Thornley & Lumb Partnership Ltd.

MERCHANT ROKEBY GLOUCESTER, DOWNINGS GLOUCESTER (PHASE II).
MEP OVERVIEW STRATEGY FOR PLANNING

PREPARED BY
THORNLEY & LUMB PARTNERSHIP LTD

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Client Merchant Rokeby Gloucester

Thornley & Lumb
Mechanical & Electrical Consultant Engineers

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SECTION ONE: INTRODUCTION

1.0 – INTRODUCTION

This report has been prepared by Thornley & Lumb Partnership on instruction received from Merchant Rokeby Gloucester Ltd., (Client) to investigate, assess and confirm availability of the primary utility services required to support the proposed and as described MEP Energy Strategy and Building Engineering Services to be adopted and employed in servicing the needs of the proposed Downings (Gloucester Phase II) residential development at Bakers Quay, Gloucester

The report's content describes and illustrates the philosophy, scope and strategy of the Building Engineering Services design principles that will be to be developed for the proposed works, and in addition will provide information of a sufficient level to support the forthcoming Planning Application, hence shall be read in conjunction with other Planning Documents produced by the wider development tea

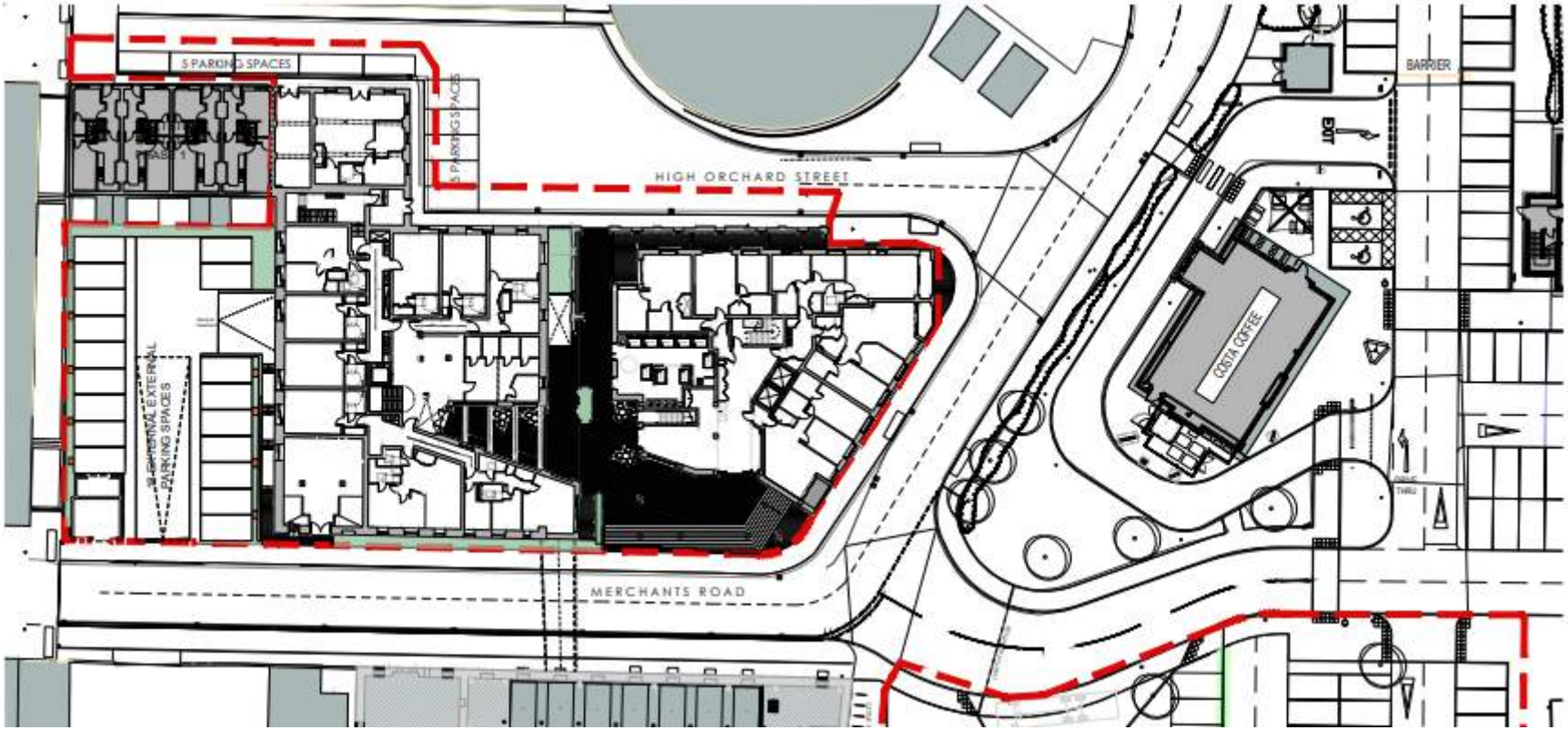
Note: The content of this report will be subject to continuing design development with the other members of the design team and approval of the Client

1.1 – THE DEVELOPMENT

The site, which was formerly the premises of West Midland Farmers, lies beside the Gloucester Quays outlet centre and leisure quarter developed by the Peel Group but has been derelict for over 25 years

The scheme comprises part retention and renovation of several listed buildings together with new build tower element constructed above podium level over common basement carpark.

The 1.49 ha (3.7 Acres) development site is situated on St Ann Way in the South West of Gloucester City Centre adjacent to the Gloucester Quays development. The historic city of Gloucester is located in the South West of England with the development less than a mile from the train station. Gloucester city is approximately 4.9 miles West of Junction 12 of the M5. The M5 ensures minimal travelling time to major cities with Bristol (35 miles), Birmingham (55 miles) and Cheltenham (11 miles). There are regular mainline train services from the Gloucester train station with regular services to Bristol (50 minutes), Birmingham (60 minutes) and Cheltenham (10 minutes).



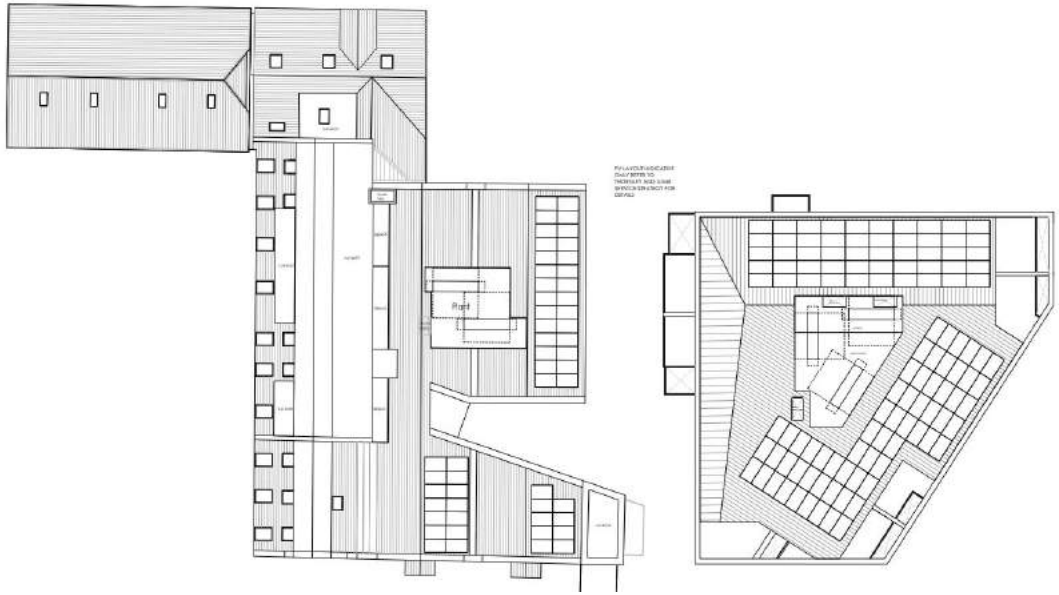
1.2 – DESCRIPTION OF THE DEVELOPMENT SITE

The Downings' development is primarily residential comprising a mixture of Studio, 1, 2 & 3 Bedroom apartments with selected apartments on the penultimate floors being of duplex design, generally arranged in two main construction blocks around a common podium courtyard, above a full basement, naturally ventilated, car park.

The two residential blocks known as 'The Tower' – new build 10 storeys and 'Heritage' part retained structure and renovation over 5 storeys including rear annex (High Orchard Street Warehouse), comprise 67 apartments and 44 + 6 apartments respectively providing a total overall of 117 dwellings. Each block is accessed and served around common vertical central stair and lift cores. A 'Residents Lounge' will be incorporated within the ground floor of the Tower and a Co-Working space will be provided within the ground level of the Heritage block. A separately demised and accessed Café shell unit for fitting out by others will be the only commercial offering at podium level.

Main plantrooms and switchrooms will be established at basement Level where the main services will be distributed to service risers in each core with Landlord ambient loop ASHP units and PV located at roof level

Basement (Lower Ground) Plan



Roof Plan

1.3 – SCHEDULE OF ACCOMMODATION

Bakers Quays - Schedule of Accomodation

Block	Floor	Flat N.	Type	Floor Area (sqm)	Floor Area (sqft)	G.I.A (sqm)	G.I.A (sqft)
BLOCK H	GROUND	H001	2B4P	60.5	651	770	8288
		H002	2B4P	59.1	637		
		H003	1B1P	31.1	334		
		H004	1B1P	30.9	333		
		H005	1B1P	31.0	333		
		H006	1B2P	41.2	443		
		H007	2B4P	70.5	759		
		H008	1B1P	32.7	352		
		H009	1B1P	31.3	337		
		H010	1B2P	45.31	488		
	FIRST	H101	2B4P	60.5	651	773	8320
		H102	2B4P	59.1	637		
		H103	1B1P	30.8	331		
		H104	1B1P	26.2	282		
		H105	1B1P	31.1	334		
		H106	1B1P	31.0	333		
		H107	1B1P	31.0	333		
		H108	1B2P	41.2	443		
		H109	1B2P	48.4	521		
		H110	1B2P	60.6	652		
		H111	1B2P	32.62	351		
		H112	1B1P	31.3	337.1		
		H113	1B2P	44.29	477		
		H114	2B4P	64.8	697		
	SECOND	H201	2B4P	60.5	651	774	8331
		H202	2B4P	59.1	637		
		H203	1B1P	30.8	331		
		H204	1B1P	26.2	282		
		H205	1B1P	31.1	334		
		H206	1B1P	31.0	333		
		H207	1B1P	31.0	333		
		H208	1B2P	41.2	443		
		H209	1B2P	48.6	523		
		H210	1B2P	61.1	658		
		H211	1B2P	32.62	351		
		H212	1B1P	31.3	337.1		
		H213	1B2P	44.29	477		
		H214	2B4P	64.8	697		
	THIRD /FOURTH	H301	2B4P	74.3	800	964	10376
		H302	2B4P	62.3	671		
		H303	3B6P	89.6	964		
		H304	3B5P	104.0	1,119		
		H305	3B5P	86.6	932		
		H306	3B5P	102.7	1,105		
		H307	2B4P	75.2	809		
		H308	1B1P	32.7	352		
		H309	1B1P	31.3	337		
		H310	1B2P	44.29	477		
		H311	2B4P	64.8	697		
BLOCK H - G.I.A TOTALS:				2,387.7	25,701	3,281	35,315

BLOCK N	GROUND	N001	1B2P	44.1	475	490	5274
		N002	1B2P	39.3	422		
		N003	2B4P	63.7	686		
		N004	2B4P	69.7	750		
		N005	2B4P	69.6	749		
	FIRST	N101	1B2P	44.1	475	482	5188
		N102	1B2P	39.3	423		
		N103	2B4P	64.1	690		
		N104	2B4P	70.3	757		
		N105	2B4P	70.1	755		
		N106	1B2P	34.5	371		
		N107	1B2P	46.6	502		
	SECOND	N201	1B2P	44.1	475	559	6017
		N202	1B2P	39.3	422		
		N203	2B4P	63.7	686		
		N204	2B4P	69.9	753		
		N205	2B4P	69.6	750		
		N206	1B2P	48.8	525		
		N207	2B4P	71.8	772		
		N208	1B2P	46.6	502		
	THIRD	N301	1B2P	44.1	475	559	6017
		N302	1B2P	39.3	422		
		N303	2B4P	63.7	686		
		N304	2B4P	69.9	753		
		N305	2B4P	69.6	750		
		N306	1B2P	48.8	525		
		N307	2B4P	71.8	772		
		N308	1B2P	46.6	502		
	FOURTH	N401	1B2P	44.1	475	559	6017
		N402	1B2P	39.3	422		
		N403	2B4P	63.7	686		
		N404	2B4P	69.9	753		
		N405	2B4P	69.6	750		
		N406	1B2P	48.8	525		
		N407	2B4P	71.8	772		
		N408	1B2P	46.6	502		
	FIFTH	N501	1B2P	44.1	475	559	6017
		N502	1B2P	39.3	422		
		N503	2B4P	63.7	686		
		N504	2B4P	69.9	753		
		N505	2B4P	69.6	750		
		N506	1B2P	48.8	525		
		N507	2B4P	71.8	772		
		N508	1B2P	46.6	502		
	SIXTH	N601	1B2P	44.1	475	559	6017
		N602	1B2P	39.3	422		
		N603	2B4P	63.7	686		
		N604	2B4P	69.9	753		
		N605	2B4P	69.6	750		
		N606	1B2P	48.8	525		
		N607	2B4P	71.8	772		
		N608	1B2P	46.6	502		
	SEVENTH	N701	1B2P	44.1	475	559	6017
		N702	1B2P	39.3	422		
		N703	2B4P	63.7	686		
		N704	2B4P	69.9	753		
		N705	2B4P	69.6	750		
		N706	1B2P	48.8	525		
		N707	2B4P	71.8	772		
		N708	1B2P	46.6	502		
	EIGHT/ NINTH	N801	2B4P	76.4	823	475	5112
		N802	2B4P	78.5	845		
		N803	3B6P	114.7	1,235		
		N804	3B6P	124.2	1,337		
		N805	3B6P	128.0	1,377		
		N806	2B4P	89.2	960		
		N807	3B6P	127.9	1,377		
		N808	2B4P	85.3	918		
BLOCK N - APARTMENT G.I.A TOTALS:				4,202.4	45,234	4801	51676

1.3 – SCHEDULE OF ACCOMMODATION

BLOCK N & H COMBINED LGF G.I.A TOTALS:			1562	16813	

BLOCK	1B1P	1B2P	2B4P	Maisonette 2B4P	Maisonette 3B5P	Maisonette 3B6P	TOTAL
H	19	13	13	0	3	1	49.0
N	0	30	30	4	0	4	68.0
TOTAL	19	43	43	4.0	3	5	117

BLOCK	Communal Areas (sqm)	Communal Areas (sqft)	Commercial Areas (sqm)	Commercial Areas (sqft)
H	42	452	60	645
N	31	333	0	0
TOTAL	73	785	60	645

1.4 DESIGN INFORMATION

This report has been developed following discussions with the client and the design team. The report has also been based upon available Roberts Limbrick Architect's drawings as at the date of this report.

SECTION TWO: BUILDING ENGINEERING SERVICES

2.0 – BUILDING ENGINEERING SERVICES – CODES OF PRACTICE

The execution of all building engineering services installation works will comply strictly with all applicable Laws, Rules, Recommendations, Regulations and Codes of Practice of all authorities having jurisdiction including, but not limited to, the latest Standards, Codes, Rules and Regulations from the following; where none exists, the design will incorporate all features of good design practice

- British Standard Specifications
- British Standard Codes of Practice
- 2013 Building Regulations, in Particular Part L2 and L1
- Offices, Shops and Railway Premises Act
- All Chartered Institution of Building Services Engineers (CIBSE) Guides and Codes
- The Building Services Research and Information Association (BSRIA)
- Guides and Recommendations;
- BS 7671-Requirements for Electrical Installations (IET Wiring Regulations);
- Statutory Authority Regulations
- Local Authority Bye-Laws;
- The Water Supply (Water Fittings) Regulations;
- Public Health Acts;
- Applicable Fire Brigade and Fire Officers requirements;
- Rules of the Fire Office Committee;
- Clean Air Act Memorandum;
- The Control of Pollution Act;
- Workplace (Health, Safety and Welfare) Regulations;
- Insurance Company Requirements
- Institution of Plumbing Engineers
- Electricity at Work Regulations
- Regulations of the Electrical Equipment for Buildings.
- Health & Safety at Work Act
- HSE CDM Regulations
- EEC Regulations and H & S Guidelines
- Local and National Electricity Supplier Regulations and Codes of Practice.
- Institute of Gas Engineers and Managers Regulations and Codes of Practice

2.1 – SUSTAINABILITY OF MATERIALS

Use materials which:

- Are new and suitable for the services and conditions of use normally expected to apply after the installation is complete
- Are able to withstand the testing and commissioning conditions specified
- Do not initiate mould growth, support vermin, contain animal hair, contain crocidolite or support bacterial life
- Do not involve the use of cfc's at any stage of manufacture, installation or subsequent operation
- Are free from objectionable odour's at the maximum or normal working conditions of operation
- Are not a fire hazard, do not produce dense or toxic fumes when subjected to excessive heat such as a fire
- Are manufactured to a European or British Standard

No materials known to be deleterious will be used in, or incorporated into, any temporary or permanent part of the works. In particular use none of the following:

- Asbestos products
- Urea formaldehyde

2.2 – APPROACH TO SUSTAINABLE DESIGN

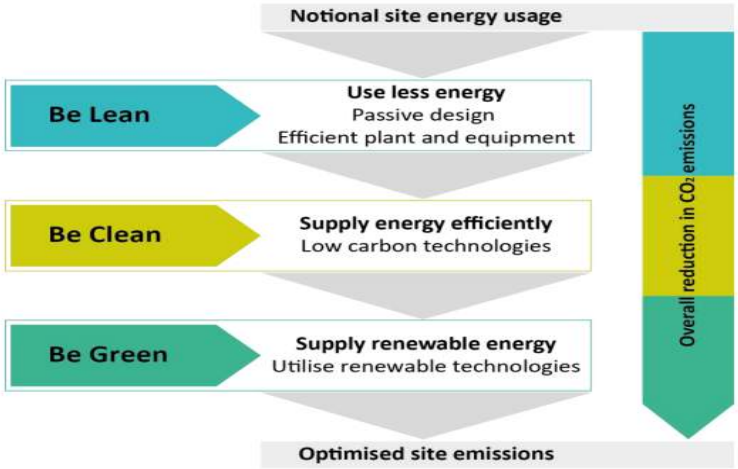
The building engineering services will be developed with due account to sustainable design with particular emphasis on energy efficiency and use of environmentally acceptable materials.

In meeting the 'sustainability Statement' as detailed in this report the following development hierarchy methodology will be adopted – principally 'Be Lean, Be Clean, Be Green':

Be Lean – Passive solutions first – to reduce energy demands to a minimum by utilisation of exemplary construction methods and quality control, choice of materials, high levels of fabric insulation, air tightness to ensure low infiltration rates and adoption of natural ventilation combined where necessary with mixed mode heat recovery ventilation and passive heating and cooling technology.

Be Clean – Meet the minimised energy demands of the building engineering services installations; heat reclaim ventilation, ASHP heating & cooling, LED lighting etc., by selective and appropriate use of energy efficient low carbon technologies to efficiently maintain internal comfort conditions for occupancy and working task.

Be Green – Finally after application and incorporation of all appropriate and properly applied passive construction and energy efficient installations, apply where practical the use of 'on site' zero carbon renewable energy generating installations such as photovoltaics, solar thermal and wind turbines combined with battery storage to fit and support the development load profile thereby reducing further consumption and reliance on incoming Utility requirements.



2.3 – OPERATION, CLEANING & MAINTENANCE

Full O & M documentation including comprehensive record drawings will be provided for the building engineering services by the installing contractors. The operating and maintenance manuals will be compliant with the requirements of BSRIA document "Handover, O&M Manuals, and Project Feedback. A toolkit for designers and contractors (BG 1/2007)". All drawings and supporting documentation will be compliant with BSRIA BG 6/2014 – A Design Framework for Building Services.

The services design and installation will incorporate adequate provision for cleaning and maintenance access

2.4 – MECHANICAL DESIGN PARAMETERS

Design Conditions

The building is to be heated based upon the external ambient conditions as detailed below

External Design Conditions

	SUMMER	WINTER
External Temperature	32°C DB / 22°C DB	-3°C / -3.6°C DB

Internal Design Conditions:

AREA	SUMMER	WINTER
Kitchen	Ambient	18± 2°C
Living/Dining	Ambient	21± 2°C
Bedrooms	Ambient	21± 2°C
Bathrooms	Ambient	22± 2°C
WC's	Ambient	22± 2°C
Hall / Landing	Ambient	18± 2°C

Ventilation Rates

AREA	MECH VENT RATE (AC/HR or l/s)
Common areas / Lobbies	N/A
Kitchen	13 l/s continuous c/w 30l/s to hob via canopy
Living/Dining	Forms part of whole house, in accordance with Part F of Building regulations
Bedrooms / WC's	Forms part of whole house, in accordance with Part F of Building regulations
Bathrooms	8 l/s (Continuous Extract)
Utility Rooms	8 l/s (Continuous Extract)

2.5 – PUBLIC HEALTH DESIGN PARAMETERS

The public health services will be designed in accordance with national standards and the relevant building regulations.

Sanitation Pipework Sizing Criteria	Fitting	Discharge Unit (DU)
	Water Closet	1.8
	Wash Basin	0.3
	Kitchen Sink	1.3
	Dishwasher	0.2
	Shower	0.4
	Washing Machine	0.6
	Bath	1.3

As per System III, Table 2, BSEN 12056:2 (2000)
Drainage Diversity Factor: K=0.5
As per table 3, BSEN 12056:2 (2000)

Rainwater Pipework Sizing Criteria		
	Rainfall intensity (Including snow melt)2 min storm event with 50 year return period. As figure NB:3 BSEN 12056:3:2000	0.056l/s per m2 = 201.6mm/hr
	Wind driven rain allowance (Vertical Surfaces) as per NC.4 BSEN 12056:3:2000	The effective catchment area of a single wall should be taken as 50 % of its area up to a maximum height of 10 m.

