MEP Services Concept Design Brief

551-557 Finchley Road

Glencar Construction Ltd

February 2024

envision

BUILDING SERVICES RIBA STAGE 2 CONCEPT BRIEF

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TABLE OF CONTENTS

1 INTRODUCTION - RIBA STAGE 2 CONCEPT REVIEW 1

1.1 Building use / Description 1

1.2 Building orientation 1

1.3 Building form 1

1.4 Concept stage MEP load analysis 1

1.5 Summary of Building Heat loss (Estimated) 1

1.6 Summary of Booster Tank and Pumpset Sizing 2

1.7 Preliminary Estimated Electrical Load 2

1.8 Approved Document Part L Concept Stage Review 3

2 Description of Works 4

2.1 Design Criteria 5

a. Internal Conditions for areas within the buildings. 5
b. Secondary Temperatures (LTHW) 5
c. Internal Lighting Levels 5
d. External Lighting Levels 5
e. Occupancy density 5
f. Ventilation Systems 5
g. Electrical Supply Characteristics 5
h. Sanitary Appliances 6

3 UTILITY SERVICES 7

3.1 Existing Services 7

4 MEP Stage 2 Design Brief – Key Design Items 8

4.1 Above Ground Drainage 8

4.2 External Lighting to Building 8

4.3 Internal Lighting 8

4.4 Ventilation 8

4.5 EPCs/SAP/SBEM 8

5 Renewable Technology options 9

5.1 Heating Installation - Air Source Heat Pumps 9

5.2 DHW installation – Air source heat pumps 9

5.3 Roof Mounted PV array 9

6 Data Collection 10

APPENDIX A – EXTERNAL LIGHTING OPTIONS 11

APPENDIX B – INTERNAL LIGHTING OPTIONS 12

APPENDIX C - PROPOSED MANUFACTURERS 13

1 INTRODUCTION - RIBA STAGE 2 CONCEPT REVIEW

This RIBA Stage 2 MEP Concept Report has been prepared by Envision on behalf of Glencar Construction Limited and supports the scheme development led by BCR Infinity Architects at the 551-557 Finchley Road site.

The works described within this document have been based on the latest BCR Infinity Architects drawings for the proposed works.

This document seeks to provide an overall strategy for the redevelopment but remains at a strategic level. It is anticipated that detailed design will be required by the M&E contractor to resolve all issues required for a successful re-development.

This document should be read alongside the scheme's outline energy statement for details relating to energy use, policy requirements and compliance with Part L 2013.

The contractor shall note that they are required to undertake detailed design of all services, this report and the design drawing produced are at concept stage only.

1.1 Building use / Description

The proposal is the refurbishment of the existing building of 4No terraced houses and conversion to apartments. The proposed units have be developed to target meeting the requirements set out in the energy statement.

1.2 Building orientation

The terraced houses are orientated on an approximate East-West axis facing onto Finchley road. There is no carparking on the site.

1.3 Building form

The apartment building and refurbishment will be undertaken over 6 storeys. The existing elevations are built in facing brickwork.

The constructions shall meet the minimum thermal performance criteria as identified in the accompanying energy statement, ref: **G1137-ESL-XX-XX-RP-Y-00001**.

Windows have been selected to maximise natural daylight and heat gains in the winter.

It is anticipated that ceiling voids required for services will be 150mm clear and 300mm in communal areas.

