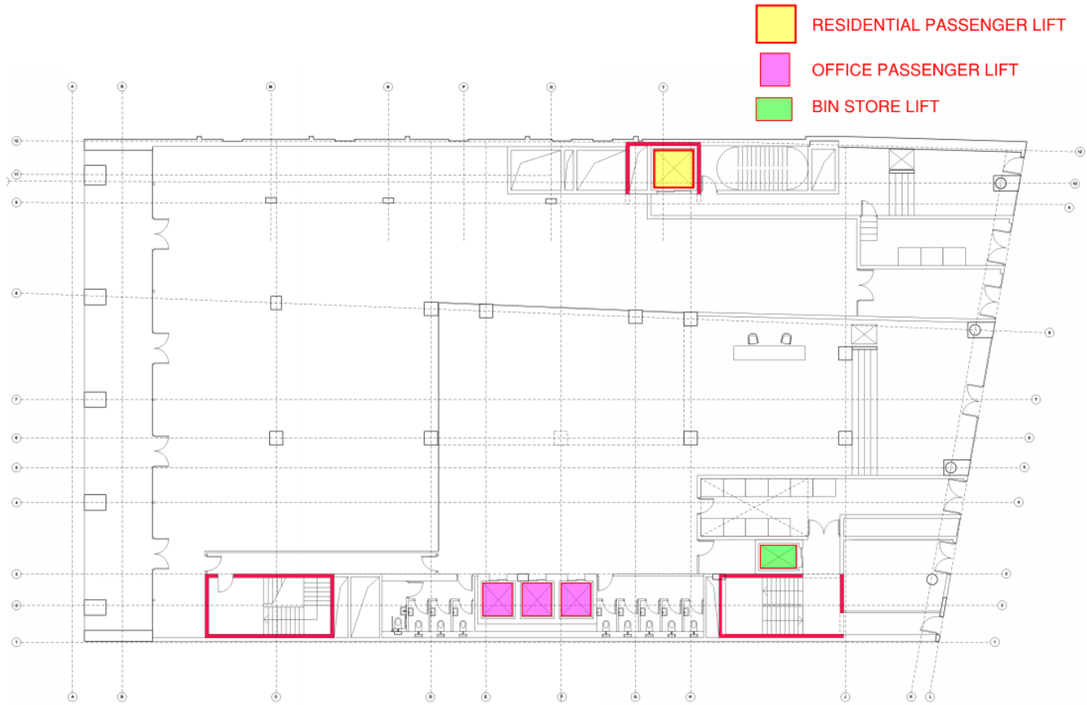
The lift car finishes for the office lift should reflect the interior of the building and the lift lobbies in particular. To this extent the same floor covering used on the Ground floor should be used in these lifts. Back painted glass or coloured patterned stainless steel should be used with a mirror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

8.4.2. Apartment Passenger Lift

The lift car finishes for the apartment lift should be robust without creating the impression of a stainless steel box. The floor covering in this lift should be vinyl or carpet, whilst the interior wall finishes should be patterned coloured stainless steel, with a polished stainless steel mirror. Provision for protection drapes should be made.

8.4.3. 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.



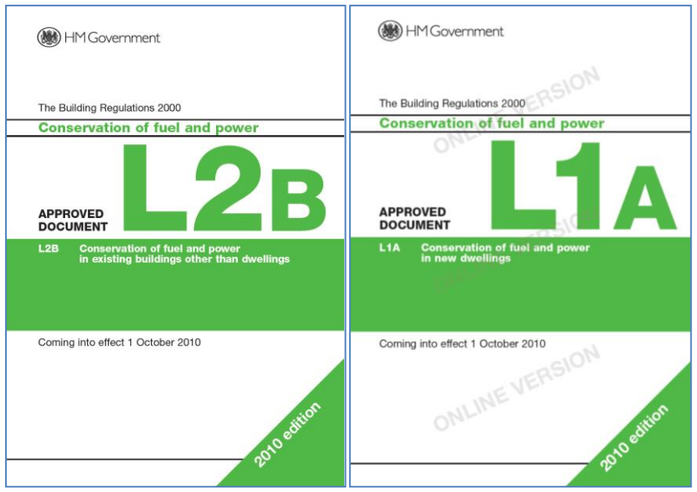
Vertical Transportation Location

9. PART L REGULATIONS

9.1. Regulations

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

- Part L1A – Conservation of fuel and power in new dwellings (2010)
- Part L2B – Conservation of fuel and power in existing buildings other than dwellings (2010)



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.

9.2. Tier two documents - Building services compliance guides

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

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

Where central plant is serving landlord areas and dwellings the more onerous of the two documents will be applied.

9.3. Apartments

The approved document Part L1A applies to new build dwellings and applies to proposed apartments that are to be located levels 4 and 5.