2.5 – PUBLIC HEALTH DESIGN PARAMETERS

Water Services Pipework Sizing Criteria	Fitting	Loading Unit (LU)
	Water Closet	1
	Wash Basin	1
	Kitchen Sink	2
	Dishwasher	2
	Shower	2
	Washing Machine	2
	Bath	4

As per Table 2 BSEN 806:3 (2006)

Main Plant Sizing	Cold Water Storage (for Apartments Only)	1 Bed / Studio	210 litres per bedroom per day
	As per Table 2 Institute of Plumbing Engineering Services Design Guide (2002)	2 Bed	130 litres per bedroom per day
		3 Bed	100 litres per bedroom per day
		4 Bed	100 litres per bedroom per day
		5 Bed	100 litres per bedroom per day

0-50% of the daily storage to be Calculated for the Cold Water Storage based on table 3
IOP Design Guide

Main Plant Sizing	Hot Water Load/ Demand (for Apartments Only)	1 Bed / Studio	115 litres per bedroom per day
	As per Table 6 Institute of Plumbing Engineering Services Design Guide (2002)	2 Bed	75 litres per bedroom per day
		3 Bed	55 litres per bedroom per day
		4 Bed	55 litres per bedroom per day
		5 Bed	55 litres per bedroom per day

2.6 – ELECTRICAL DESIGN PARAMETERS

Electrical Supply Characteristics

Utility Company Supply	11kV - 3ph, 4 wire, 50Hz,
Consumers Supply	400 volts/230 volts AC, 3ph, 50Hz (PME)
Voltage Regulation	+10% -6%

Volt Drop Allowances

LV Distribution System Lighting	3%
Other Circuits	5%

Lighting

Interior Lighting	CIBSE Society of Light and Lighting Guide 2
Exterior Lighting	BS 5489 Part 1:
Emergency Lighting	Emergency lighting will be provided to comply with BS 5266
Building Regulation	Part L2A

The electrical installation will comply with the requirements of BS 7671 18th Edition (IET Electrical Wiring Regulations) including as updated and published March 2022.

2.6 – ELECTRICAL DESIGN PARAMETERS

Lighting:
Interior Lighting CIBSE Society of Light and Lighting Guide 2
Building Regulation Part L2A

Exterior Lighting BS 5489 Part 1:

Emergency Lighting:
Emergency lighting will be provided to comply with BS 5266

Earthing:
The electrical supplies to each building or service will be designated as Protective Multiple Earth (PME) and outgoing earthing installations will comply with the requirements of BS 7671 and BS 7430.

Fire Detection and Alarm:
The fire detection and alarm installations will be provided in accordance with the Fire Officer, Fire Engineer and Building Control requirements and to comply with the requirements of BS 5839 Part 1 to Part 8.

Specialist Systems:
The Access Control system will be provided to comply with the requirements of BS EN 50133-1 and NACOSS standards.

The Satellite and terrestrial TV system will comply with the requirements of BS 5640 and BS 6330 CAI standards.

Telecommunications:
The specification for services connected to the BT public telephone network will comply with the requirements of BS 6305.

Lightning Protection:
The lightning protection systems will be provided to comply with the requirements of BS62305-1: Protection Against Lightning.

Lift services:
The passenger and firefighting/evacuation lift installations will comply with BS EN 81, Building Regulations Part M and in accordance with the recommendations of CIBSE Guide D: Vertical transportation within buildings.

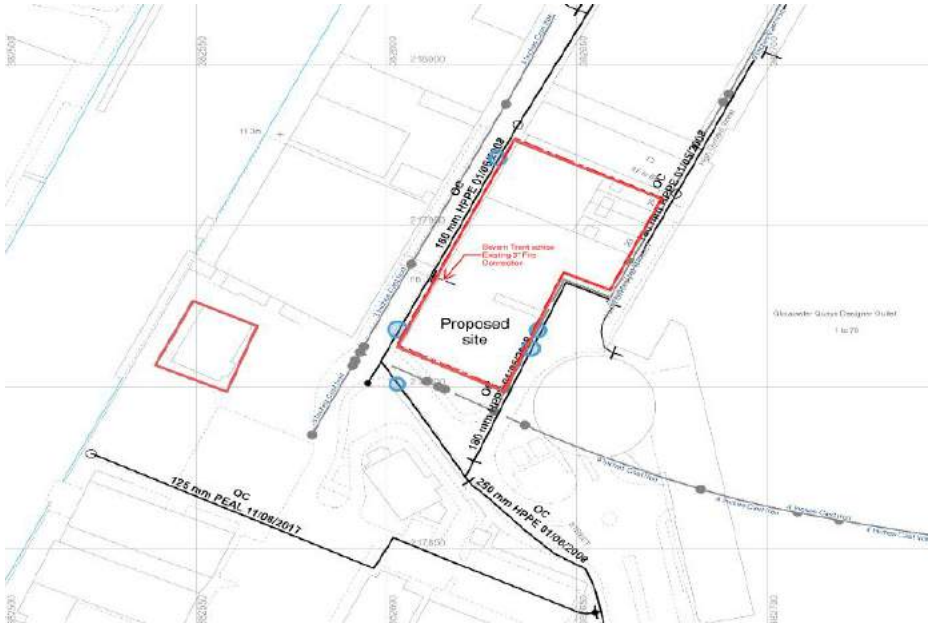
The lift final finishes will be fully DDA compliant.

SECTION THREE: INCOMING SERVICES

3.0 – INCOMING SUPPLIES - WATER

There are currently existing 180mm (dia) HPPE water mains located in High Orchard St & Merchants Rd. It is proposed that the High Orchard St apartments will be served from the network main in High Orchard St and the Historic rebuild apartments & the new Build apartments will be served from Merchants Rd.

There is currently a 3”fire main to the site which will be utilised for the commercial sprinkler system serving the basement car park.



New suitably sized incoming mains water supplies and separate fire supply will be extended from the local water distribution network to serve the designated apartment tank rooms and to provide a direct mains connection to commercial / retail space.

The incoming water supply will be installed in MDPE barrier pipework and will enter the basement via a dedicated entry duct and routed at high level to serve the residential plantroom with a separate connection serving the café area.

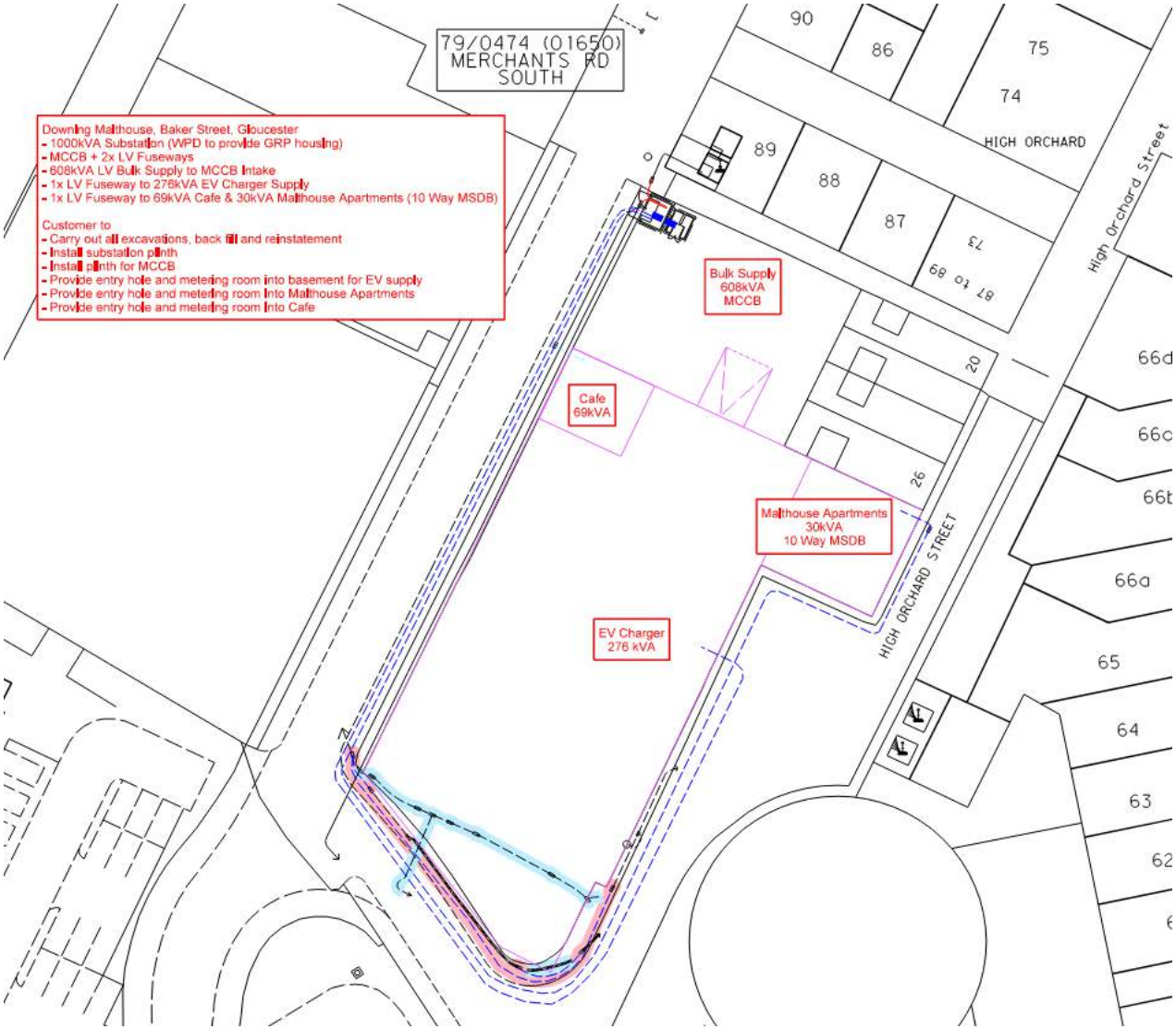
The incoming ducts will be installed with a minimum 100mm thick sand bed and surround, with a minimum cover of 750mm. The route of the supply pipe will be marked with identification tape incorporating an electronic tracing wire.

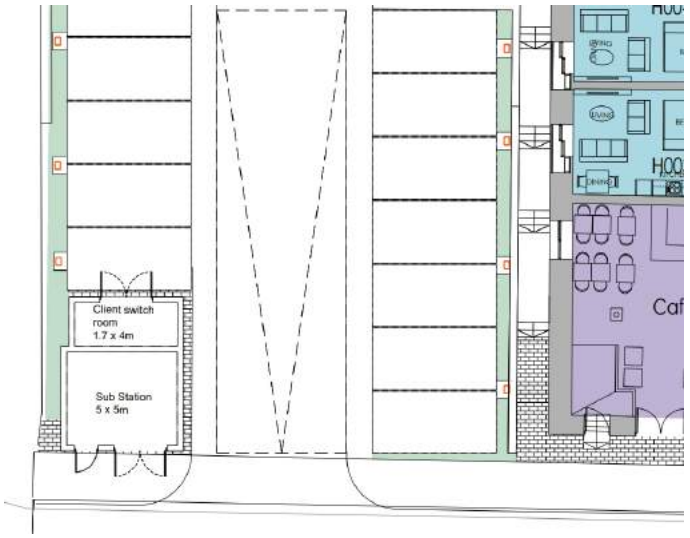
Within the café area on entry to the building a leak monitoring system will be installed for leak detection & BREEAM purposes.

At the point of entry to the building, the incoming mains water supply will be provided with a main internal isolating valve, double check valve and drain cock.

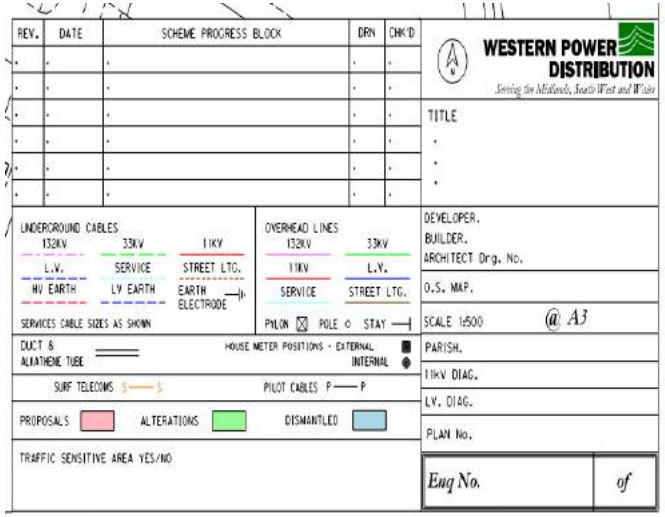
3.1 – INCOMING ELECTRICITY SUPPLIES

The new incoming electrical supplies to the development will be derived from the local Community Network Operator's, Western Power Distribution (WPD), high voltage network. An externally sited brick-built substation including adjacent primary LV distribution switchroom will be established local to the site.





SITE LOCATION PLAN - SUBSTATION ADJACENT TO CARPARK ENTRANCE WITH 24/7 ACCESS



3.1 – INCOMING ELECTRICITY SUPPLIES

The substation will be located within the boundary of the development adjacent to the external carpark entrance thereby providing 24/7 direct access from public highway in accordance with WPD requirements. Subject to detailed discussion and agreement with WPD, low voltage supply cables will be taken from the substation switchroom, drawn through a 125mm black HDPE rigiduct underground duct and draw pit infrastructure installed by the developer terminating within intake rooms strategically located to serve the respective development load centres.
From the intake rooms, the new LV supplies will be distributed around the site and will be generally 400 volts, three phase, 4 wire 50Hz or 230 volts, single phase, 2 wire 50Hz. Supply arrangement is anticipated to be TN-C-S format subject to detailed design.

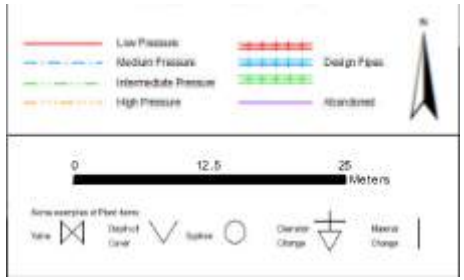
The 1.0MVA WPD Substation and infrastructure will have adequate supply capacity to serve the new development comprising Utility metered supplies to the following:

- High Orchard Street Warehouse Apartments.
- Heritage Block Apartments
- New build Tower Apartments.
- Development Landlord services
- Electric Vehicle Chargers (Phase II)
- Future Café.

Note: The Electric Vehicle Chargers (Phase I) metered supply shall be derived from the existing Provender WPD Substation.

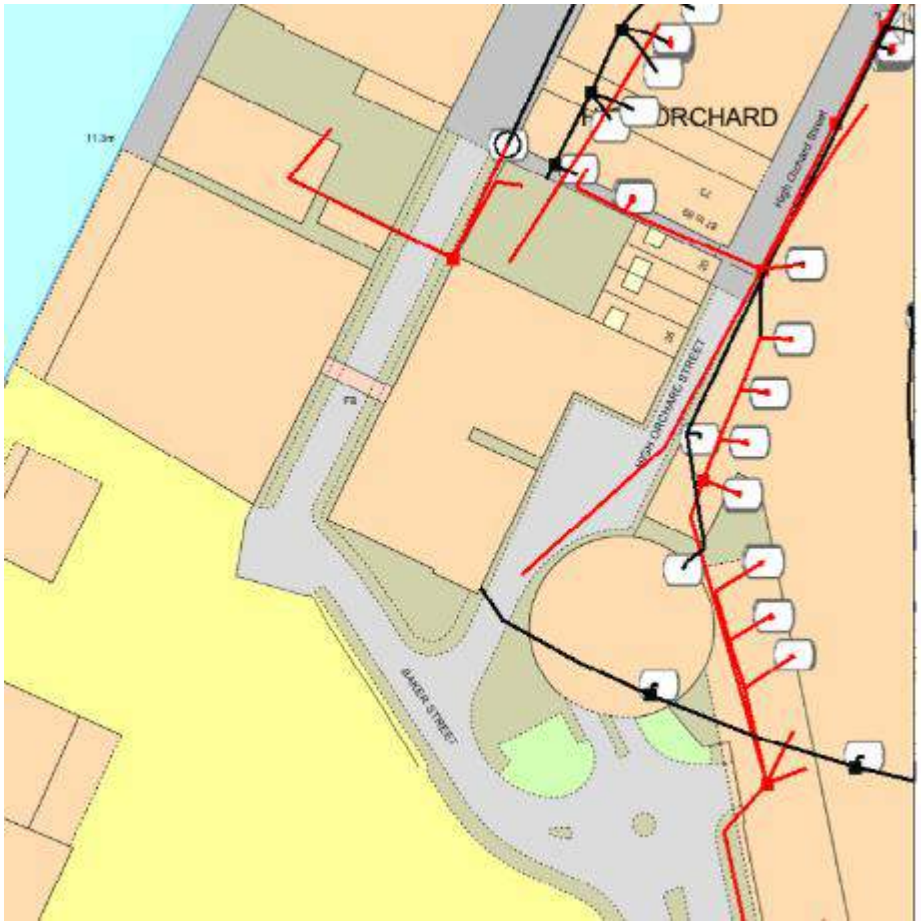
3.2 – GAS SERVICES

The Wales and West owned local gas infrastructure currently serves the buildings located around the new development. The asset maps do not identify any service serving the existing site, further surveys should be carried out once the elements of the remaining structure are deemed safe.
Further discussions with Wales and West will be required as the existing 125mm PE main in Merchant Place and a 63mm PE main in High Orchard St that appears to serve the adjacent shopping centre are close to the site boundary and may need diverting to allow safe construction of the development. Currently no new gas connections are envisaged for the site.



3.3 – TELECOMMUNICATIONS

The BT local infrastructure serves the buildings located around the development. The BT asset maps do not indicate any services currently serving the development site, further surveys should be carried out once the elements of the remaining structure are deemed safe.
New ducts for telecoms will be provided from the local infrastructure network to the development. Additional ducts shall be allowed at the boundary for future proofing to allow flexibility for other providers to service the development.



SECTION FOUR: MECHANICAL SERVICES

4.1 Heating

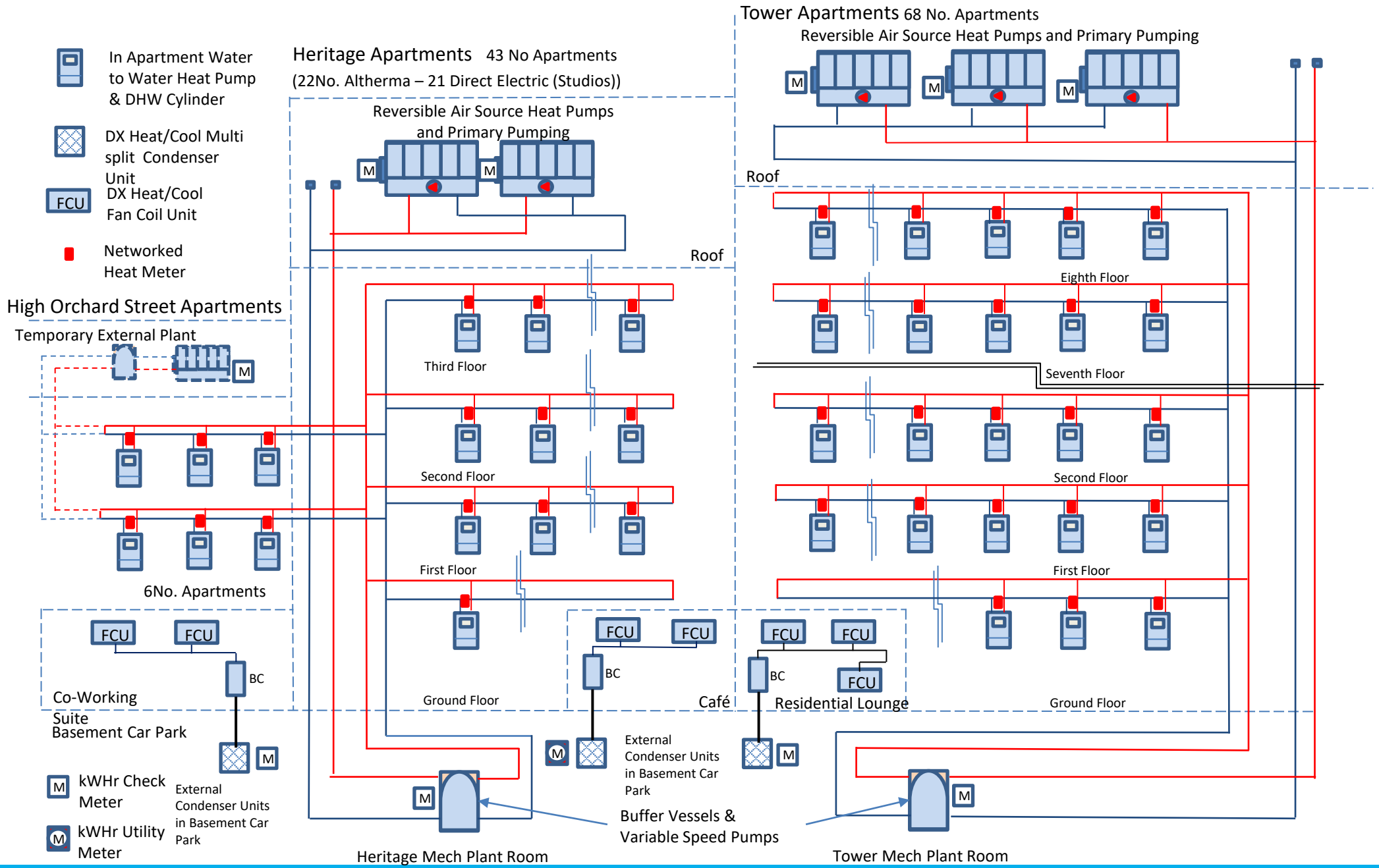
4.1.1 Heating & Hot Water Generation

The heating and hot water generation equipment will depend on type of property being serviced. As a general principle, individual Apartments will utilise an ambient loop centralised system.
For the 1, 2, 3 & Duplex apartments an internally mounted heat pump will be installed, however due to the larger number of apartments there will be a number of larger condensers (duty/standby) which are proposed to be located on the 2No. Roofs which will feed buffer vessels within the basement via an ambient loop distributed to each apartment.
Each of the internal heat pumps will be provided with an onboard controls facility to ensure optimum efficacy of the system.
Each internal heat pump will be located within the mechanical service utility cupboard as described/shown in section 4.2.2.
Within the Apartments blocks the flow and return pipework into each of the apartments will be provided with heat meters (as shown on page 27) so that energy billing can be achieved.
Currently it is proposed to use Daikin Altherma R32 heat pump units for both the stand alone heat pumps and the ambient loop systems.