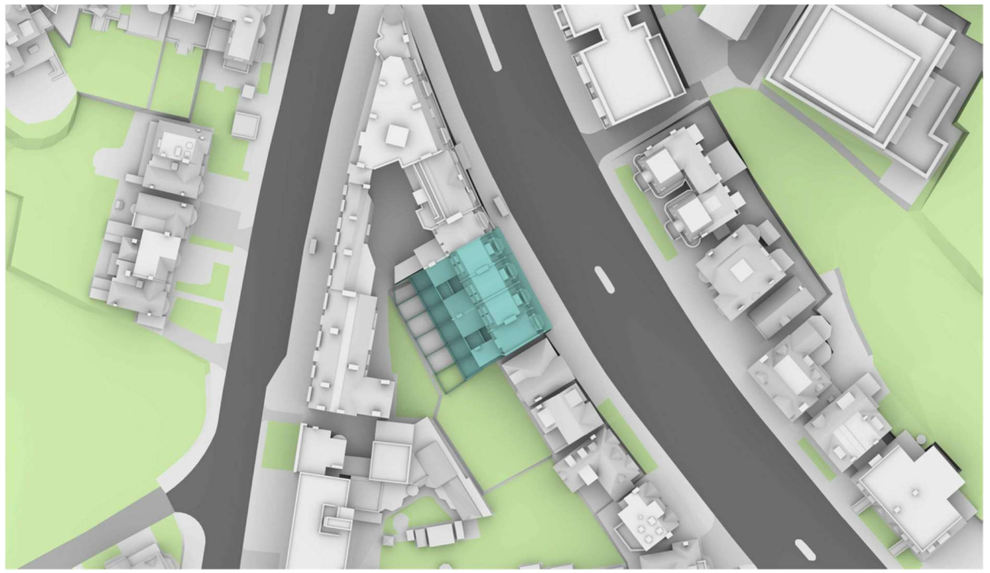


Figure 1.1 –Site Plan

1.4 Concept stage MEP load analysis

The contractor shall be responsible for making application for all new supplies and disconnections of existing where applicable.

1.5 Summary of Building Heat loss (Estimated)

For the purpose of this concept report an estimated load of 60w/m2 has been applied to each apartment.

The maximum heat loss estimated for each apartment is 5kW.

For the Lower Ground floor and Ground floor units it is anticipated that a Mitsubishi Ecodan or similar approved will be installed outside each unit to meet this load and the domestic hot water (DHW) generation requirements. Within these unit underfloor heating shall be

The installed capacity of the Heat pump solution should be equal to the estimated heat loss identified above.

Each unit shall be provided with a suitably sized DHW cylinder linked to the heat pumps and backed up with an immersion heater.

In the apartments above Ground Floor a Worcester Greenstar CDI combi boiler will be installed to provide the heating and hot water.

Note: Comfort cooling/air-conditioning is not included in this services strategy.

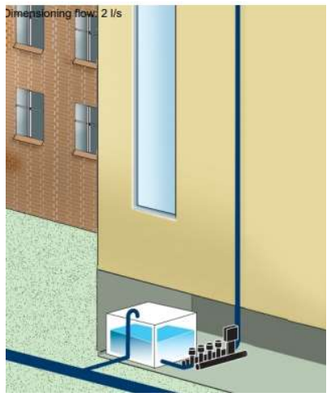
1.6 Summary of Booster Tank and Pumpset Sizing

Tank sizing (as per Layout)			
Site Total Loading Units	flow rate (l/s)	+10% margin	15 minutes storage (in litres)
340	1.7	1.87	1683

Booster Sizing - Flow Rate	
Loading Units	340
flow rate (l/s)	1.7
+10% margin	1.87

Booster Sizing - Pressure		
Building height	19	m
pressure loss	1.86	bar
Pressure @ top outlet	1.5	bar
Losses	0.15	bar (estimate)
Total	3.51	bar
+10% margin	3.86	Bar

Based on the above a 2,000-litre storage tank is required and the booster set selected is a Grundfos Hydro Multi-E 2 CME5-04 or similar approved. The unit shall have a Run/Standby capability.



1.7 Preliminary Estimated Electrical Load

	No of Flats or Quantity	Diversified Load (kW)	Coincidence factor (ks)	Total kW
Level -1	3	11	0.53	17.5
Level 0	2	11	0.53	11.7
Level 1	3	7.5	0.53	11.9
Level 2	3	7.5	0.53	11.9
Level 3	2	7.5	0.53	8.0
Level 4	2	7.5	0.53	8.0
Landlord (General Lighting and Power)	1	15	1	15.0
Landlord (Life safety systems)	1	5	1	5.0
Commercial Unit 1	1	21.15	1	21.15
Commercial Unit 2	1	20.25	1	20.25
Total			130.3	
20% Spare capacity for future			156.4	
kVA (kW / 0.9pf)			173.7	

Note

The power requirement for the building shall be served via the local network which is owned and operated by UK Power Networks (UKPN). The proposed development receiving the load calculated in the above table is subject to application and network studies taking place to ensure there is sufficient capacity within the network adjacent to the site. A preferred location for the incoming supply to terminate has been located at Lower Ground floor level as per the drawings.

The mains incoming utility connection shall feed a meter and CT arrangement, and Ryefield panel which will split the service for the landlord's supply, commercial supplies and the residential supplies.