Limiting fabric parameters for the new apartments are:

Table 2 **Limiting fabric parameters**	
Roof	0.20 W/m².K
Wall	0.30 W/m².K
Floor	0.25 W/m².K
Party wall	0.20 W/m².K
Windows, roof windows, glazed rooflights, curtain walling and pedestrian doors	2.00 W/m².K
Air permeability	10.00 m³/h.m² at 50 Pa

Table 2 from ADL2A - Limiting fabric parameters

9.4. 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 1000m2 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 level
- The installation of a new building services HVAC and lighting systems.

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

9.4.1. New and Replaced Thermal Elements

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

Table 4 **Standards for new *thermal elements***	
Element[1]	**Standard (W/m².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

9.4.1.1. 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**	
Fitting	**Standard**
Windows, roof windows and glazed rooflights[1]	1.8 W/m².K 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 W/m².K
Curtain walling	See paragraph 4.28
Pedestrian doors where the door has more than 50% of its internal face area glazed	1.8 W/m².K for the whole unit
High-usage entrance doors for people	3.5 W/m².K
Vehicle access and similar large doors	1.5 W/m².K
Other doors	1.8 W/m².K
Roof ventilators (including smoke extract ventilators)	3.5 W/m².K

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 14351-1, *Windows and doors – Product standard, performance characteristics*, 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**	**Rooflights 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 buildings	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.

9.4.1.2. 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/m².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

9.4.1.3. 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.

9.4.1.4. Replacement Building Services

All replaced building services will be specified in accordance with Non-Domestic Building Services Compliance Guide 2010. This includes minimum performance standards for:

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

9.4.1.5. 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 will 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 will usually meet the economic feasibility criterion set out 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 m² 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 rooflights (but excluding display windows) or doors (but excluding high-usage entrance doors) which have a U-value worse than 3.3 W/m².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 will 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.

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

9.5.1. 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 has 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) will 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 will need to be considered to meet the above criteria for office areas.

9.6. Part L2B Compliance Methodology

The compliance of the proposed development will 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 will be undertaken, the existing building and the proposed building. The simulations will be used to demonstrate that the proposed building design will 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.

10. PLANT REPLACEMENT

10.1. Plant Replacement Strategy

Replacement of major items of plant at 5th and basement levels should not be required during the normally anticipated life expectancy of the plant. As the anticipated life of the building is in excess of the life of the plant (typically 20-25 years) consideration has been given as to how these services can be replaced without significant impact on the building structure.

Major items of plant are located at 5th floor level and within the basement level plant area.

Basement plant replacement strategy is such that normal periodic plant maintenance activities and minor equipment replacement of the basement plant can be carried out using normal access routes such as lifts and staircases. A knock out soft spot within the ground floor slab will be provided to remove larger sizes of plant from the basement.

5th floor plant replacement strategy is such that the normal periodic plant maintenance activities, minor equipment replacement and installation and replacement of landlords and tenants plant can be carried out using the landlords passenger lift. Replacement of major items of plant located at 5th floor level will necessitate the use of craneage.

Plant Item	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 will be in sections for replacement and transported to ground by the landlord's passenger lift or stairs.
UKPN Transformer	Ground	Existing UKPN access will be maintained.
Switchboards	Basement	Broken down into small parts and transported to ground by the landlords 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.
Fire Pressurisation Fan	Residential Stair Core	Craned to and from the rooftop.
Toilet Extract	5th Floor	The extract fan unit will 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.

11. STANDARDS

All works to be carried out will 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 2007.
- Health & Safety at Work Act.
- The Water Regulations.
- CIBSE Guides.
- IEE.

12. SERVICE ENGINEER'S DRAWINGS

Doc No:	Revision:	Type:	Description:
COMBINED SERVICES			
CS-0B-001	P01	Drawing	Combined Services - Basement Level
CS-0G-001	P01	Drawing	Combined Services - Ground Floor
CS-01-001	P01	Drawing	Combined Services -Typical Floor
CS-04-001	P01	Drawing	Combined Services – Fourth Floor
CS-05-001	P01	Drawing	Combined Services – Fifth Floor
CS-0R-001	P01	Drawing	Combined Services - Roof
MECHANICAL SERVICES			
M-S-001	P01	Drawing	Mechanical Services - Ventilation Schematic
M-S-002	P01	Drawing	Mechanical Services - LTHW Schematic
M-S-003	P01	Drawing	Mechanical Services – Condenser Schematic
ELECTRICAL SERVICES			
E-S-001	P01	Drawing	Electrical Services - Schematic
PUBLIC HEALTH SERVICES			
H-S-001	P01	Drawing	Public Health Services – Water Services & Gas Schematic
H-S-002	P01	Drawing	Public Health Services - Sanitary Schematic