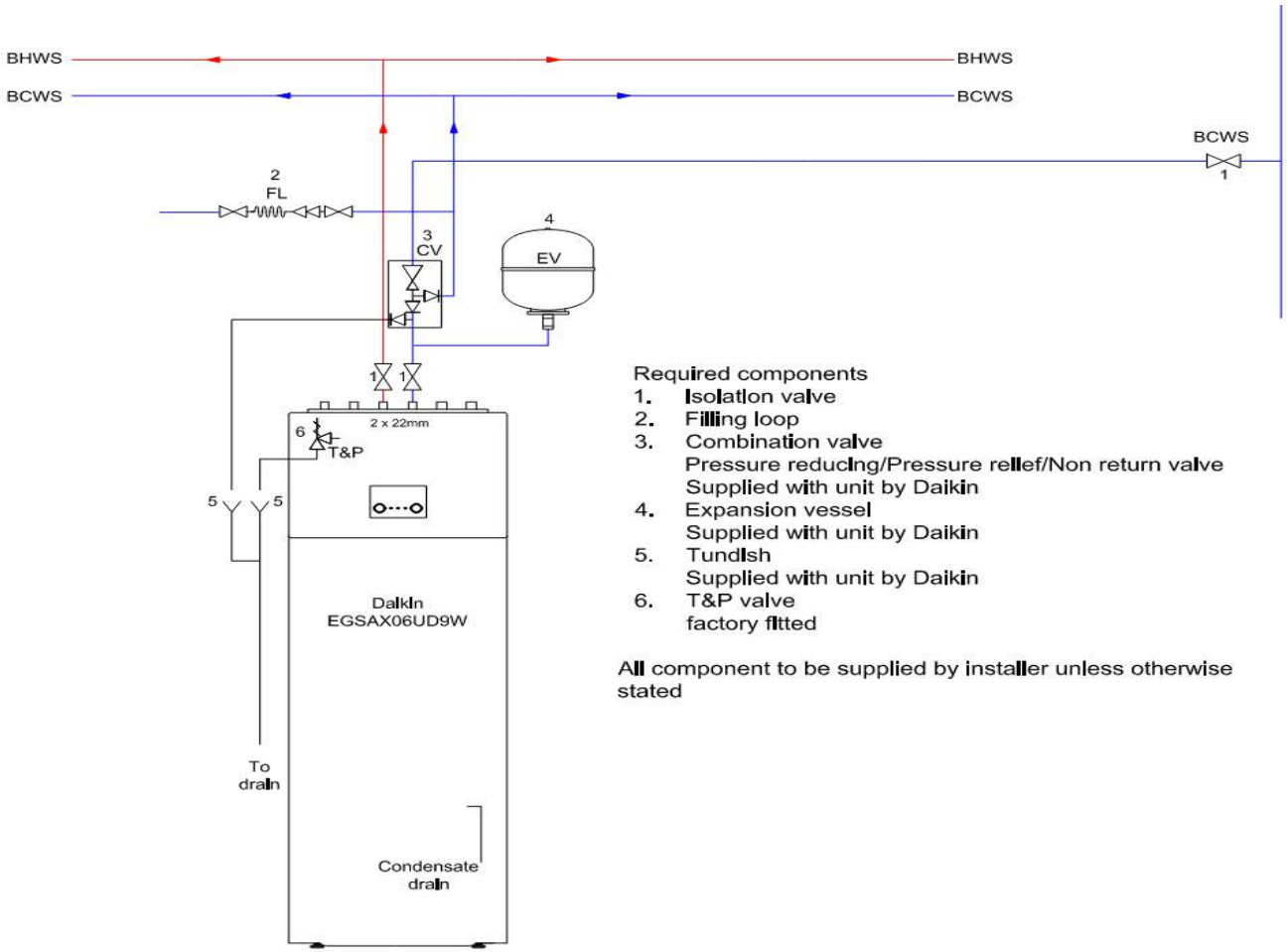
Daikin - Altherma

Energy Meter

4.0 – MECHANICAL SERVICES



Typical Internal Altherma Schematic



Required components
1. Isolation valve
2. Filling loop
3. Combination valve
   Pressure reducing/Pressure relief/Non return valve
   Supplied with unit by Daikin
4. Expansion vessel
   Supplied with unit by Daikin
5. Tundish
   Supplied with unit by Daikin
6. T&P valve
   factory fitted

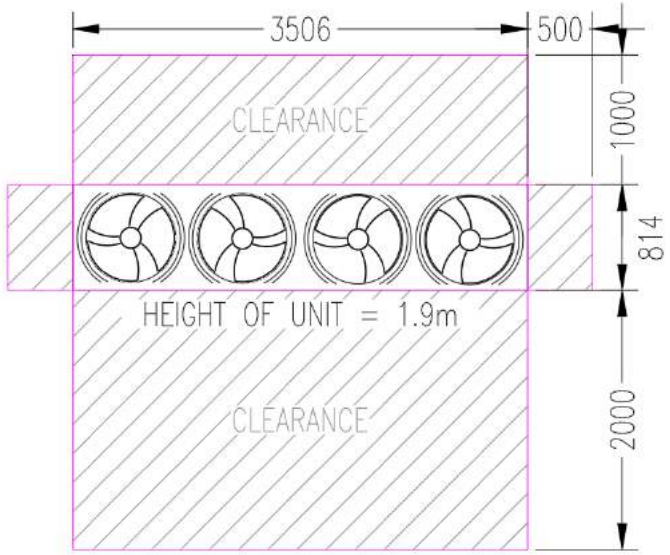
All component to be supplied by installer unless otherwise stated

4.0 – MECHANICAL SERVICES

The Air source heat pumps are to be positioned externally on the 2No. Roofs as detailed below.
These ASHP's will use an ambient water loop circulating around the building, the use of the ambient loop means that although the water is circulating around common areas they do not give rise to high internal temperatures in communal spaces which minimises overheating issues.
From the condenser locations the pipework is to distribute through the communal areas to direct feed into each apartment and avoid the need for pipework to cross over demises, all Isolation valves are to be installed within corridors to allow for maintenance access.
As the Condensers will be located on the main roof acoustic treatment for vibration and noise breakout will be considered to meet the acoustic consultants requirements. The exact parameters to be achieved are to be confirmed by the Acoustic Engineer.

Proposed ASHP Units:
Heritage Apartments – 2No. External ASHP Units positioned on Roof
Tower Apartments – 3No. External ASHP Units positioned on Roof

External ASHP Unit



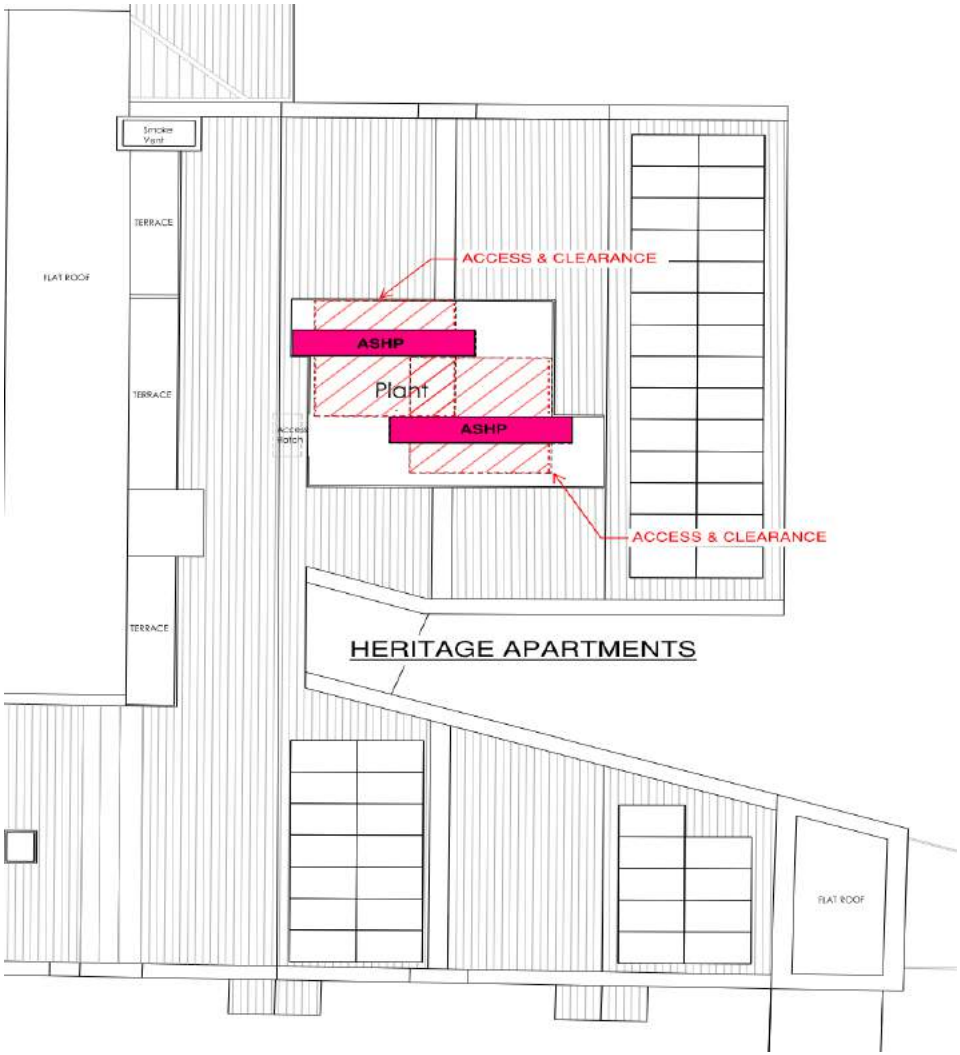
ASHP Air Distribution Clearances

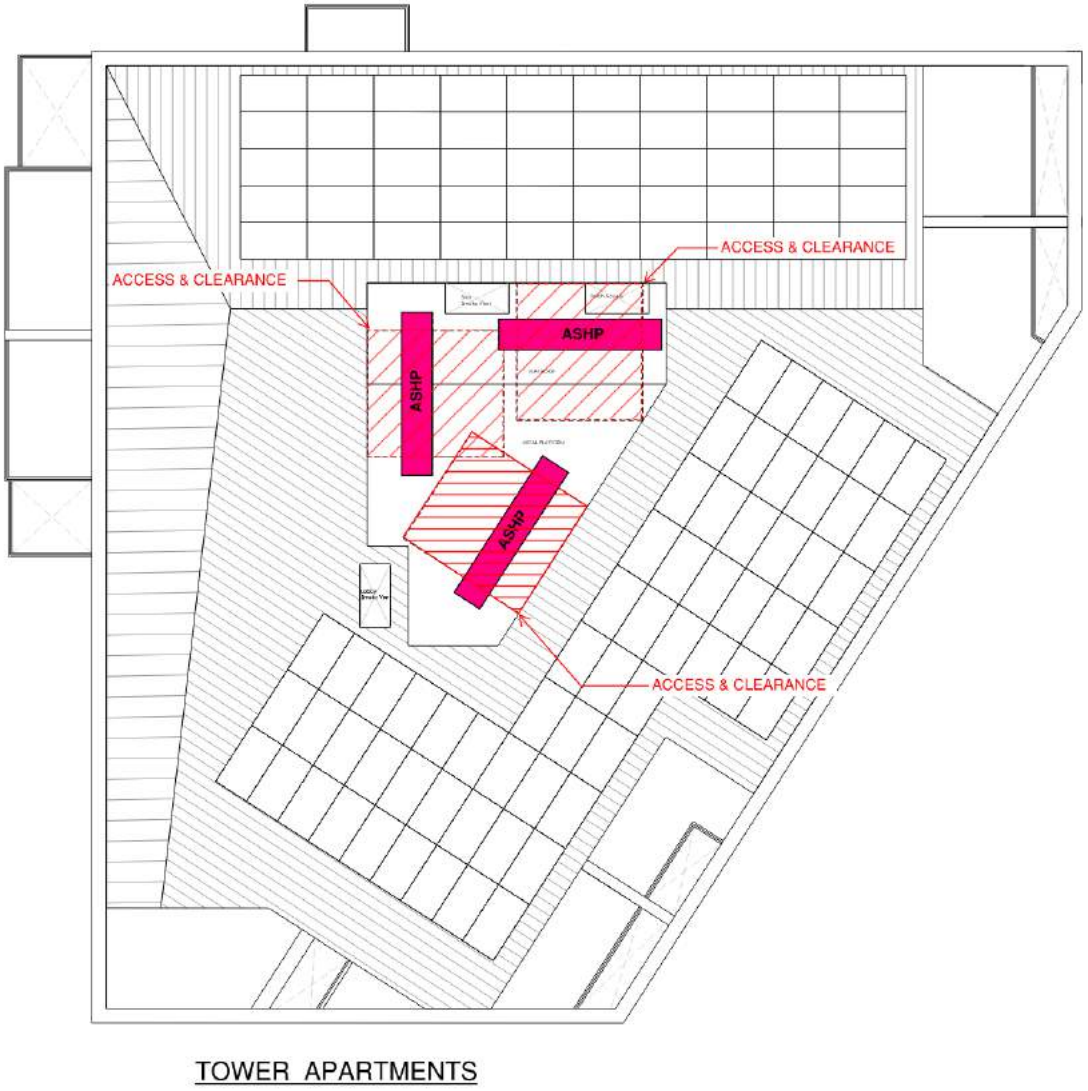
4.0 – MECHANICAL SERVICES

Proposed ASHP Units:

Heritage Apartments – 2No. External ASHP Units positioned on Roof

Tower Apartments – 3No. External ASHP Units positioned on Roof





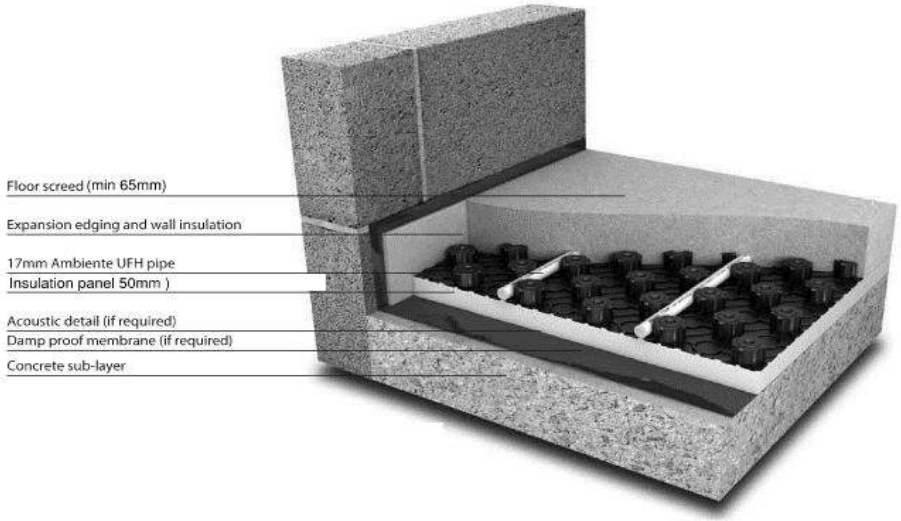
4.1.2 Dwellings

1, 2 & 3 Bed Apartments (Including Duplex)

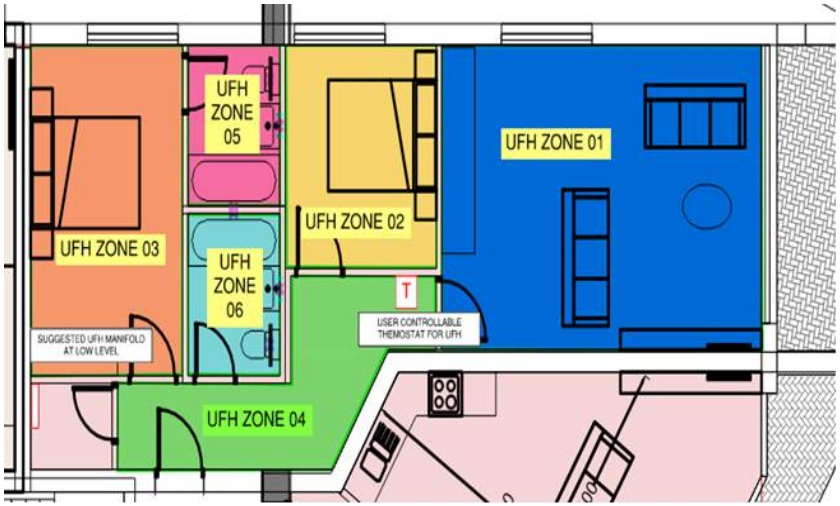
The 1 Bed, 2bed 3 bed and duplex apartments will be heated by the means of a wet under floor heating. This shall be directly fed from the heat pump system with low temperature water heating served from a central manifold system. Each room shall be provided with their own loop circuit(s) from the manifold to allow control of the loops with distribution pipework being routed as directly as possible.
Distribution pipework shall run within halls / corridors where possible. The appropriate floor build up will be determined with the Architect / Structural Engineer to suit the proposal floor structures of each development.

All heating pipework will be connected to a common manifold positioned within the Mechanical Utility / Service Cupboard.

All heat loads will need final selection to take account of proposed floor finishes, ie hard flooring or carpet.



Typical UFH Build Up

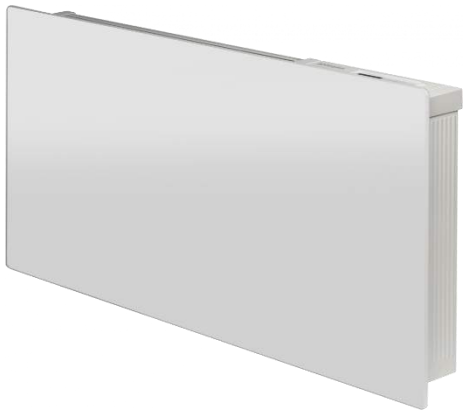


Typical UFH Zones

4.1.2 Dwellings

Studio Apartments

The Studio Apartments will be heated via Electric panel heaters complete with control user interface that allows for complete control over the temperature of the room for maximum comfort.
The Controller is to be provided with a seven-day timer profile that enables your heating requirements to be pre-set with a seven day programme and different user profiles, such as 'Holiday mode', that can be used as required. The LCD display and six touch-sensitive buttons enable easy usability and also have an optional sound when pressed, for greater accessibility.



Typical Electric Panel Heater

Typical Electric Panel Heater Controls

High Orchard St Apartments (6No. Apartments)

In order to be able to deliver the 6No. High Orchard Street Warehouse (HOSW) Apartments ‘for sale’ earlier then the main development, it is proposed that the common parts of this annex block be initially connected to a temporary ambient loop containerised heat pump. Once the main development is completed and commissioned the HOSW apartment system will be integrated onto the main Heritage Block ambient loop system with the temporary system removed.

4.1.3 Common Areas

Co-working Space & Residents Lounge

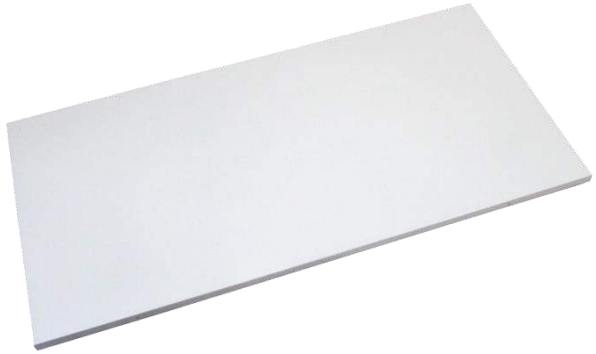
The Co-working space and Residents lounge situated on the ground floor are to be provided with heating & cooling via DX units positioned within the car park feeding internal ceiling mounted cassette units.
At stage 3 further thermal modelling calculations will be completed to determine the cooling capacity required within each space.
Each space will have individual wall mounted controls c/w time clock to provide the comfort conditions required.

Café

The café area situated on the Ground floor will be initially provided as a shell for fitting out by others, as part of our scheme we **won't** be providing Heating / Cooling ventilation within the Café area, however we envisage it being fed by standalone DX Units providing heating / cooling to the café area therefore space allowance is to be made within the car park for a condenser.

Reception / Lobby Area

The Reception / Lobby area will be provided with adequate heating via either Electric Radiant Panels or Underfloor heating fed from the building ambient loop to an internal heat pump.
The system is to be designed and co-ordinated closely with the architect at stage 3 to determine the best solution for the proposed entrance Reception / Lobby.



Typical Electric Radiant Panel

4.2 Mechanical Ventilation

4.2.1 Dwellings

Dwellings will be provided with the following ventilation systems:

- Standard Mechanical Ventilation with Heat Recovery (MVHR) systems

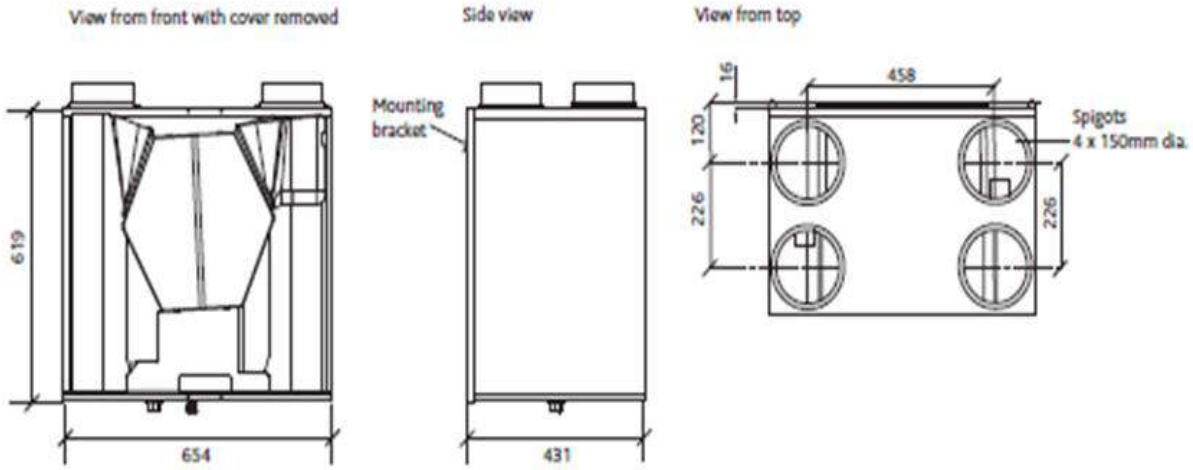
The system will provide supply air to all the habitable rooms, typically the living spaces and bedrooms through supply grilles ducted from a MVHR unit centrally located in each dwelling inside a cupboard or above a washing machine. Extract ventilation is from bathrooms, en-suites, utility cupboards and cloakrooms through extract grilles ducted back to the MVHR unit for heat recovery. Fresh air intake and exhaust air discharge will be by way of dedicated louvres on each dwelling façade aiming to achieve a minimum of 3m separation to avoid cross contamination of air flows. Under normal operation the unit runs at low speed providing background ventilation to the dwelling but switches to high speed when required to ventilate a bathroom, en-suite, etc.
All systems will be fully compliant with the requirements of the Building Regulations Part F1 System 4 and in accordance with the recommendations of the Energy Savings Trust good practice guide GPG268 'Energy efficient design of ventilation in dwellings – a guide for specifiers'
Minimum ventilation rates will be provided as detailed in tables 5.1a and 5.1b of The Building Regulations Part F 2010. Typical flow rates are listed below:

Bathroom	8 l/s Continuous extract high rate
Living space	Balanced supply air
Workspace	Balanced supply air
Toilet	6 l/s Continuous extract high rate
Utility Room	8 l/s Continuous extract high rate

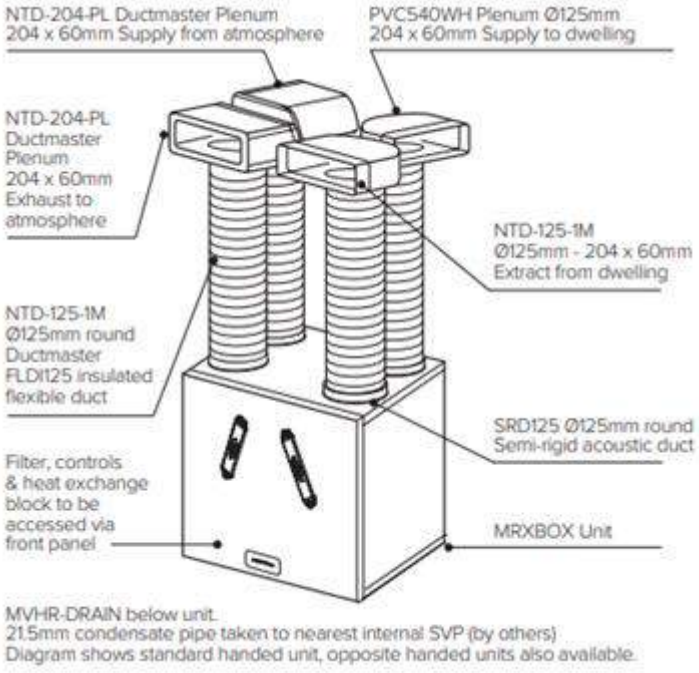
In addition to this the total air flow rate for the portion of the dwelling served should be at least 0.3 l/s/m2 at low speed.
Each standard MVHR unit will normally sit at high level in the combined services cupboard within each apartment. It is recommended that the unit is supported from a masonry wall on AV mounts to prevent vibration transfer and the access door is sealed to prevent any noise break out.