The residential supplies will be individually metered, with smart meters located within utility cupboards/stores within the apartments.

The units will each have their own consumer unit which will supply the electrical services within each unit.

1.8 Approved Document Part L Concept Stage Review

The energy statement shall be consulted for details relating to energy use, policy requirement and Part L 2013.

2 DESCRIPTION OF WORKS

The following works describe the preliminary design for the installation of the Mechanical and Electrical and Public Health (MEP) services for the works at the Finchley Road site.

The Brief provides an outline description scope of works anticipated for the Building Services within the building. The building design, floor layouts and configuration concepts are in development for RIBA stage 2. This concept review has considered information provided by BCR Infinity Architects.

The MEP brief has been developed in line with our interpretation of the client's requirements and with design options to be considered.

The M&E contractor shall provide as-built record information for all services installed in the building.

The installation shall comply fully with all the relevant British Standards, Statutory Acts, CIBSE Guidelines, Building Regulations Parts L and F and any Planning Constraints including:

IET 18th Edition Wiring Regulations BS7671 to current amendment.
CIBSE Codes of Practice, Guidelines and Recommendations in particular SLL Lighting Guide 9:Residential Lighting and SLL Lighting Handbook.
All relevant British Standards and Codes of Practice in particular:

- Fire alarm detection in accordance with BS 5839-6 Grade 4 category LD3 (Apartments).
- Fire alarm detection in accordance with BS 5839-1 category L5 (Communal Areas).
- Emergency lighting in accordance with BS 5266-1 and EN 1838.
- BS EN 12464-1: 2011 Light and Lighting – Lighting of Work Places Part 1: Indoor Work Places
- BS EN 12464-2: 2014 Light and Lighting – Lighting of Work Places Part 2: Outdoor Work Places.

Building Regulation approved Documents and in particular Part P relating to Electrical Safety in Dwellings.
Electro-magnetic interference guidelines.
Construction design and management regulations.
Manufacturers recommendations for installation, testing and commissioning, and maintenance.
COSHH regulations.
The Health & Safety at Work Act & Recommendations of the Health & Safety at Work Executive.
Factories Act.
Health & Safety at Work Act.
Electricity Acts.
Electricity at Work Regulations.
Local By-Laws and regulations.

At this stage our assessment suggest the following Building Services will be considered for design development at Stage 2:

1. A central store/plant room which will accommodate mains cold water storage tank and booster set and associated controls and equipment.
2. Individual air source heat pump system (heating & DHW generation only) to the lower ground floor and ground floor unit, heat pump units located outside each unit (5 No) and internal distribution of LTHW pipework to underfloor heating and DHW systems. Acoustic enclosures may be required to ensure noise levels are acceptable. Domestic hot water will be provided via a cylinder in each unit linked to the heat pumps and backed up with an immersion heater. Space is required in each unit for the cylinder.
3. Individual gas-fired combi boilers to the remaining units on the upper floor and internal distribution of LTHW pipework to radiators and DHW systems.
4. Boosted cold drinking water distribution pipework to serve the individually metered units.
5. Mains cold water feeds to be provided to the landlord areas at ground level for refuse area wash down. The wash down will be fed from a Cat5 Break Tank and Booster.
6. Separate main cold water feeds to the shell commercial units in the position indicated on the drawings.
7. Above ground drainage from each sanitary appliance in each unit (Kitchen, bathroom and WC provision). Capped connections to be allowed in each commercial unit, minimum 2No per unit.
8. Bathroom/En-suite WC extract ventilation from each unit via MVHR unit providing tempered fresh air supply back to each individual unit. MVHR will require 2no airbricks per unit, ideally 10m apart and on differing elevations. MVHR unit to be located as per the drawings.
9. The residential units LV electrical distribution from a central distribution location in the lower ground floor, as per the drawings. This connection will be fed via the incoming main supply from UKPN.
10. LV distribution to communal Landlord areas which includes for external lighting.
11. Each unit will comprise a metered consumer unit which will be used to power all the circuitry within the unit.
12. Small Power, Lighting and Data design within each unit.
13. LV domestic outlets and fittings to each area inclusive of common areas.
14. Lighting circuit and fittings to each area inclusive of common areas.
15. Emergency lighting to external staircase.
16. TV, data and telecoms to each unit.
17. Fire alarms and sensors within each unit/communal spaces (quantities vary upon receipt of fire strategy).
18. LV and control wiring for all mechanical plant
19. 8.8kWp solar photovoltaic array to the roof.