4.0 – MECHANICAL SERVICES

In addition to this the total air flow rate for the portion of the dwelling served should be at least 0.3 l/s/m2 at low speed.
Each standard MVHR unit will normally sit at high level in the combined services cupboard within each apartment. It is recommended that the unit is supported from a masonry wall on AV mounts to prevent vibration transfer and the access door is sealed to prevent any noise break out. Images and dimensions are shown below.

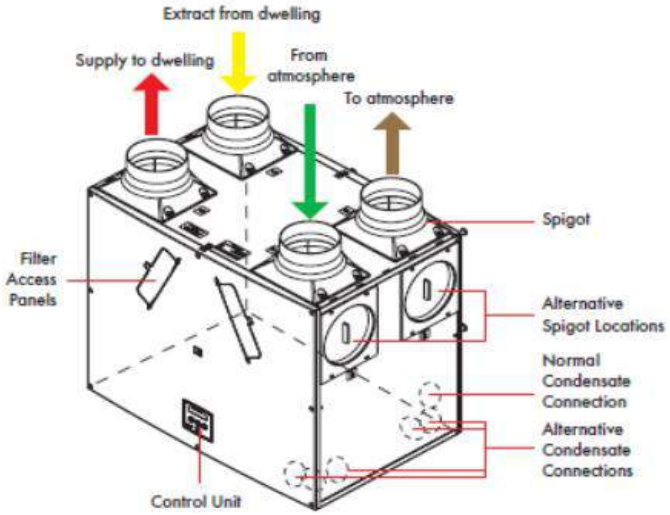


Typical Dimensions of a MVHR Unit

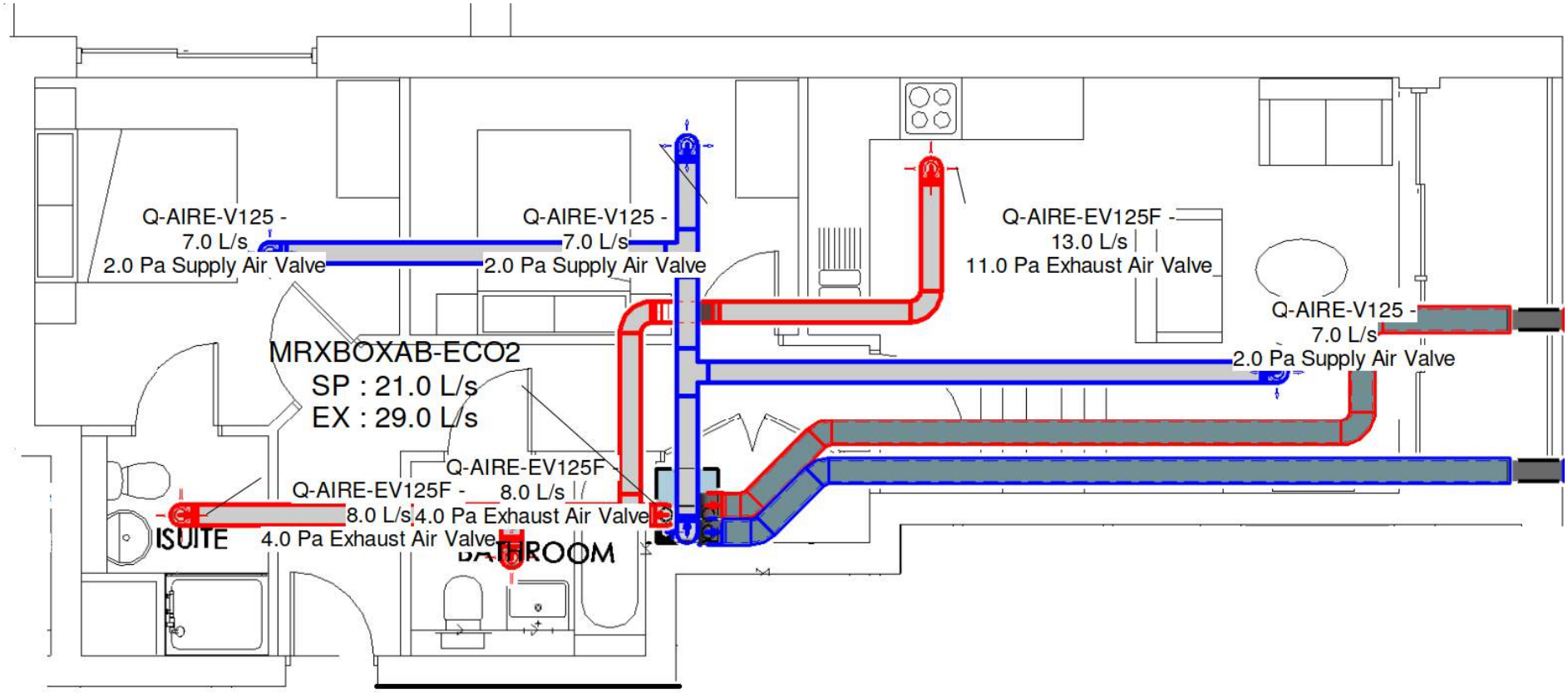


4.0 – MECHANICAL SERVICES

The ventilation ductwork is installed, in the ceiling void, in rectangular plastic ductwork, typically sized at 204mm x 60mm or 220mm x 90mm, depending on the size of the apartment. All ductwork joints will be sealed and taped to minimise air leakage from the ductwork. Both the intake and exhaust ductwork will be insulated from the MVHR unit to the external louvres, to ensure condensation does not form on the ductwork. All ductwork connections onto the MVHR Unit shall be fitted with attenuators as close as practical to the MVHR unit to reduce noise breakout from the fans along the ductwork. Where identified by the acoustician, individual attenuators may be removed if deemed as not being required.
MVHR ventilation does not preclude the use of openable windows. Openable windows to all habitable spaces are required for compliance with AD Part F and overheating analysis where permitted by the acoustician. Images and dimensions are shown below.



How the MVHR operates & High Level Ductwork distribution



Indicative Typical MVHR System Layout

4.2.2 Common Areas

Co-working Space & Residents Lounge

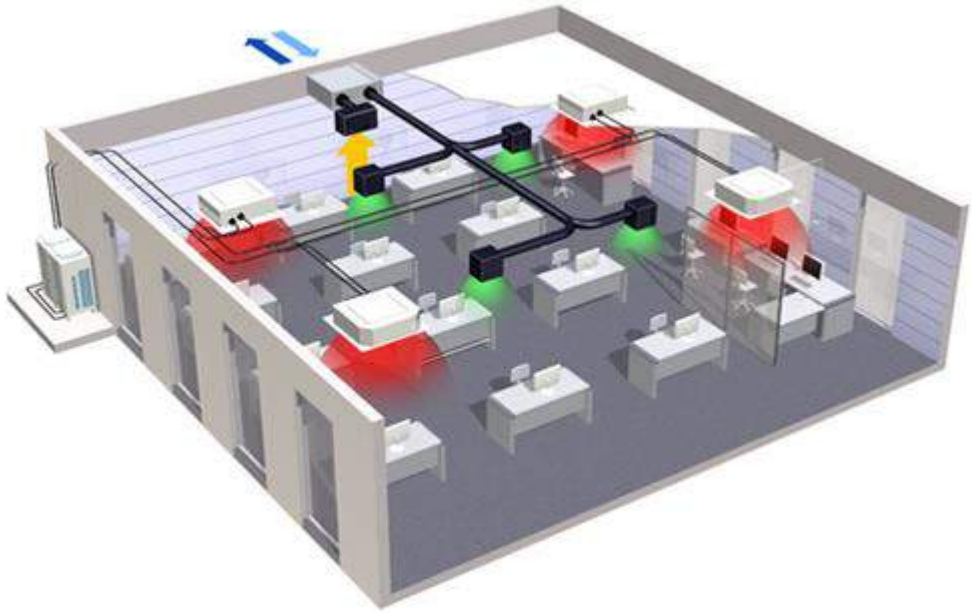
Both areas will be provided with ceiling void Heat recovery units (HRU) with exhaust and intake through the external wall complete with louvres to be designed / co-ordinated with the architect at stage 3 design.

The Heat recovery units are to be controlled via individual wall mounted controllers, position to be agreed.

Café

The café area situated on the Ground floor will be initially provided as a shell for fitting out by others, as part of our scheme we **won't** be providing ventilation within the Café area.

Typical Ceiling Void Heat Recovery Unit



Typical Heat Recovery Ventilation Layout

Typical wall mounted controller

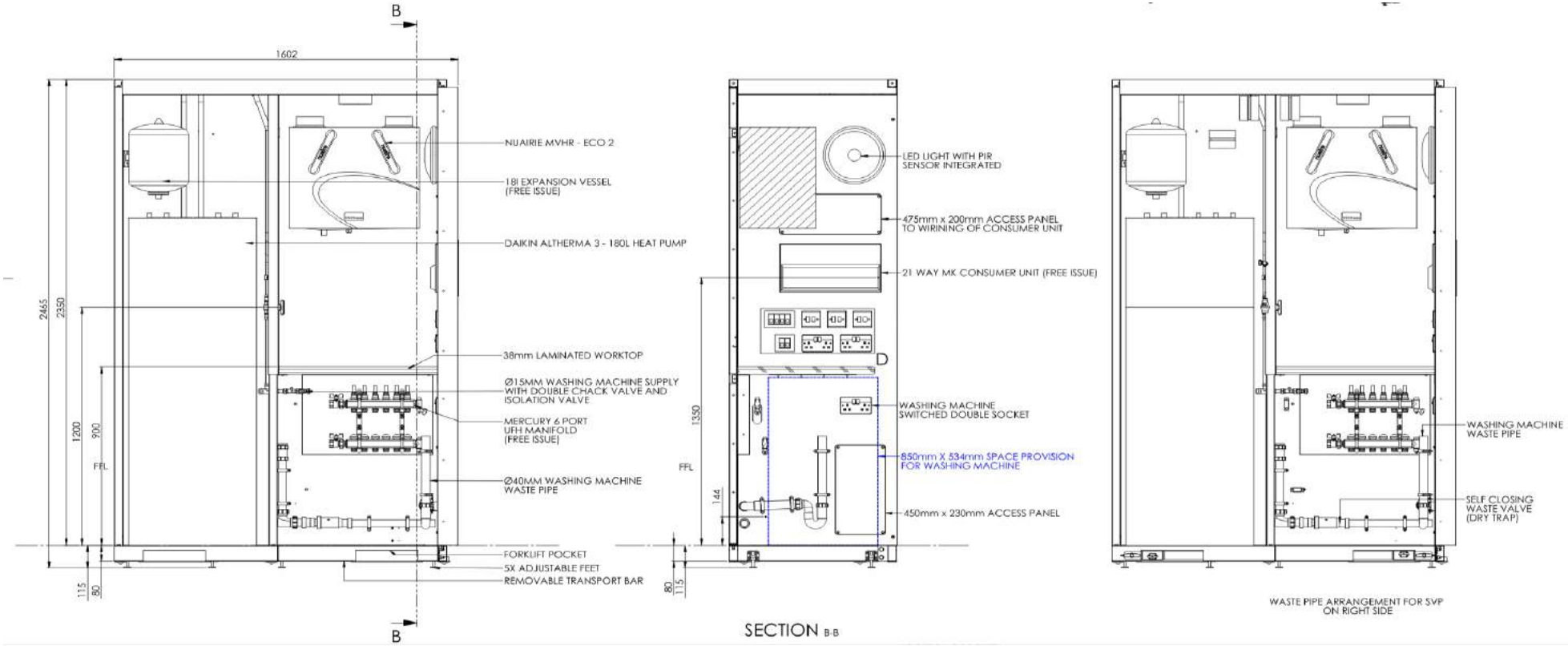
4.2.3 NOX Filtration

NOx filters will be applied to all MVHR fresh air inlet ducts as advised by the air quality assessor.

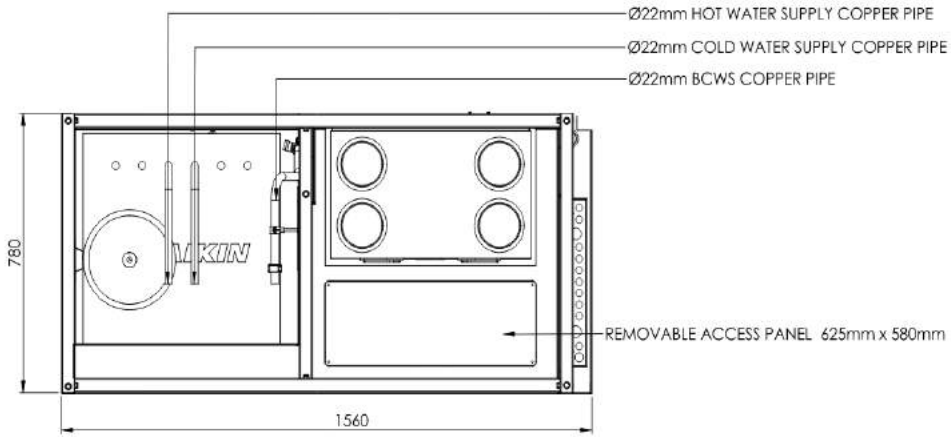
4.2.4 Typical Mechanical Service Cupboard

It is proposed that a manufacturer is engaged to produce a Packaged Service Cupboard , which is manufactured off site in order to maximise the space available .It is therefore important to correctly space plan in each dwelling for the required mechanical services equipment for the ventilation and heating requirements. The best space planning the MVHR unit can be mounted above the washing machine. The Altherma unit is then mounted adjacent to the MVHR unit. Ductwork to and from the MVHR unit is from high level and pipework to and from the Altherma unit is also from high level.

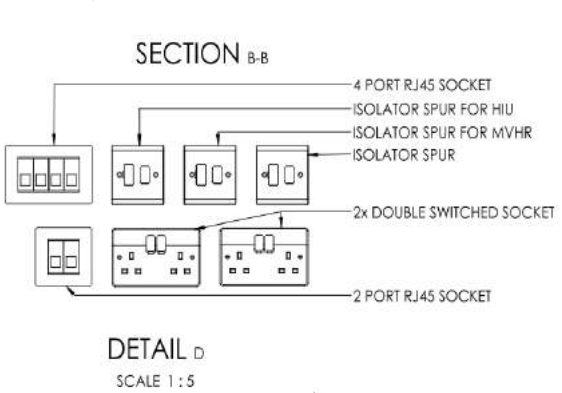
In corridor areas it is recommended that the minimum ceiling void depth is 250mm to allow for ductwork cross overs. The approximate dimensions are 1800mmW x 800mmD (subject to the POD manufacturers proposals).

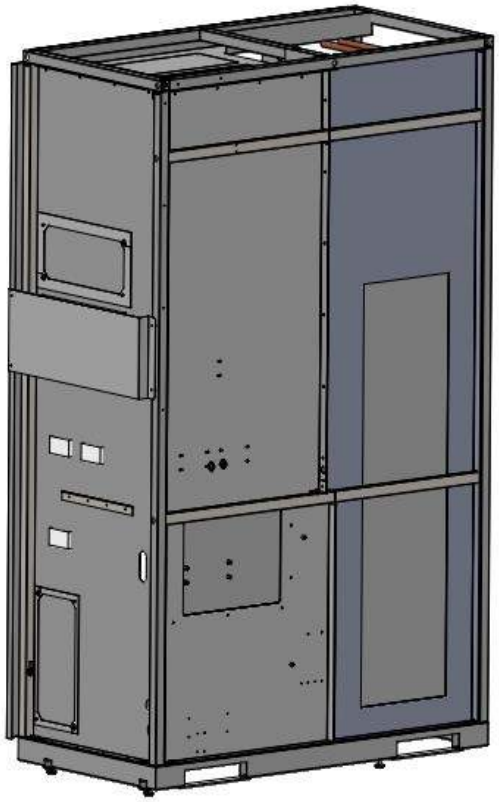


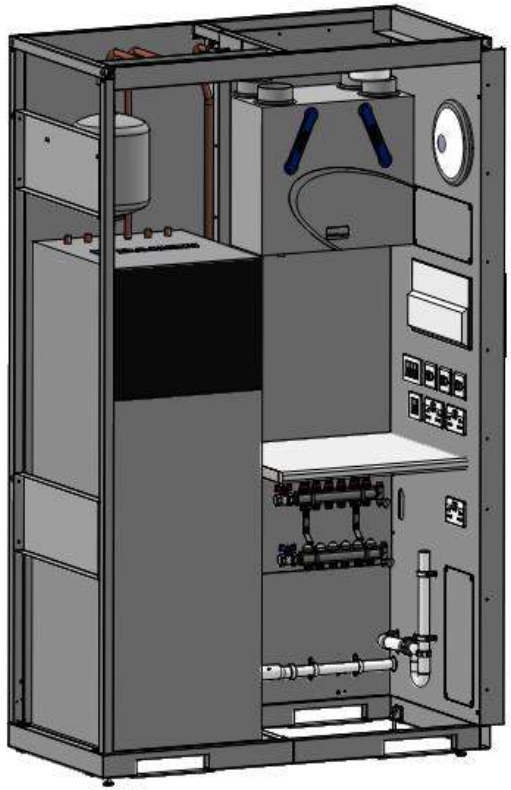
4.0 – MECHANICAL SERVICES



ALL PIPEWORK WITH 13mm CLASS O INSULATION







4.2.5 Smoke Ventilation

It is thought that at this time only smoke ventilation will be required in the Apartment common stairwells, however the final fire strategy has yet to be confirmed on this item and approved by Building Control.
This is to be agreed at RIBA Stage 3.

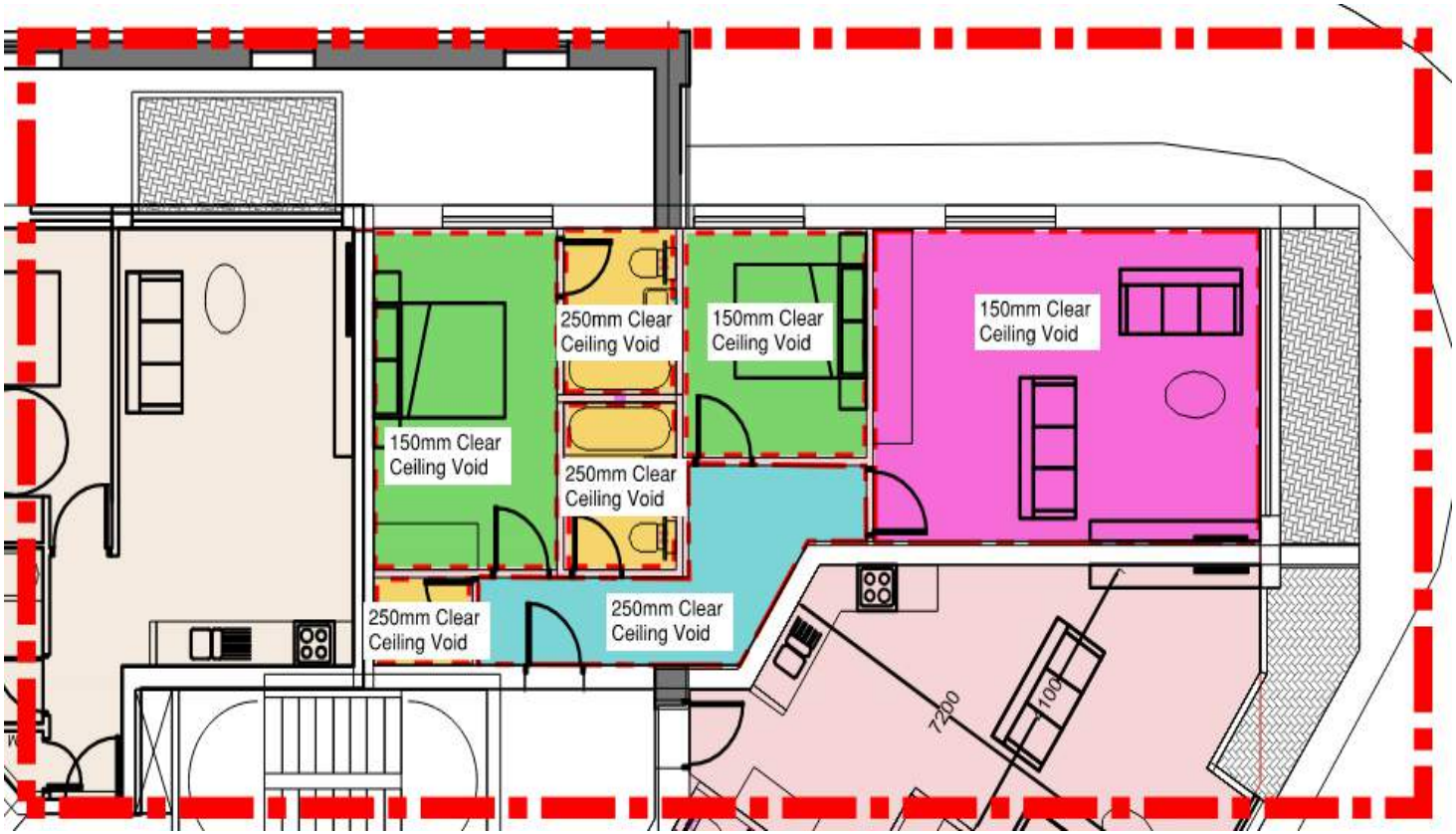
4.2.6 Carpark Ventilation

The car park is to be naturally ventilated to comply with regulations, Part F (AD F), for further information please refer to architects Design & Access statement.

4.3 Typical Ceiling Voids

Generally, the ceiling void depth where the services enter the dwelling, utility cupboard, bathrooms and any common routes are no less than 250mm to provide the cross overs where required. The incoming services are routed to the main utility cupboard where the main items of plant are situated from here the distribution would be within a void of 250mm to serve all areas of the demise. At the design stage pipework & ductwork crossovers are kept to a minimum and generally allowed for where deeper voids are defined and agreed.

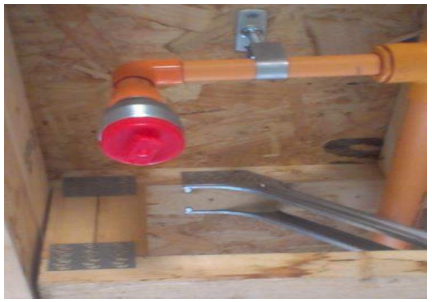
Where pipes and ducts are routed without the need for cross overs these voids can be reduced to 150mm and this is mainly due to the sprinkler head requirement



4.3.1 Sprinkler Head Requirements

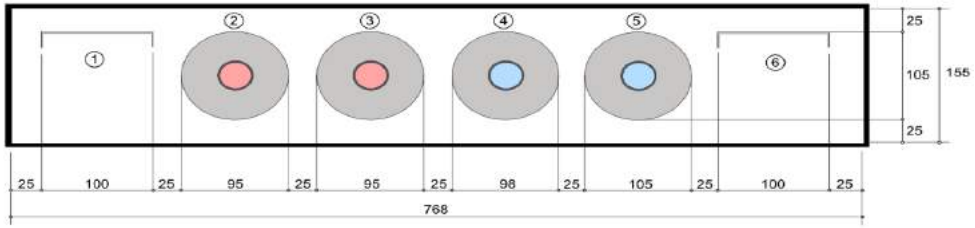
Dependant upon the structure the sprinkler pipe within the dwelling will be fixed tight to the soffit with bends & flexible connections at the sprinkler head in each room, to allow for the bend and head connection a minimum clear void of 150mm will be required.





4.3.2 Services Entering Dwellings

Generally, the services routed down the communal corridors will either tee off from the right or the left to enter the dwelling, trying to keep the cross overs to a minimum and the pipework configured to prevent operational issues like air in the system.
Services entries to the dwellings will be via a “letter box” type detail where all incoming services are routed above the main door.

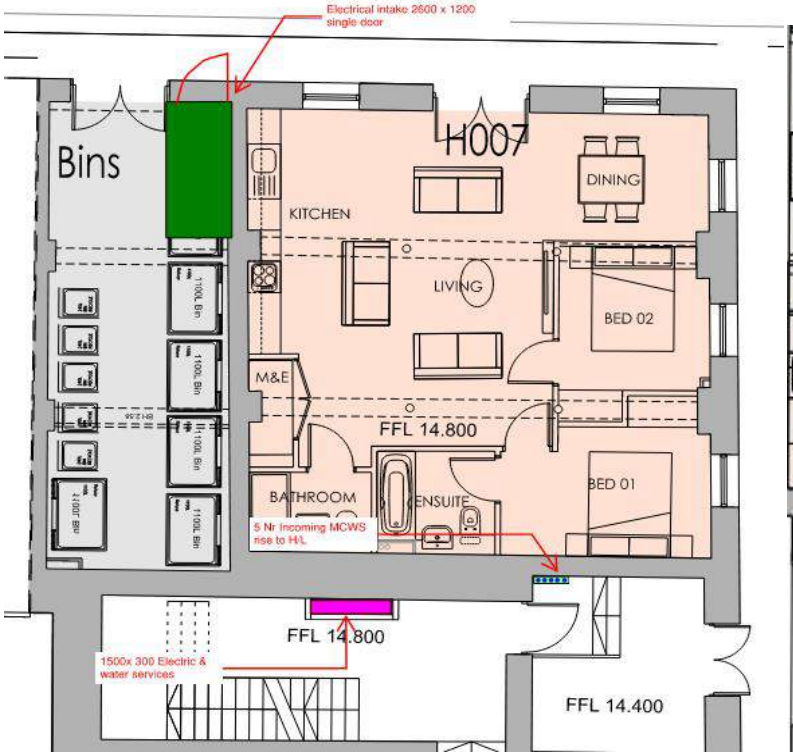


Typical “Letter Box” detail

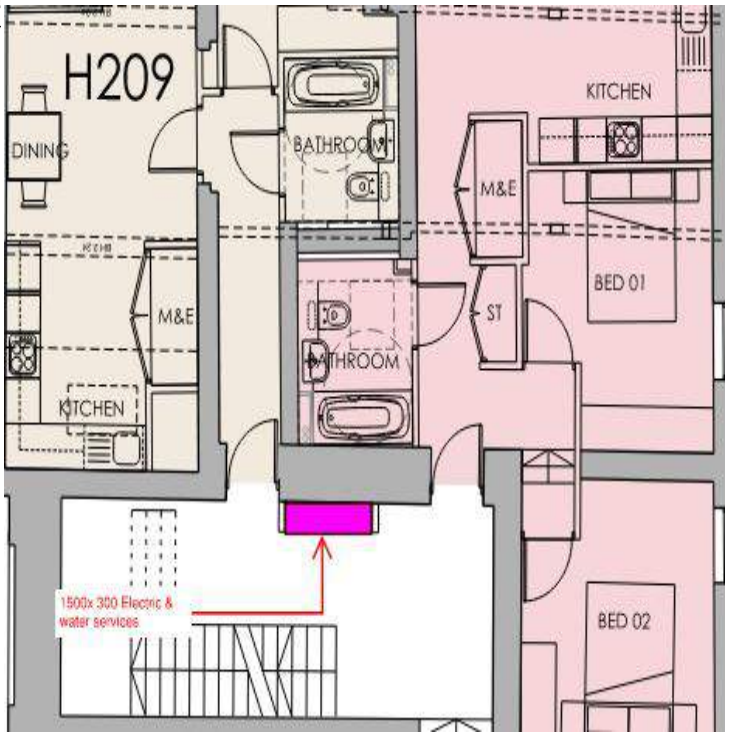
4.4 Common Parts Service risers

Generally, the services are routed vertically through the building with access to each riser from the communal corridors.

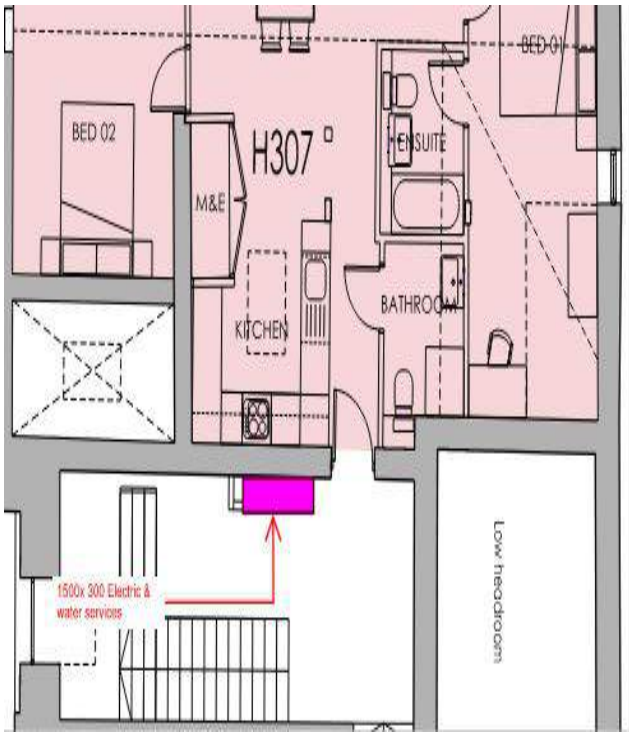
High Orchard Apartments



Grd Floor (High Orchard Apartments)



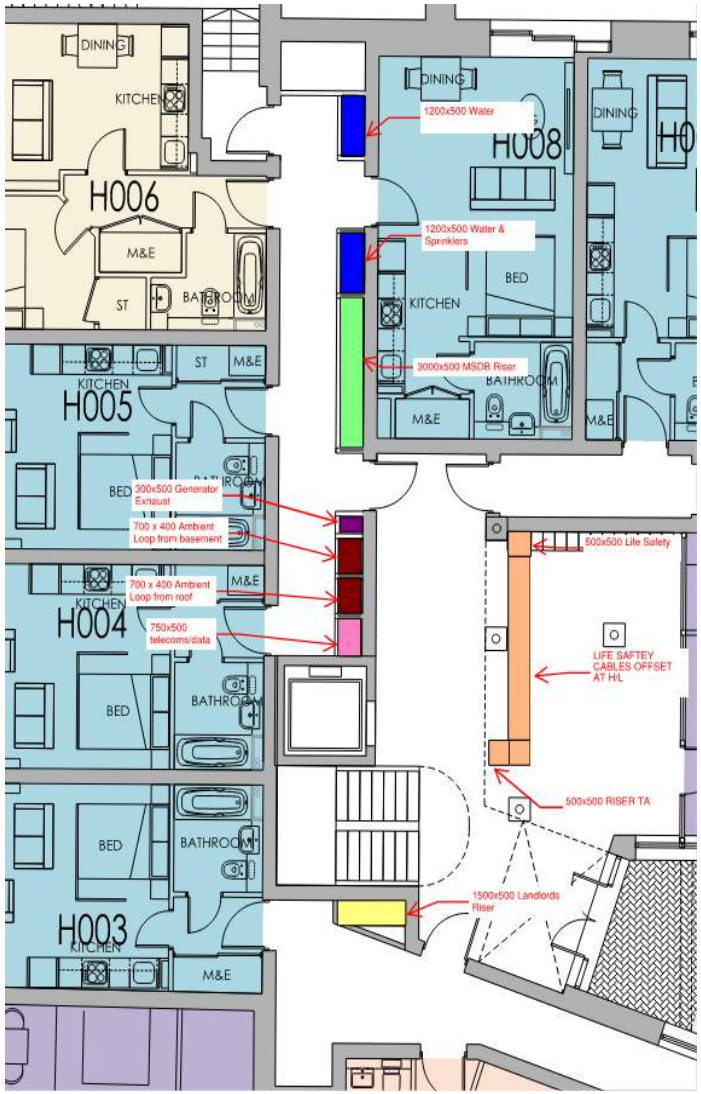
2nd Floor (High Orchard Apartments)



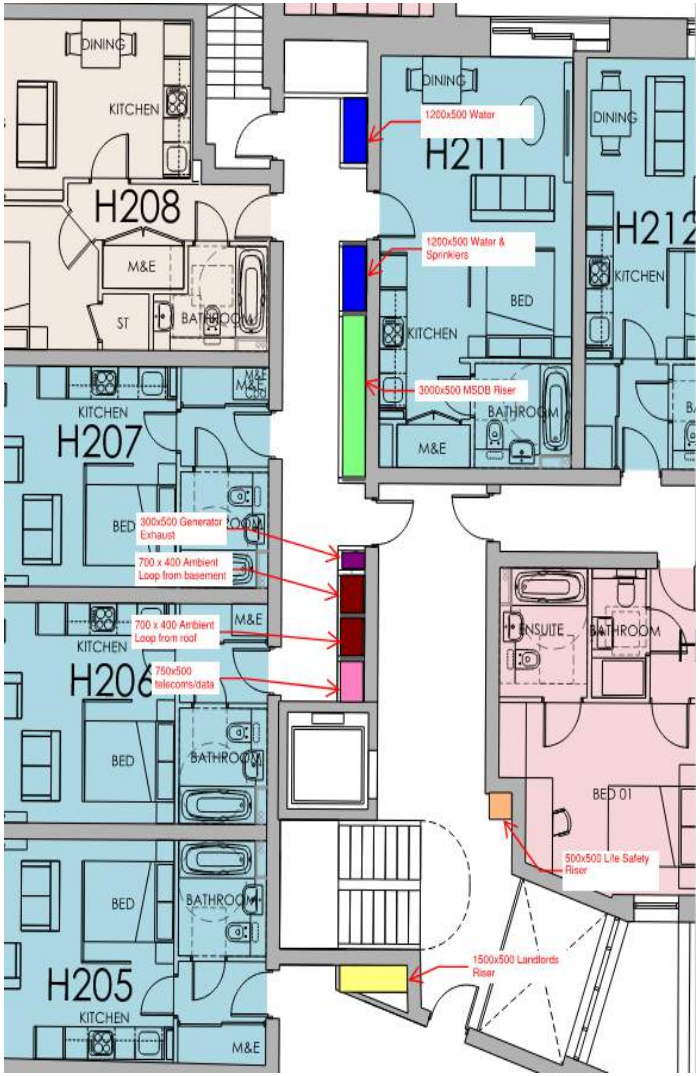
3rd Floor (High Orchard Apartments)

4.0 – MECHANICAL SERVICES

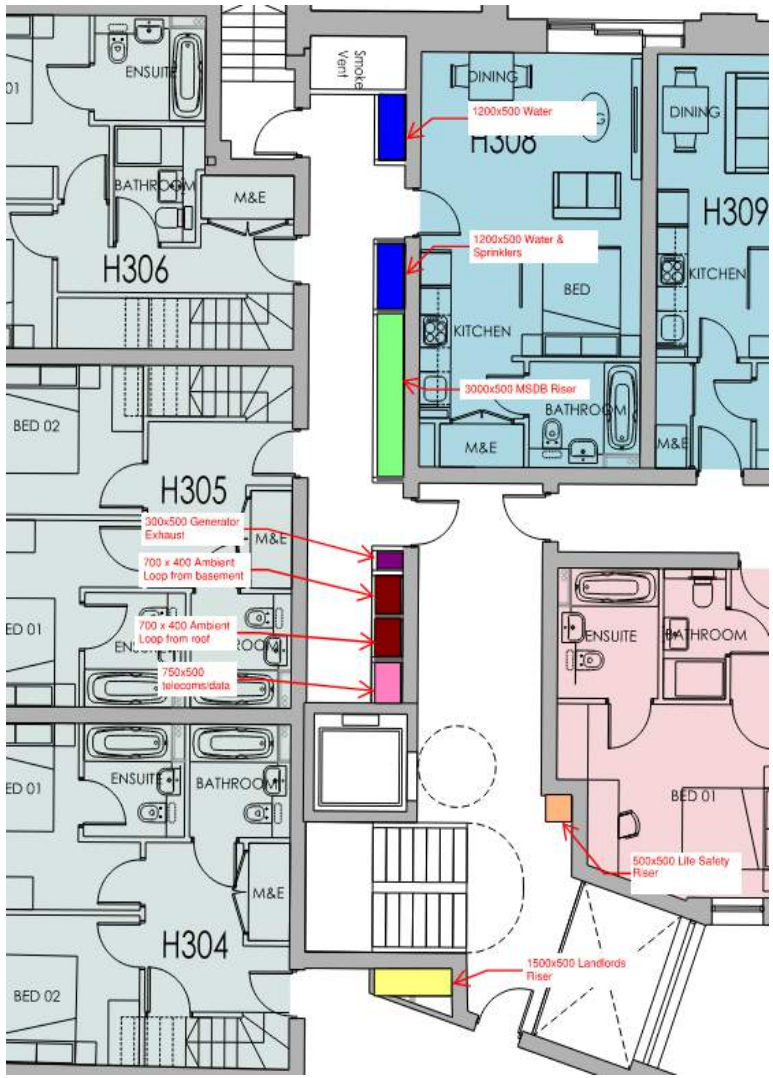
Heritage Building Apartments



Grd Floor (Heritage Building)



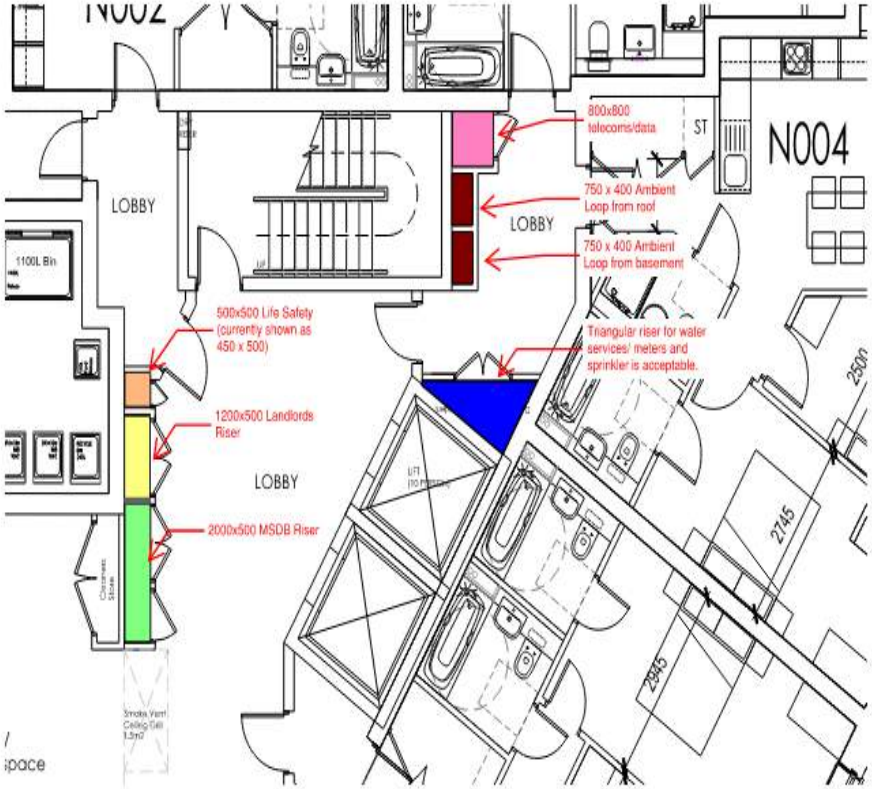
2nd Floor (Heritage Building)



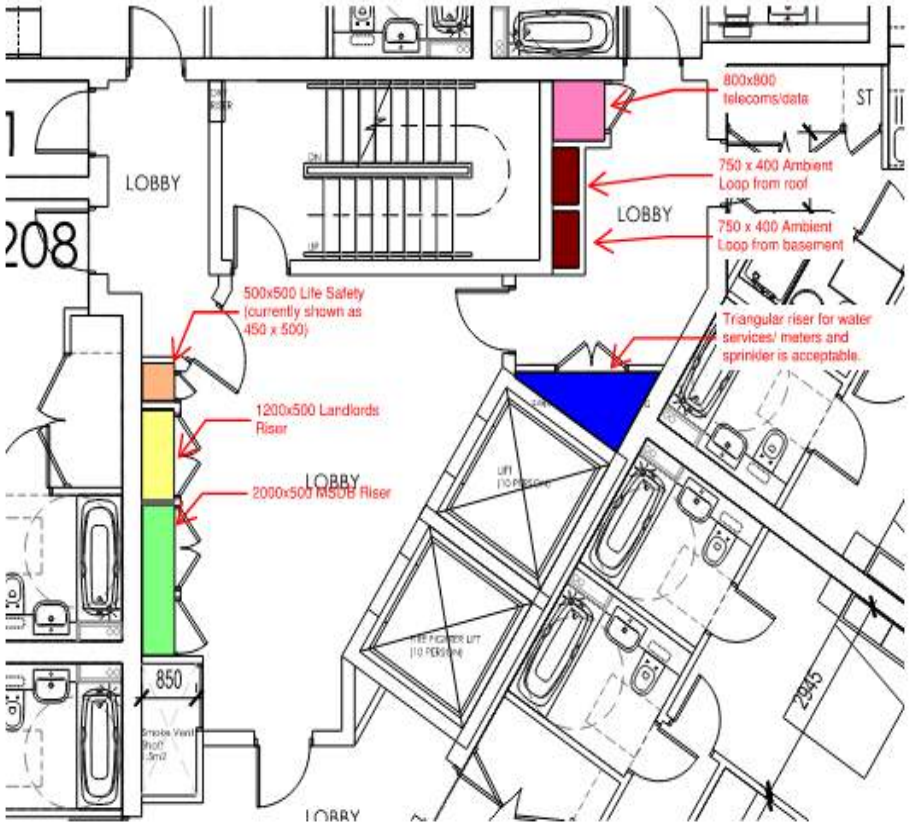
3rd Floor (Heritage Building)

4.0 – MECHANICAL SERVICES

New Build Apartments

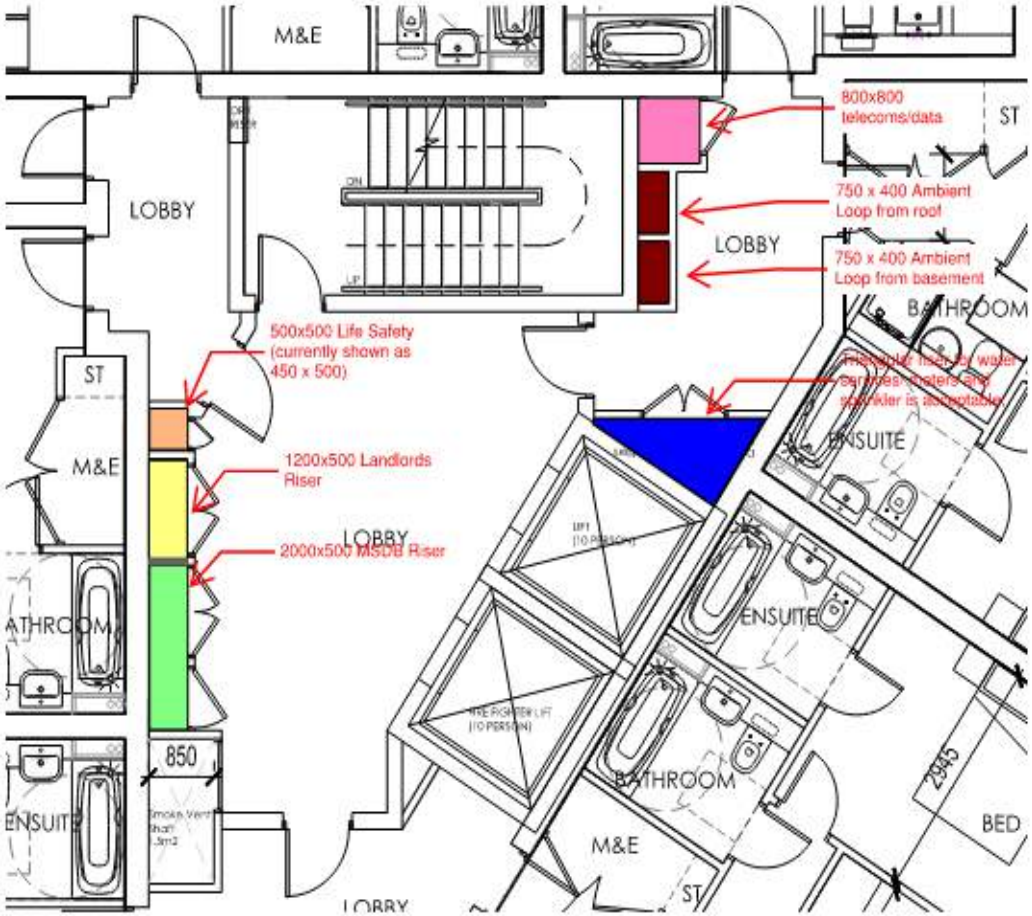


Ground Floor (New Build)