The following Building Services shall be installed for the building as a whole.

1. Lightning protection, earth rods and pits, depending on risk assessment.
2. Incoming sub main statutory supplies, electricity, water, data & telecoms to service user system.
3. Foul and rain-water drainage – connection from local building into existing infrastructure
4. Bib Tap water point fed from CAT5 break tank and pump set to bin store.

2.1 Design Criteria

The following design criteria shall be applied to all Building Services selections.

a. Internal Conditions for areas within the buildings.

All heated spaces : 21˚c

Note – Conditions will vary with Ambient temperature in summertime where no active cooling proposed.

b. Secondary Temperatures (LTHW)

ASHP - UFH

Flow Temperature: 55˚c

Return: 45˚c

Boilers

Flow Temperature: 60˚c

Return: 40˚c

*Note: radiator sizes will need to match the above flow temperatures.

c. Internal Lighting Levels

Circulation areas: 100Lux

Corridors: 100Lux

Staircases: 100Lux

Lift lobbies: 100Lux (200Lux in front of lift car)

Cycle Stores: 100Lux

Refuse / Recycling: 100Lux

Plant rooms: 200Lux

Switch rooms: 200Lux

Apartment Lighting levels shall be:

Room/Area	Light Level (LUX)
Entrance Halls	200
Living Rooms	150
Dining Rooms	150
Kitchens	200
Bedrooms	150
Bathrooms	150

d. External Lighting Levels

Pedestrian Walkways: 5Lux – uniformity 0.25

e. Occupancy density

In line with architect drawings.

f. Ventilation Systems

Mechanical Ventilation with Heat Recovery (MVHR) In accordance with Part F Building Regulations.

All internal doors shall be undercut to allow good internal air transfer between rooms. Air transfer grilles with intumescent treatment will be used where door transfer isn't possible or allowed. Windows shall be openable type to meet Part L and F as necessary.

A requirement for NOx filters on the fresh air intakes has been identified by the air quality report.

The acoustic report has identified the requirement for attenuators on fresh air intakes and exhaust to the units.

g. Electrical Supply Characteristics

Electrical General	
Temperature range for equipment selection	External -15C to +40C Internal +10C to +40C
Relative humidity for equipment selection	0 to 80% RH
Supply Voltage	400/3/50 nominal
Electrical Cable Sizing	
Total volt drop from origin of circuit	Lighting – 3% Other uses – 5%

Sub-main cable size	2.5mm2 minimum
Cable sizing general except for final circuits	20% spare capacity
Final Circuits: Ring circuits Radial circuits Lighting circuits	 2.5mm2 minimum 2.5mm2 minimum 1.5mm2 minimum
Radial circuits	2.5mm2 minimum
Lighting circuits	1.5mm2 minimum
Final Circuit Design	
Lighting	6.0A max installed load
Ring circuits	Separate 32.0A ring circuit for: Each plant room (RCBO) Each main entrance/reception area (RCBO) Each 250m2 of circulation area (RCBO) Areas not listed above – max. 12No 2-gang sockets (RCBO)
Final Circuit design current for volt-drop and Grouping calculations	
Lighting	Installed load
Ring circuits	32.0A
Final Circuit Grouping – in addition to IET Regs requirements – Max. number of circuits per containment compartment	
Lighting	16 circuits
Ring or radial (combined circuit)	7 circuits
Final Circuit load diversity for building load calculations	
Lighting	Minimum – design load x 66% (90% for landlord areas)
Ring circuits	Minimum – 32.0A x 30%
Radial circuits	Minimum – design load x 50%
Spare Capacity required	
Containment – trunking	Sized to ensure that a 45% space factor can be attained with 20% additional future cabling
Containment – sub-main	Sized to allow 20% additional future cabling without stacking
Containment - other	Sized to allow 20% additional future cabling
Sub-main cables	Diversified design current not to exceed 75% of corrected rating
Final circuit distribution boards	20% complete spare TPN ways above design requirements
Switch boards	20% complete spare TPN ways above design

h. Sanitary Appliances

The contractor shall undertake Part G calculations when sanitary fittings have been selected to ensure compliance with the planning policy and Building Regulations.

3 UTILITY SERVICES

3.1 Existing Services

Each of the buildings on the site of 551-557 Finchley road are served by gas, electricity, telecoms and water.

All existing services are to be isolated safely and in accordance with suppliers guidelines. The contractor shall approach a multi utility services contractor to remove all existing utility supplies as they are considered unsuitable for re-use.

Gas

The building will be provided with a Natural Gas supply to the commercial units and all units above ground floor level for boilers only. All units will be provided with electric cooker and induction hobs.

All residential units with gas shall be provided with a 40kW minimum gas supply with the pipework to the final outlet sized at a maximum 50pa pressure drop.

Each commercial unit shall be provided with a 60kW minimum gas supply with the pipework to the final outlet sized at a maximum 50pa pressure drop.

Electricity

A TPN supply shall be provided to the site. This will be via a connection from the mains network within the adjacent street. The main utility provider within the area of the site is UK Power Networks (UKPN). The supply will terminate within the lower ground floor electrical room, subject to approval from UKPN.

The overall demand has been estimated as 185kVA including spare capacity.

An application to UKPN will need to be made for the electrical supply to the site. Once the application has been made, the utilities engineer will be able to provide more information on the location for where the supply will be able to terminate. The utilities engineer will also confirm whether there is sufficient capacity within the network to support the site, or whether a substation will be required.

Supplementary roof mounted PV will be connected via G59 Import/Export Meter with the energy used throughout the building, and any excess going back into the grid. This may require a network analysis by the DNO.

An application for new MPAN numbers will be required for the new supplies.

Water Supply

A new Mains Cold Water supply shall be provided to the building to serve the BCWS and on-site storage located in the lower ground floor tank room.

The booster set is to be a run/standby system sized to meet the requirements in section 1.

The mains will supply a portable cold water storage tank. From the tank cold water mains will run to a boosted cold water duplicate pump set, which will supply the cold water will be distributed to the individual units throughout the site. This will require a legionella risk assessment and maintenance which the client shall be aware of.

The BCWS shall be potable drinking water and shall include necessary water conditioning and treatment as required and to meet WRAS regulations.

The refuse area wash down facility shall be fed from a separate Cat5 break tank and pump set to ensure compliance with local water company requirements to protect against backflow contamination if the client confirms these are required.

The fire engineer has confirmed that sprinkler protection is not required.

Above Ground Drainage

The above ground drainage will be connected (above ground stacks) into the new below ground drainage system, to meet with the site requirements as determined by the appointed Civil engineer. The system will be installed in accordance with Building Regulations Part G and all other relevant guidance.

Consideration for noise transfer and sound reduction on common SVPs running from top floor to basement shall be considered and specialist acoustic treated drainage systems shall be used in all units.

All vertical drainage shall be acoustically insulated – Geberit - Silent db20 HDPE or equal within the building.

Below Ground Drainage

The below ground drainage shall be designed to accommodate the new building requirements as specified by the Civil Engineer.

Telecoms

New incoming fibre optic supplies will be provided for the residential and commercial units. It should be to a minimum that high speed broadband (30Mbps) is installed to each of the units.

A new BT open reach fibre optic cable would be advised to be located within the electrical room at lower ground floor level, where a distribution point can be installed.

Dedicated conduit routes will run to the individual BT outlets in each unit. Position of main incoming DP to be determined following consultation with Open Reach.

4 MEP STAGE 2 DESIGN BRIEF – KEY DESIGN ITEMS

4.1 Above Ground Drainage

New above ground drainage utilising branch UPVC pipework will be installed to serve all necessary equipment that will include, but not necessarily limited to, the following:-

Soil and waste fittings to WC's, Showers, Baths, Sinks and Wash Hand Basins.
All over flows from WC cisterns and basins.

The connections to the below ground drainage will utilise clay pipe adaptors.

The above ground drainage installation will be designed and installed in accordance with the relevant BS & Codes of Practice. The local Building Control Officers' requests will also be sought and implemented

The installation of the above ground drainage will be designed in order to ensure that:-

All the appliances drain quickly, quietly and completely at all times without nuisance or risk to health. Discharge is conveyed without cross flow, back fall, leakage or blockage.

All above ground drainage shall be contained within removable 'boxing in' sections. Rodding eye locations shall be allowed as necessary.

All vertical stack drainage shall be acoustically insulated – Geberit - Silent db20 HDPE or equal within the building.

4.2 External Lighting to Building

External lighting shall be provided to the building. The external lighting to the residential entrances will be detailed to provide a welcoming aesthetic.