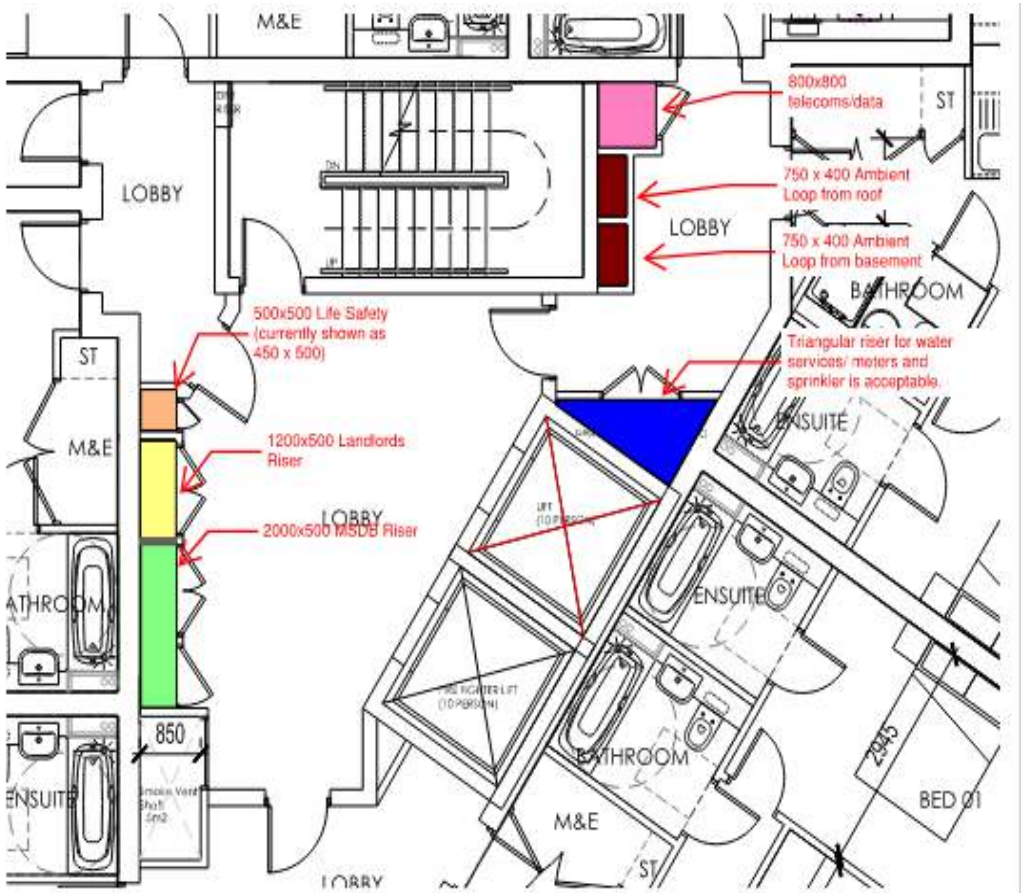


2nd Floor (New Build)

New Build Apartments

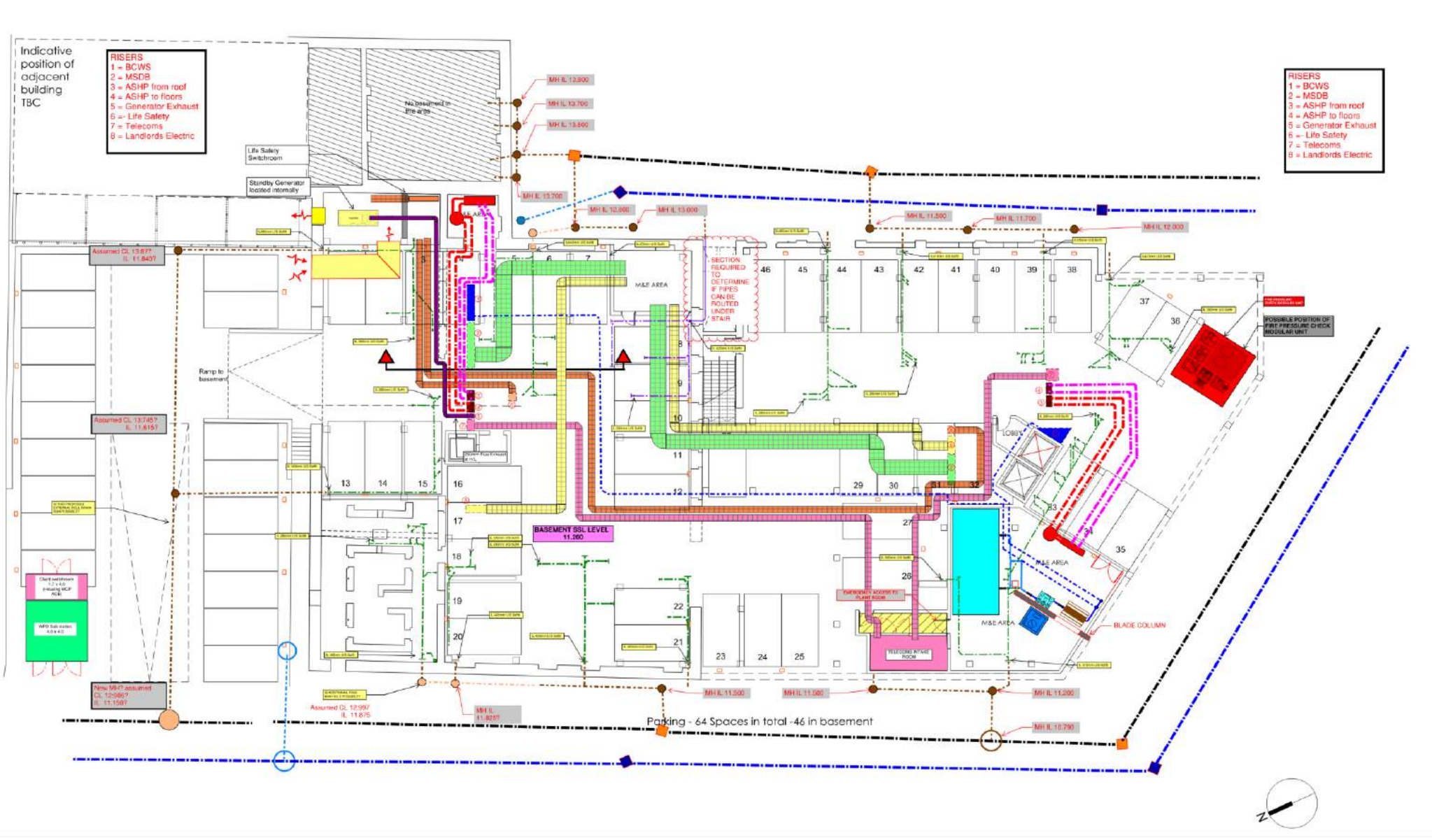


3rd Floor (New Build)

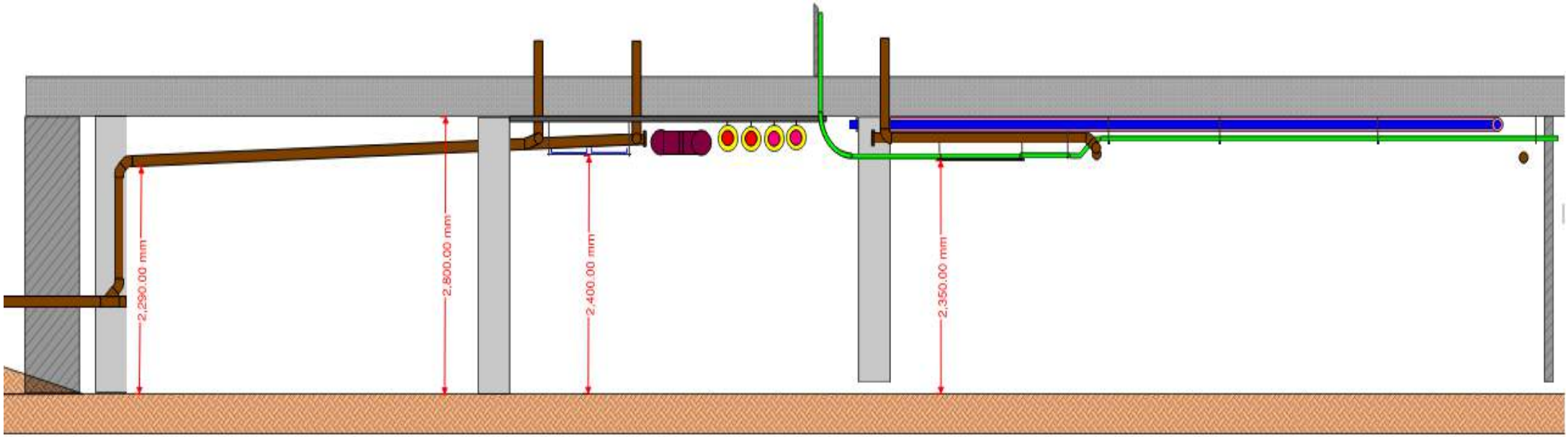


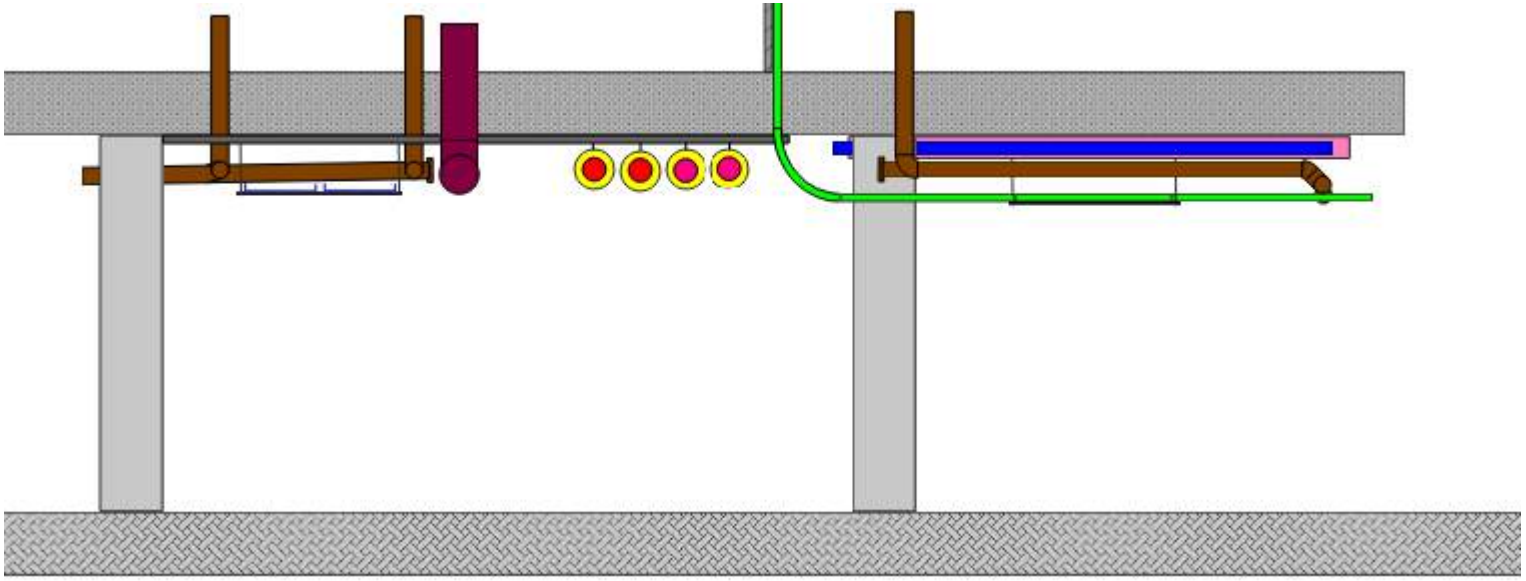
7th Floor (New Build)

Basement Preliminary Services Layouts.



Basement Preliminary Services Sections.





SECTION FIVE: PUBLIC HEALTH SERVICES

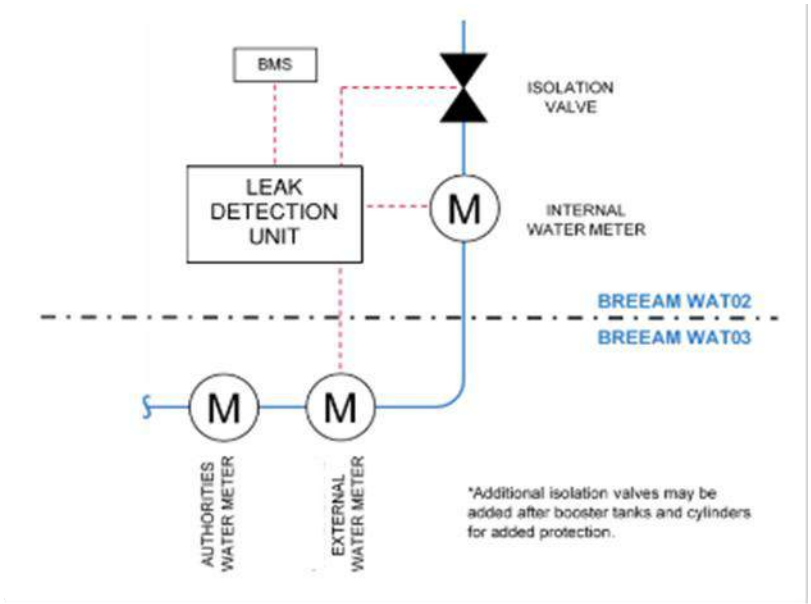
5.0 – PUBLIC HEALTH SERVICES

5.1 INCOMING WATER SUPPLY

It is proposed that a suitably sized unmetered mains water supply pipe will be provided to serve each apartment and landlord service from the existing Seven Trent network. This will be extended from the site boundary to serve the designated residential cold water storage plantroom serving the combined Residential Sprinkler & Domestic water Storage tank and Landlords CAT 5 tank & pump set located in a dedicated plantroom beneath the new 9 storey apartment block. The café will have a dedicated direct connection.

The incoming water supply will be installed in MDPE barrier pipework and will enter the basement from below ground via a dedicated entry duct. Within the plantroom a leak monitoring system will be installed for leak detection purposes the duct will be installed with a minimum 100mm thick sand bed and surround, and with a minimum cover of 750mm. The route of the supply pipe will be marked with identification tape incorporating an electronic tracing wire.

The incoming dedicated MCWS to the café space will incorporate an external pulse meter linked to an internal meter & solenoid valve ford for leak detection purposes.
At the point of entry to the cafe, the incoming mains water supply will be provided with a main internal isolating valve, double check valve and drain cock.

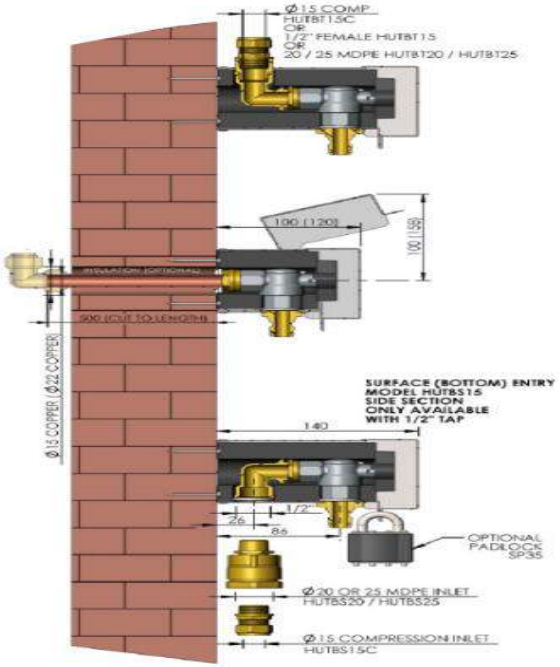


5.2 LANDLORD WATER SUPPLY

The metered Landlords supplies will comprise a landlords Cat 5 tanks & booster set for watering and washdown points within the building, where supplies are routed to a number of main core risers.
A packaged non-potable category 5 cold water tank and pump set, located in the basement plantroom will serve landlords items of equipment which could be subject to backflow contamination such as refuse washdown, mechanical plant and irrigation / watering points.

All landlords washdown and / or watering points will be terminated with a lockable Hose union bib tap (HUBT)

CAT 5 Tank & Booster Set



Lockable HU Bib Tap

Lockable HU Bib Tap

5.3 METERING

High Orchard St Apartments

Metering of the High Orchard St apartments for the 6 separate units will be provided with a traditional external meter located in a boundary box.

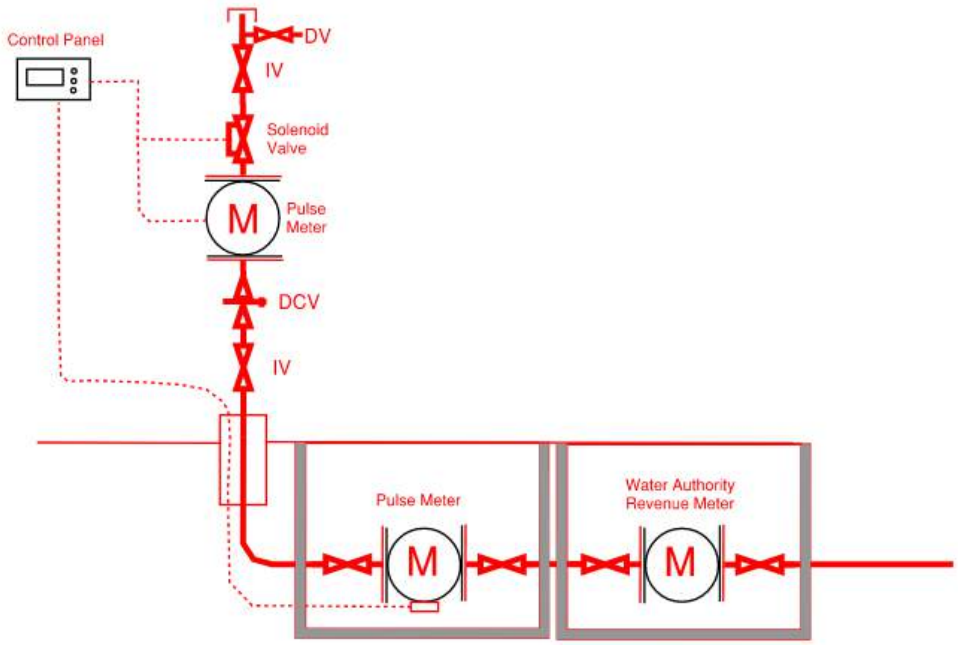
Historical & New Build Apartments

Metering of mains cold water across the site will be undertaken for each residential apartment and for the landlords' supply.

Each meter will be a 'revenue' meter from which a bill will be generated for the end user. Revenue water meters will be located in common parts riser cupboards on each floor. Total meters Historical / Heritage 44Nr internal fit meters, New Build 67Nr internal fit meters & 1Nr Landlord internal fit meter.

Commercial / Retail

The café unit will be metered conventionally by way of water meter at the boundary within a meter pit, and shall be complete with leak detection meter & solenoid valve that will close down in the event of a major leak, in accordance with BREEAM WAT criteria.
The incoming main shall not be connected until such time a tenant is in place and fit out has been completed.



TYPICAL WATER METER ARRANGEMENT FOR RETAIL SPACE

5.4 COLD WATER BOOSTING

Due to the height of the buildings on the development and to ensure a guaranteed minimum water pressure to all apartments, it will be necessary to provide centralised cold water booster plant with a dedicated plant room within the basement.

The bulk cold water storage tanks and booster plant will be provided in the dedicated plant room and from here a combined boosted domestic cold water service and residential sprinkler supply will serve the buildings. To minimise any build-up of salts within the plant, and to control the water quality delivered to the occupants, it is proposed that as part of the central plant an physical or other suitable water conditioning units will be fitted on the boosted supply to serve the building. Due to the limited space it is proposed to install a totally internally flanged tank (TIF)

Cold water booster set

Totally Internally Flanged Tank (TIF)

Physical Water Conditioner

5.0 – PUBLIC HEALTH SERVICES

The boosted cold water service (BCWS) from the dedicated plant room will distribute at high level to a number of vertical main core risers. At every floor served a branch will be taken off this riser and feed a manifold, from this manifold 2No separate supplies will be provided;

- Domestic cold water service (potable water) including a landlords stop cock, Thames Water 'revenue' meter, pressure reducing valve, double check valve and drain cock
- Domestic sprinkler service including a pressure reducing valve, a monitored flow switch, pressure gauge and monitored lock shield valve.

Both supplies will route at high level within common areas to each dwelling, concealed within the ceiling void. Each apartment will have a minimum pressure at entry of 3.0 bar.

In the event of a fire it is essential that the sprinkler service is prioritised over the BCWS. To achieve this a priority valve on the BCWS will be provided so that the BCWS will be isolated to prevent water distributing through the BCWS branch.

Within each apartment the boosted cold water service will distribute via the ceiling voids, stud walls and pipe boxings to serve the various cold water outlets and the hot water requirements.

All pipework within unheated areas will be provided with line sensing electric trace heating for frost protection.

All mains and domestic cold water pipework will be installed in copper tube to BS EN 1057 and thermally insulated.

All feeds to items of sanitary ware will be fitted with flow regulating isolation valves or flow restrictions within the taps. This will ensure the system is well balanced, will reduce undue consumption and wastage of water, and will assist in achieving a better than building regulations 110 lites /per person/day . All feeds to appliances will be 22mm or 15mm diameter.