External lighting in the form of wall mounted fittings, bollards, amongst others, and will be considered during the lighting design (Up-Light will be subject to URL calculations). The lighting will be designed to enable the residents a safe route to walk around the building.

The lighting will be controlled via a time clock and daylight sensor array to ensure no nuisance lighting.

Examples of potential fittings which can be applied to the building can be found in Appendix A.

4.3 Internal Lighting

The lighting within the building will be designed to give a habitable and a level of light which will give the occupants an inviting feeling.
Within the units, downlights accompanied by pendant fittings should be considered. Additional lighting with the form of LED strip lighting will also be considered within the units.
Examples of fittings which will be considered during the design stage are available within Appendix 'B'.

4.4 Ventilation

Mechanical ventilation with heat recovery and natural ventilation will be the preferred method to sustain the environment within the dwellings. Natural ventilation will be provided to reduce the risk of overheating in the summer by a method suitable to the space and also with full consideration to security and safety. Natural ventilation will be achieved by utilising the following method:-

Opening windows

The design of the natural ventilation systems will be undertaken in conjunction with the project Architect to provide a fully integrated solution.

The ventilation openings will be designed to achieve natural ventilation at a rate to satisfy the latest building regulations part F.

The kitchens, bathroom, bedrooms and living room areas will be provided with type 4 continuous mechanical supply and extract ventilation with heat recovery. Fresh air make up air will be provided by diffusers mounted at high level within the dwelling, generally in accordance with the typical arrangement shown below.

The proposed ventilation unit for the houses and 2-bed apartments is the Airflow UK DV110 Adroit. The Airflow UK DV96 Adroit is proposed for the 1-bed apartments. In all instances exhaust and fresh air ductwork shall be minimised. It is assumed this ductwork will be limited to 1m in length total and intake and exhaust will be installed on different facades (or via the roof).

Figure 4.1 – Nuaire MVHR details

4.5 EPCs/SAP/SBEM

The contractor shall refer to the Energy strategy for details of the proposed installation. The contractor shall be required to update the EPCs for the commercial and residential units and lodge at practical completion. The contractor shall be responsible for ensuring that the targeted savings are achieved in the actual build and shall submit these to the engineer for review with a summary confirming compliance.

5 RENEWABLE TECHNOLOGY OPTIONS

The following systems shall be considered during the design development process to satisfy clients aspirations to reduce energy demand and implement best practice guidance for new buildings.

The systems selections shall be designed to satisfy planning and building regulations requirements for new build construction.

5.1 Heating Installation - Air Source Heat Pumps

The energy statement has determined the most appropriate heating solution for the development will be the use of air source heat pumps. However external space for these is only available for the apartments at the lower ground and ground floor level.

Figure 5.1 – Mitsubishi Ecodan Ultra Quiet Unit

This system (at stage 2) is considered the most suitable and in line with budget cost appraisal and as identified in the planning stage energy statement.

Options will be developed using a Mitsubishi Ecodan ultra quiet unit which will be combined with a suitably sized Mitsubishi FTC5 pre-plumbed standard cylinder for DHW generation. Space allowance has been made externally for the heat pump unit and space will be required in each unit for the DHW cylinder.

Each dwelling will be provided with heating to all rooms via underfloor heating with control provided by thermostats for zone temperature control.

5.2 DHW installation – Air source heat pumps

The heat pump shall provide LTHW to each unit's DHW cylinder. The DHW storage in each unit will be via a suitably sized cylinder designed to integrate with the Mitsubishi heat pump system. It is proposed that the 1-bed apartments and 2-bed apartments will accommodate a 150litre and 210litre cylinder respectively.