5.5 HOT WATER SERVICE

Domestic hot water will be generated within each of the dwellings, the majority of the dwellings will be via a Daikin Altherma unit and located in a dedicated utility cupboard/room. The dwellings with the Altherma unit will have its heat source from the buildings ambient loop system. The Altherma unit will provide a pressurised hot water supply to the sanitary fittings within each apartment. (refer to the mechanical section for further information).

ALTHERMA UNIT

TYPICAL UTILITY CUPBOARD

5.5 HOT WATER SERVICE

The 19Nr Studio units located in the Heritage Building will have a direct electric unvented water heater located in a dedicated cupboard. The cylinders shall incorporate 3Kw immersion heater

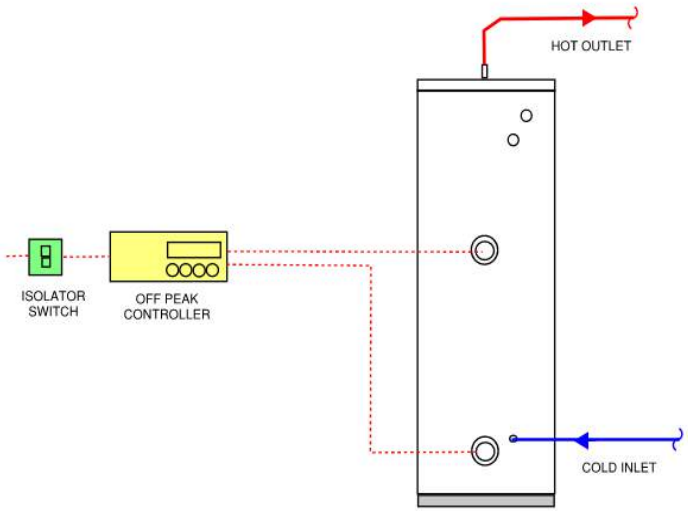
All feeds to items of sanitary ware will be fitted with flow regulating isolation valves or flow restrictions within the taps. This will ensure the system is well balanced, will reduce undue consumption and wastage of water. All feeds to appliances will be 22mm or 15mm diameter.

Thermostatic blending valves will be provided to all apartments incorporating a bath to limit the hot water temperature to prevent scalding in accordance with The Building Regulations Approved Document G.
As required in Part G the hot water to a bath should be limited to a maximum temperature of 48°C. Therefore each bath tap shall be provided with a thermostatic mixing valve (type TMV2 as a minimum) or a tap set incorporating a TMV and limit the hot water to 46°C. (Refer to the Architects drawings & schedules for sanitaryware requirements).

All domestic hot water pipework will be insulated with copper tube BS EN 1057 and thermally insulated.

All current guidelines and regulations regarding the prevention of legionella within domestic hot and cold water services systems will be adhered to in the design.

Typical Blending Valve



TYPICAL UNVENTED DIRECT CYLINDER

5.6 SANITARY DRAINAGE.

RETAIL SPACE

The above ground drainage installations will be designed in accordance with the requirements of BS 12056-2 and the Building Regulations Approved Document H to provide a hygienic and free flowing system.
The retail unit will have capped pop-up with a suitable 100mm capped connection at ground floor level to the suspended foul drainage system (routed through the Lower Ground Floor.
Pop-up connections for soil & waste will be installed using cast iron pipework to ensure an inherently durable installation. Local soil and waste run-outs to items of sanitary ware etc. will be installed by the incoming tenant.

DWELLINGS.

New above ground drainage systems in accordance with BS EN 12056:2 (2000) will be provided to serve the building.
These will gravity-based systems comprising soil and vent pipe (SVP) stacks and with local branch pipework to serve items of sanitary ware and equipment within individual apartments.
The installations will be ventilated via a combination of proprietary roof terminals and air admittance valves (AAV's) as dictated by the building layouts.

SVP's have been located to co-ordinate with the space planning of each dwelling and the associated structure. Typically a SVP will be provided for each wet area; bathrooms, en-suites, utility rooms and kitchen. Although where the space planning offers a back-to-back wet areas, a single SVP may be provided to serve these both.
Branch soil, waste or vent pipework will not pass between the demise of apartments in the horizontal plane (i.e. through party walls). SVP's are, however, 'common' in the vertical plane as they are classified as a landlord's service.

5.0 – PUBLIC HEALTH SERVICES

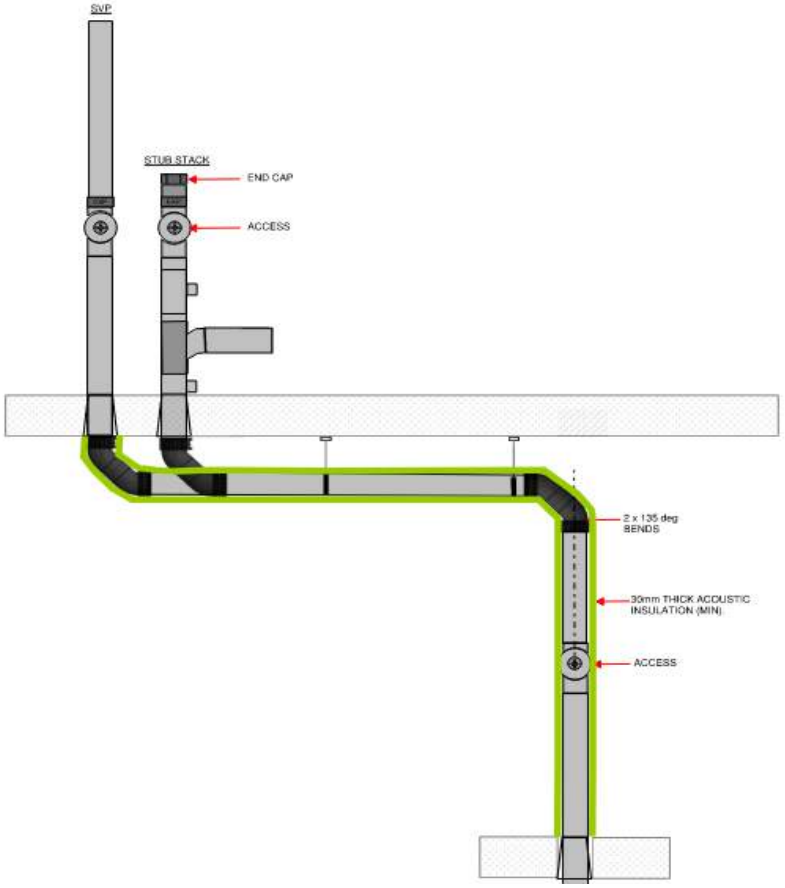
Branch connections will be utilised on SVP's within each apartment to allow waste connections from low-level sanitary fittings such as baths and showers. Suitably sized builders work openings will be provided within the floor slabs to allow the manifold to sit partially within the slab depth thereby allowing the branch wastes to sit as close to the finished floor level as possible.

Generally, all sanitary plumbing systems above ground floor level will be installed using HDPE (black) with fusion joints. All plastic pipework of 50mm diameter and above passing through floor slabs and other such fire compartments will be fire stopped in accordance with Building Regulation requirements.

Within the Lower Ground floor the suspended high level drainage shall be installed in Cast Iron pipework to ensure an inherently durable installation.

Where required by BS EN 12056 (typically for buildings in excess of 5 storeys), sanitary pipework connections will connect into independent 'stub stacks' at ground floor adjacent the main SVP serving the upper floors. Where possible these stub stacks will terminate at approximately 1000mm above finished floor level. All stub stacks will be provided with an access fitting to allow future rodding and maintenance.

Where offsets occur, and dictated by apartment layouts, stub stacks will be incorporated



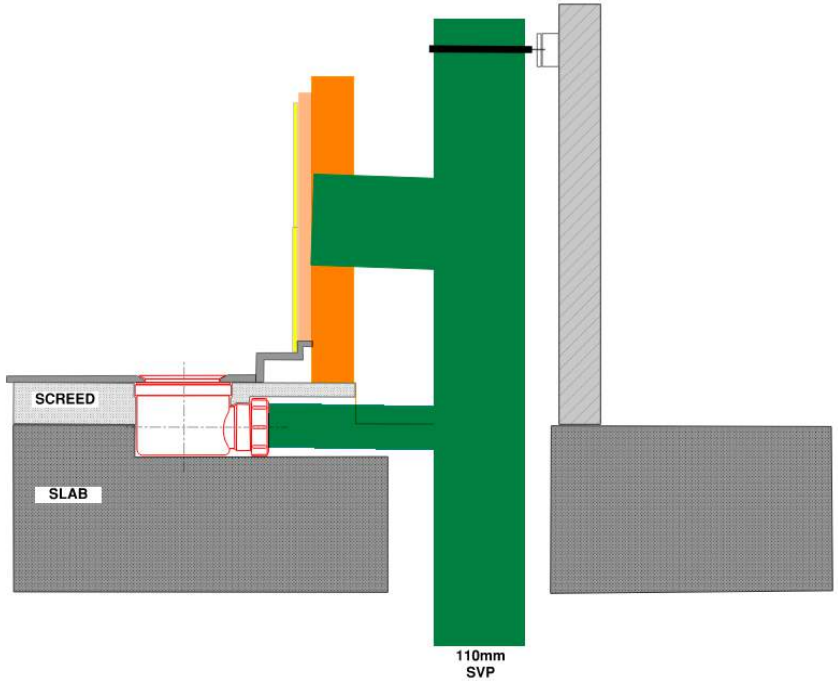
5.0 – PUBLIC HEALTH SERVICES

Where walk in showers are indicated the following assumptions are based on design guidance information and experience, and highlight the types of typical installations.

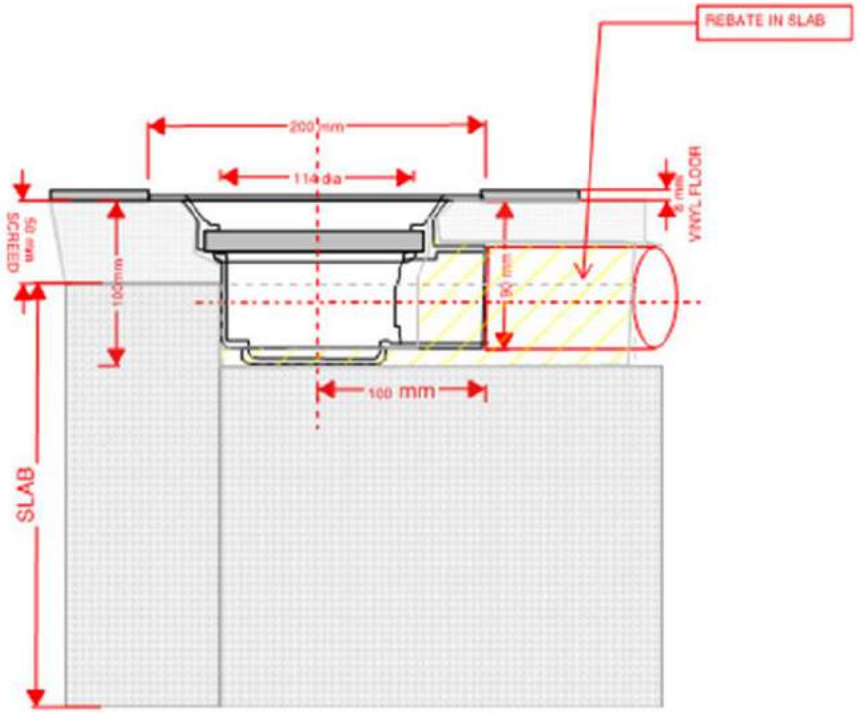
There are several ways of installing a level threshold shower (Walk-in) but not all are suitable for all architectural & structural Scenarios.
The options initially considered are:-

1. Shower outlet & waste pipe routed in a rebate in the structural slab.
2. Shower outlet & waste with vertical outlet through structural slab & pipework at high level.
3. Shower outlet & waste pipe cast in slab.
4. Shower outlet & waste pipe routed in floor insulation.

Based on the current information options 2. 3 & 4 have been discounted on a flexibility, Coordination & operational risk and options 1 has been explored further in section below as the preferred option going forward.
Where a level threshold (walk-in) showers are to be installed the floor make up, screed details & bathroom layouts need to be considered in order to achieve the required fall of the waste pipe discharge along its length to facilitate connection into the corresponding Soil Vent Pipe (SVP) and or Stub Stack (S/S).



TYPICAL SHOWER DETAIL



TYPICAL SHOWER OUTLET & TRAP IN REBATE.

5.0 – PUBLIC HEALTH SERVICES

All SVP's within the residential element of the development will be a minimum of 100mm nominal diameter and will be thermally & acoustically insulated with a minimum 25mm of Rockwool acoustic quilt as dictated by NHBC guidelines and the acousticians requirements. The minimum overall outside diameter (OD) of an insulated 100mm SVP will be 160mm; including allowance for a proprietary fixing bracket of 35mm will dictate a minimum pipe boxing size of 200 x 200mm.

Generally, builders work holes in floor slabs for the soil, waste and vent installations will generally be formed as noted below (minimum sizes):

- Single 100mm SVP or Stub Stack 200 x 200mm
- Pair of 100mm SVP's/stub stacks 200 x 360mm
- 3 No SVP's/Stub Stacks 200 x 530mm.

5.7 RAINWATER DRAINAGE.

New above ground drainage systems in accordance with BS EN 12056:3 (2000) will be provided to convey rainwater from collecting surfaces into the below ground drainage network (by others).

The rainwater disposal system for the buildings will primarily consist of roof outlets with domed gratings suitable for the roof construction and waterproofing details.

For the main roofs and any terraces outlets will discharge into internally routed gravity rainwater pipes (RWP's) and will be interface with the below ground drain points at the lowest level. (Refer to Roberts Limbrick drawings & specification)

Inset balconies and terraces will be drained via internal rainwater pipes (RWP's) and will be routed to underground drain points. If the area of the balcony is up to and including 6m2 and external/façade mounted then subject to approval from NHBC and building control, these could be free draining i.e. not be provided with rainwater drainage.

All RWP's will be a minimum of 100mm nominal diameter and internal RWP's will be thermally & acoustically insulated with 25mm of Rockwool quilt as dictated by NHBC guidelines and the acoustician's requirements. The minimum overall outside diameter (OD) of an insulated 100mm RWP will be 160mm; including allowance for a proprietary fixing bracket of 35mm will dictate a minimum pipe boxing size of 200 x 200mm.

All rainwater downpipes will be located by the Architect

5.8 DRY RISER.

A new dry riser installation in accordance with BS 9990-2015, Part B of the Building Regulations will be provided to serve the new build buildings.

The dry riser installation will consist of a externally located twin inlet breeching piece at ground floor level and exposed landing valves to all floors including ground, and subject to Fire Consultants requirements.

The dry riser will be installed using galvanised mild steel pipework, to meet the pressures, and will distribute up through the building with landing valves located within dedicated valve cabinets, in accordance with BS5041-4, at each floor level including the ground level. The landing valve should be located within the stair enclosure on the full landings or otherwise agreed with the appropriate authority. Where practical a landing valve will be provided at roof level at the top of each dry rising main for test purposes.

In all cases the landing valve cabinets will be located within each building to co-ordinate with the architectural space planning and will sit at approximately 750mm AFFL.

Inlet Breeching

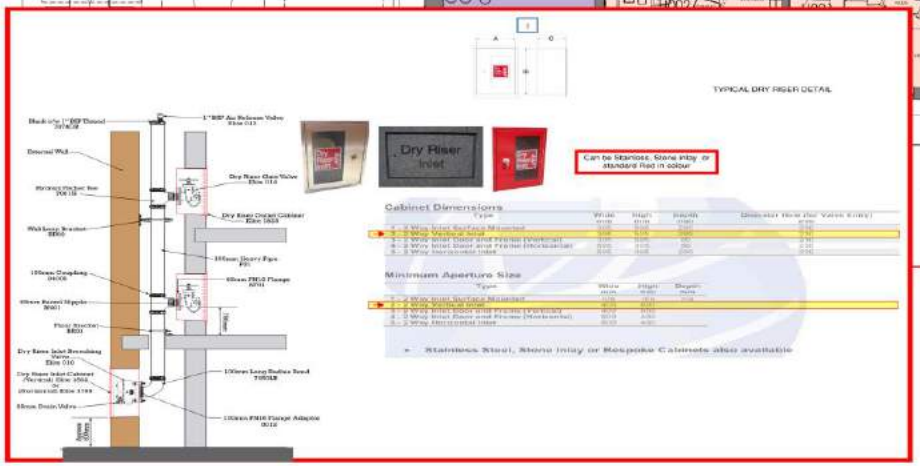
Exposed Landing Valve

5.0 – PUBLIC HEALTH SERVICES

APPROX POSITION OF EXISTNG W.O.

RECESSED OUTLET CABINETS

EXPOSED LANDING VALVE



FH APPROX POSITION OF HYDRANT

5.9 Sprinklers Residential.

Sprinkler protection will be provided in accordance with the latest fire strategy report and to the satisfaction of the Authority Having Jurisdiction. The following areas are currently proposed to be sprinkler protected:

- Residential apartments
- Ancillary Areas
- Bin Stores
- Ground floor

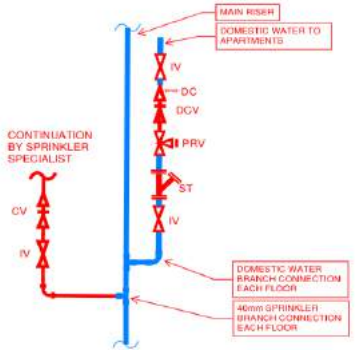
Subject to confirmation from the Fire Consultant & their respective fire strategy assessment, the residential Sprinkler system will be designed by an LPC approved contractor and will comply with BSEN 9251:2021.& as over 18.0m a CAT 4 system 4 heads operating for 60mins shall be allowed.

The cold water storage and booster plant for residential cold water will also be used for the sprinkler requirements which will supply the residential sprinkler system to the building.
The sprinkler mains to the apartment will have a minimum pressure of 3.0bar.

Sprinkler pipework will form part of the BCWS with a branch connection at each floor and shall terminate with isolating valve & check valve for the sprinkler specialist to continue. Each floor shall incorporate monitored isolating valve & flow switch linked to the Fire Alarm system.
From the riser upto the entry point in the apartments the use of CPVC pipework would be envisaged however due to the adhesive used, CPVC pipework cannot be installed at freezing temperatures. Therefore, the contractor shall ensure the installation on site is in a controlled heated environment so as to allow the correct curing of the pipework and trace heated for frost protection where running in spaces exposed to atmosphere.

The sprinkler alarm device should be connected to an internal audible alarm or interfaced with an automatic fire detection and alarm system. If interfaced with fire detection, the sprinkler alarm actuation should be clearly distinguishable on any fire alarm control and indicating equipment.

If the sprinkler system is to be installed for the protection of vulnerable people, the alarm system should be related to a permanently manned 24/7 alarm receiving centre, i.e. RED Care and the sprinkler alarm should be transmitted as a confirmed fire signal to a permanently staffed location.



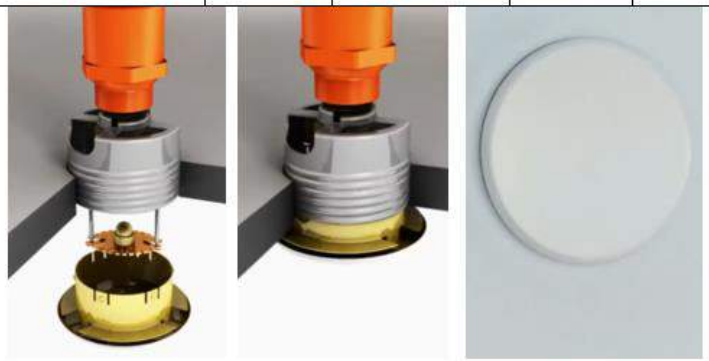
Typical Riser Detail.

Sprinkler Heads

All sprinkler heads within a pattress will be fixed by the specialist but set out by others in the proposed sprinkler head location. The firefighting specialist will detail the sprinkler heads to be used on the project, the heads need to be approved by authorities having jurisdiction:

Types of Sprinkler Heads.

False Ceiling Sprinklers				
Sprinkler Head Type	**Response**	**Finish**	**Size**	**Temperature**
Concealed Ceiling Sprinkler	Residential	White	15mm	74°C



Soffits / Exposed Sprinklers

Apartment heads

Soffits / Exposed Sprinklers				
Sprinkler Head Type	Response	Finish	Size	Temperature
Upright / Pendant / Conventional	Residential	Brass	15mm	74°C

Ancillary Areas

Sprinkler Pipework

Sprinkler mains will need to be designed to ensure minimum bends are used from the water supply to the furthest heads, to ensure hydraulic design of the system will work in accordance with BS 9251: 2021. Full co-ordination will need to be carried out by the specialist in order to determine any critical issues.

5.10 Sprinklers (Car Park).

Subject to the Fire Consultants report it is currently assumed that with the introduction of electric vehicle charging points within the basement car park a sprinkler system will be provided to the space & will be in accordance with BS EN 12845 Ordinary Hazard II as noted below allowing for a 125m3 storage tank (useable water) and two electric pumps with secondary supply provided from the onsite life safety generator.