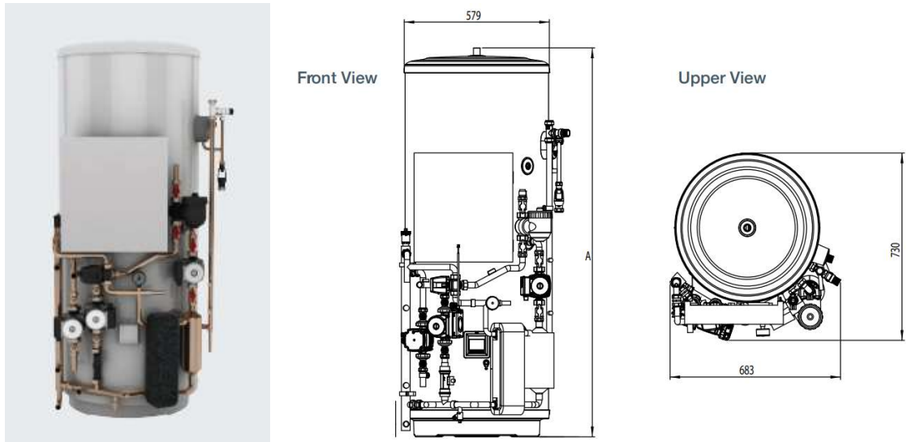


Figure 5.2 – Mitsubishi Pre-plumbed Cylinder

5.3 Roof Mounted PV array

Roof mounted PV shall be installed in accordance with the good practice requirements for building and to meet the requirements of the energy statement.

The energy statement shall be consulted for details on the size of the system proposed and dimensions.

6 DATA COLLECTION

6.1 The development shall provide metering, with the following systems covered:

- Main incoming supplies, electricity and water;
- Air Source Heat pump systems, electricity consumed and heat generated;
- Roof mounted PV array;

Analysis

6.2 The managing agents shall collate the data on a 6-monthly basis and analyse the inputs, considering the following:

- Energy and Water consumption relative to the As Built Performance, split by end use, where possible.
- Energy generation achieved through the PV array.
- Specific attention will be given to any variance in performance which were better or worse than expected. This will include analysis, based on the following potential influencers:
    - Occupancy, including building use hours derived from access control logs.
    - Commercial vacancies within the building.
    - The influence the weather conditions may have played.
- Actions plans should be developed where high levels of variance are predicted. Such information should be fed back to the design team / contractor.

APPENDIX A – EXTERNAL LIGHTING OPTIONS

The following are options which will be considered during the design of the external lighting (or similar approved);

Wall Mounted Up/Down Light

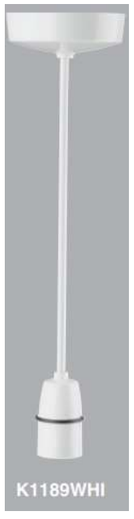
Wall mounted up-down fitting - Orlight – ORL3009A-S – standard GU10 fitting, is available in 2 shades of grey, or black, as well as stainless steel.

APPENDIX B – INTERNAL LIGHTING OPTIONS

Downlight

Ceiling recessed downlight - Orlight – ORLCB-FX-AW-9010 – 13W, 3000K/4000K- is available in white or black trim.

Pendant fitting



Pendant fitting – MK Electric – K1186WHI– 13W, 3000K/4000K- is available in white.

Wall mounted fitting

Wall mounted fitting - Orlight – LEO355-CH-4000K– 23W, 4000K- is available in white, chrome, and satin chrome

APPENDIX C - PROPOSED MANUFACTURERS

Mechanical Services

System	Manufacturer
Heat Pump System	Mitsubishi Electric
	Daikin
Boilers	Worcester Bosch
Fans	Nuaire
MVHR, Grilles and Diffusers	Nuaire
	Schako Limited
	Trox Limited
Valves	Crane Limited
	Hattersley Limited
	Oventrop
Water storage Cylinders	Mitsubishi Electric
Pumps	Grundfos
Radiators	Myson
	Stelrad
Underfloor heating	Nu-heat
	Warmafloor
Ventilation filtration	Nuaire
Ventilation attenuators	EEC

Electrical services

System	Manufacturer
Distribution Switchgear	Eaton MEM
	Schneider
General Lighting	Orlight
	Thorlux Lighting
	Concord Lighting
	ASD Lighting
Emergency Lighting	Thorlux Lighting
	Concord Lighting
	ASD Lighting
	ABB - Emergi-Lite
	P4 Emergency
External Lighting	Thorlux Lighting
	Concord Lighting
	ASD Lighting
LV Small Power Accessories	MK
	Crabtree
	Schneider
Fire Detection Systems	Clymac Fire Detection Systems
	Chubb Fire Detection
Intruder Alarm System	Initial Electronic Security
	Chubb Electronic Security
Lightning Protection	Omega Red Group
	Strike Control
Containment Systems	MK Electric
	Marshall Tufflex
	Schneider Mita
Access Control Systems	Initial Electronic Security
	Chubb Electronic Security
	Came – BPT