BS EN 12845:2015+A1:2019
EN 12845:2015+A1:2019 (E)

Occupancy	Ordinary hazard group			
	OH1	OH2	OH3	OH4
Miscellaneous	Hospitals Hotels Libraries (excluding book stores) Restaurants Schools (see 6.2.2) Offices (see 6.2.2)	Laboratories (physical) Laundries Car parks Museums	Broadcasting studios (small) Railway stations Plant (technical) room Farm building	Cinemas and theatres Concert halls tobacco factories Film and TV Production Studio

Table A.2 Ordinary Hazard Occupancies States Car Parks OH2

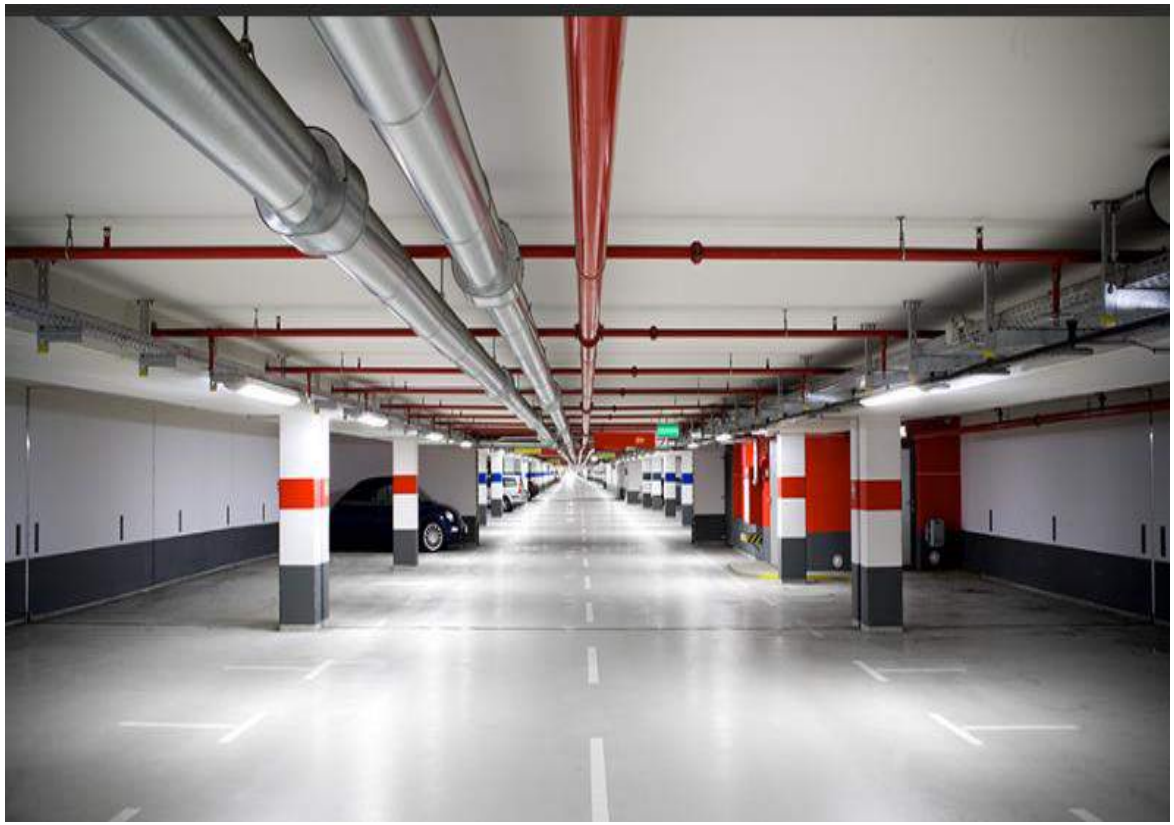
Table 9 — Minimum water volume for pre-calculated LH and OH systems

Group	Height h of the highest sprinkler above the lowest sprinkler (see NOTE) m	Minimum water volume m^3
LH – (Wet or pre-action)	h ≤ 15	9
	15 < h ≤ 30	10
	30 < h ≤ 45	11
OH1 – Wet or pre-action	h ≤ 15	55
	15 < h ≤ 30	70
	30 < h ≤ 45	80
OH1 – Dry or alternate	h ≤ 15	105
OH2 – Wet or pre-action	15 < h ≤ 30	125
	30 < h ≤ 45	140
OH2 – Dry or alternate	h ≤ 15	135
OH3 – Wet or pre-action	15 < h ≤ 30	160
	30 < h ≤ 45	185
OH3 – Dry or alternate	h ≤ 15	160
OH4 – Wet or pre-action	15 < h ≤ 30	185
	30 < h ≤ 45	200
OH4 – Dry or alternate	Use HH protection	
NOTE Excluding sprinklers in the sprinkler valve room.		

Table 9 of the same document OH2 wet or pre-action system to have a minimum usable storage of 125m3

The basement will include an isolation valve with monitoring facility and a zone check assembly and shall be located in an agreeable location.
The system shall be designed and installed by an LPCB approved designer/contractor. Power for the zone check and wiring connection for monitoring of the valve and flow switch shall be by the fit-out contractor.

5.0 – PUBLIC HEALTH SERVICES



TYPICAL CAR PARK PIPEWORK ARRANGEMENT

TYPICAL VALVE SET ARRANGEMENT

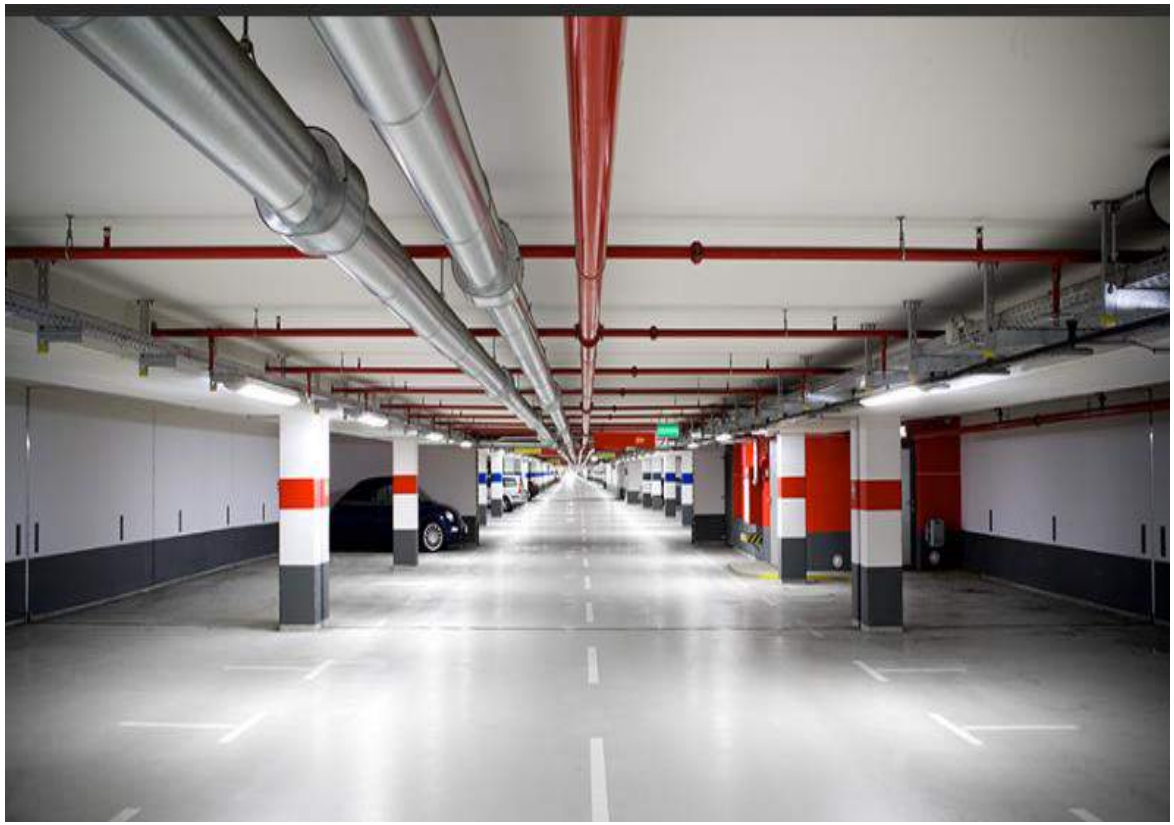
The storage can be reduced in size providing the incoming main is of a sufficient flow, a flow test has been carried out and a minimum 1500L/Min had been identified at an adjacent Hydrant.

Our current Strategy is to have a combined residential Sprinkler & domestic water combined serving the development with a separate system for the Car Park.

With the above in mind, we have considered the following options for the car park sprinkler requirements: -

- A Town's mains fed system subject to flow & pressure.
- A Full capacity tank & pump system
- A reduced capacity tanks & pump system
- A packaged systems with reduced storage subject to flow

5.0 – PUBLIC HEALTH SERVICES



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- A Town's mains fed system subject to flow & pressure.
- A Full capacity tank & pump system
- A reduced capacity tanks & pump system
- A packaged systems with reduced storage subject to flow.

5.0 – PUBLIC HEALTH SERVICES

Town's Main option.

Following receipt of the pressure loggers from Seven Trent Water & a separate flow test the existing network has an average pressure of 4.8 bar and a min flow rate of 1500l/min, utilising these figures it may be possible to have a town's main fed sprinkler system for the car park and will be subject to further hydraulic calculations undertaken in the next stage.

	Estimated pressure at property (bar)
	Max: 4.30
	Min: 3.86
	Average: 4.08

Full Capacity Tank.

With the limited space available this option has been discounted.

Reduced Capacity Tank.

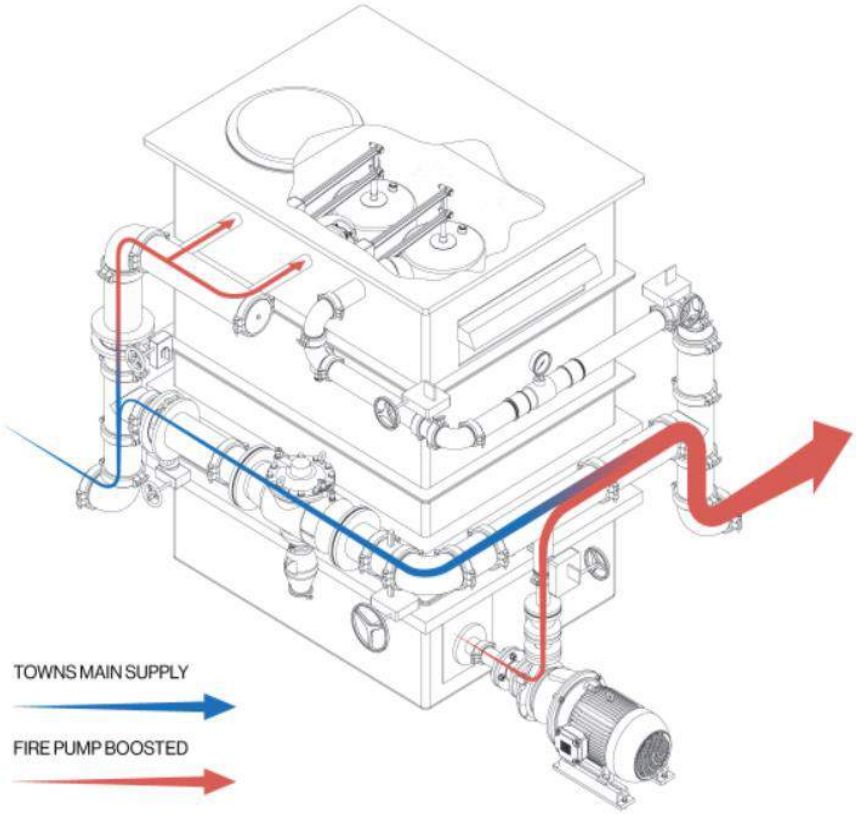
A reduced capacity tank (property) based on 1500L/min infill rate will need to have 33mcu effective capacity (ca. 40mcu total volume, accounting for dead water and top of tank). For this option the pressure is not relevant as the systems will be pressurised via pumps. The infill pipe will need to be ca. 100mm NB (Nominal Bore).

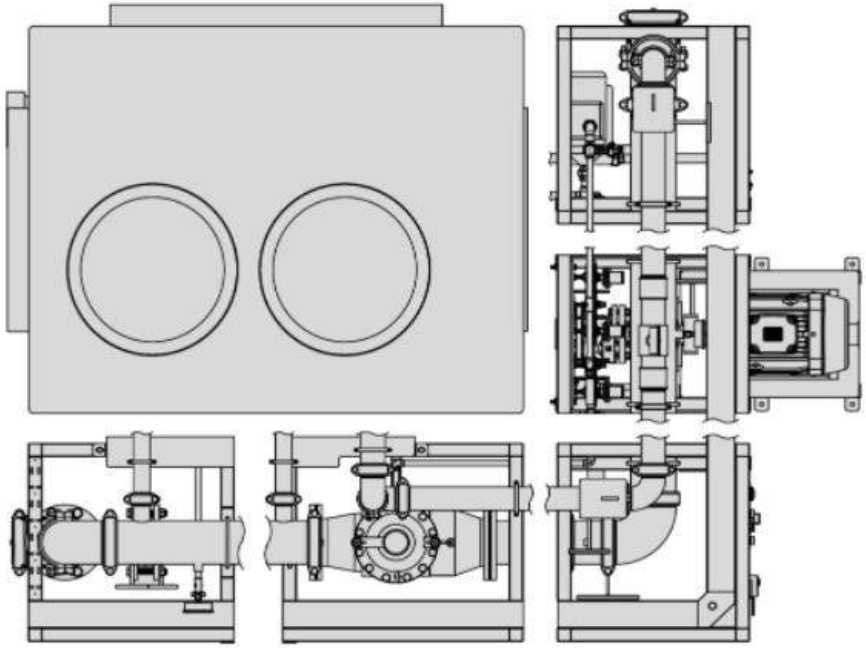
When a full hydraulic calculation of the system has been carried out (FHC) the tank size may reduce further in size but could only be determined following a detailed design.

Packaged option

As an Alternative to a full capacity tank and due to the space requirements of an OHII system “The project Fire Pressure check unit” has been considered. This will be subject to agreement with Authority Having Jurisdiction (AHJ) Building Control, Gloucester Fire Service, Clients Building Insurers.

The pressure check is a compact water supply unit (about the size of two car parking spaces)has been engineered to allow the sprinkler system to be compliant within a smaller footprint, the minimum flow rate required is 1200l/min the local network will currently deliver 1500l/min. The unit draws water from the towns mains supply to feed the sprinkler system to accommodate the required pressure for the specific hazard classification. The Pressure check is modular design and is pre-configured to an OHII classification and is manufactured off site. The compact design requires a minimum floor space of 4.0 x 4.0 with a minim

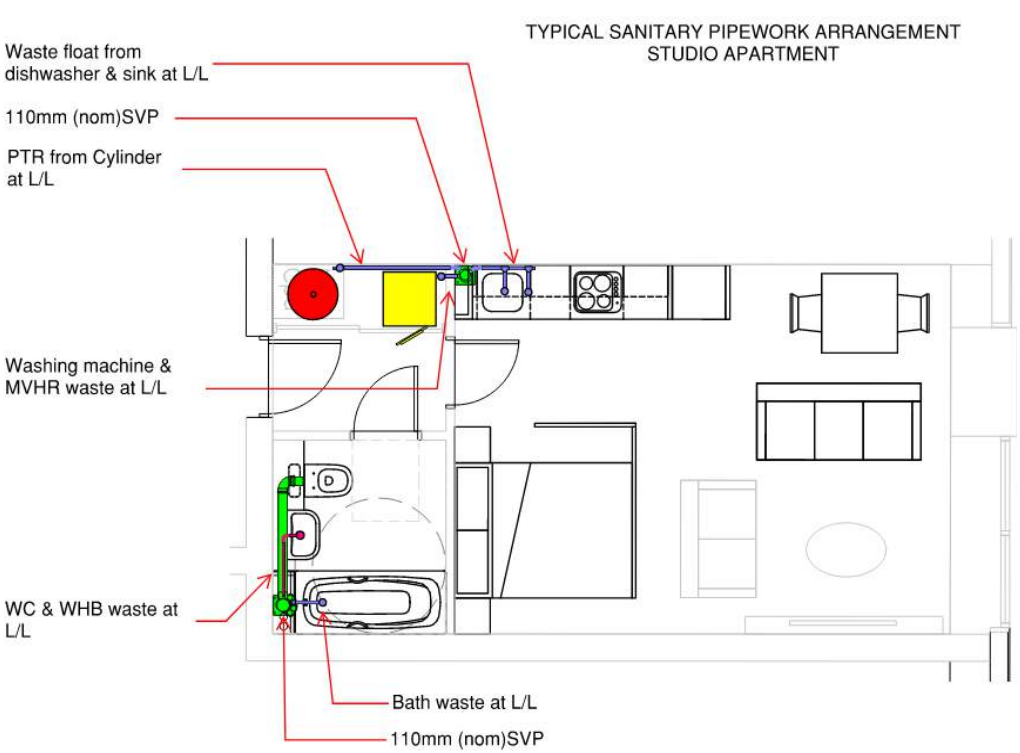


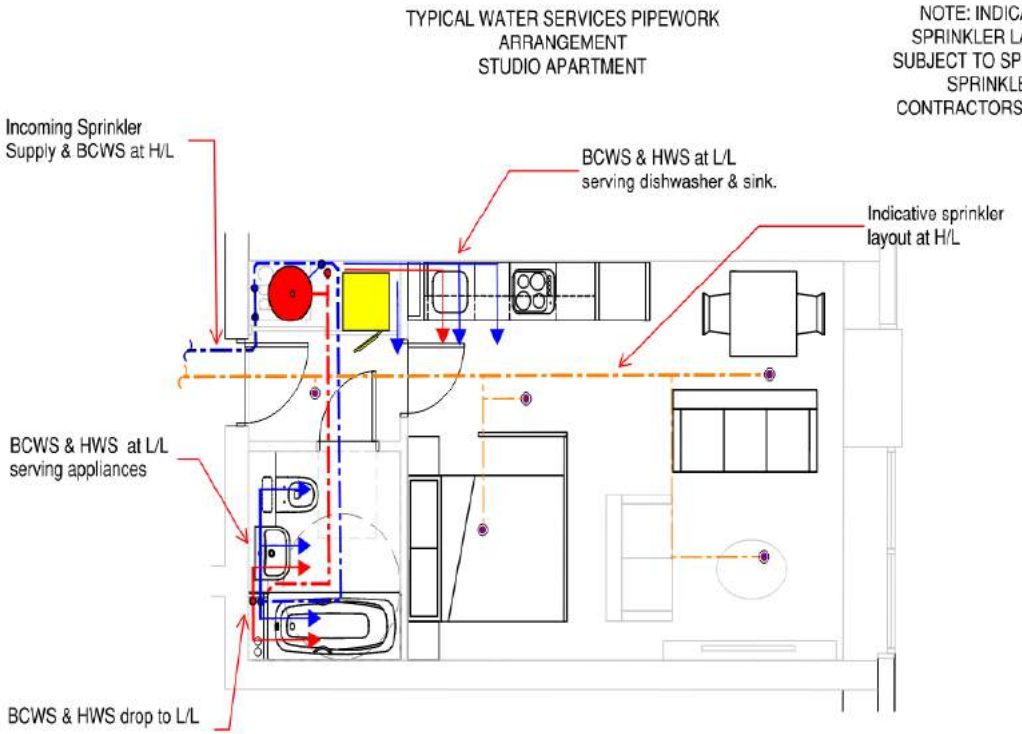


TYPICAL “PRESSURE CHECK ARRANGEMENT

5.11 Typical Apartment PH Layout.

Studio

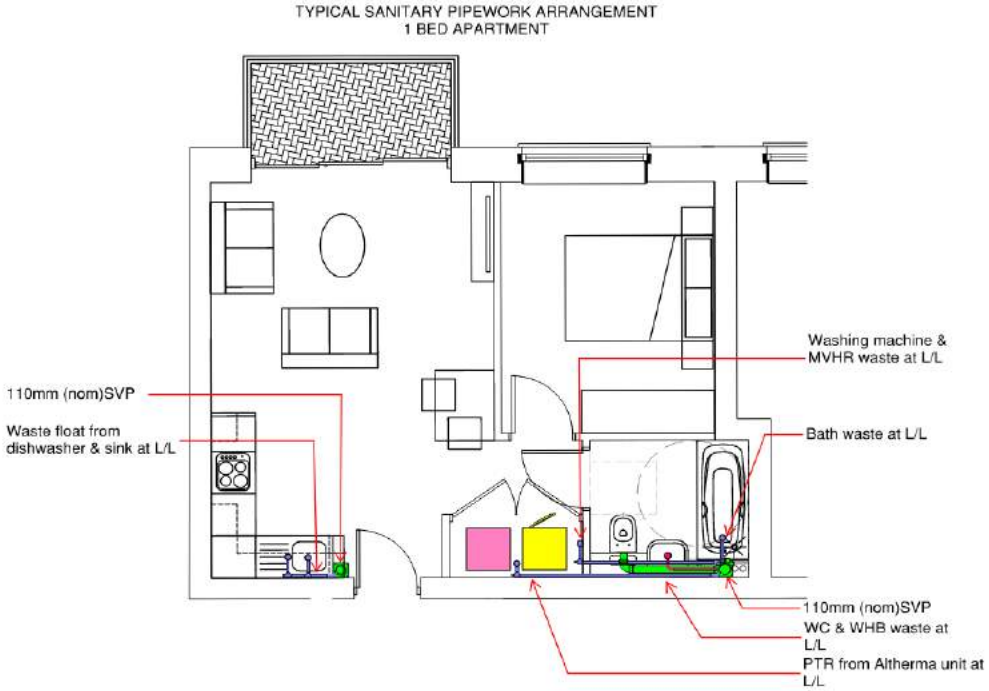


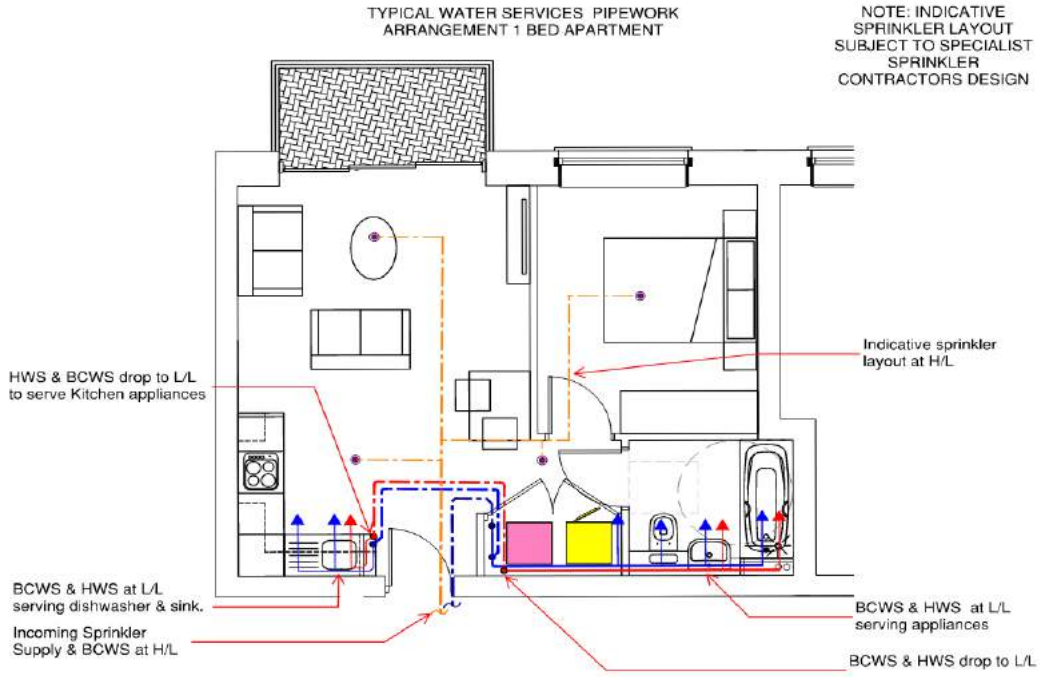


5.0 – PUBLIC HEALTH SERVICES

Typical Apartment PH Layout.

1 Bed Apartment

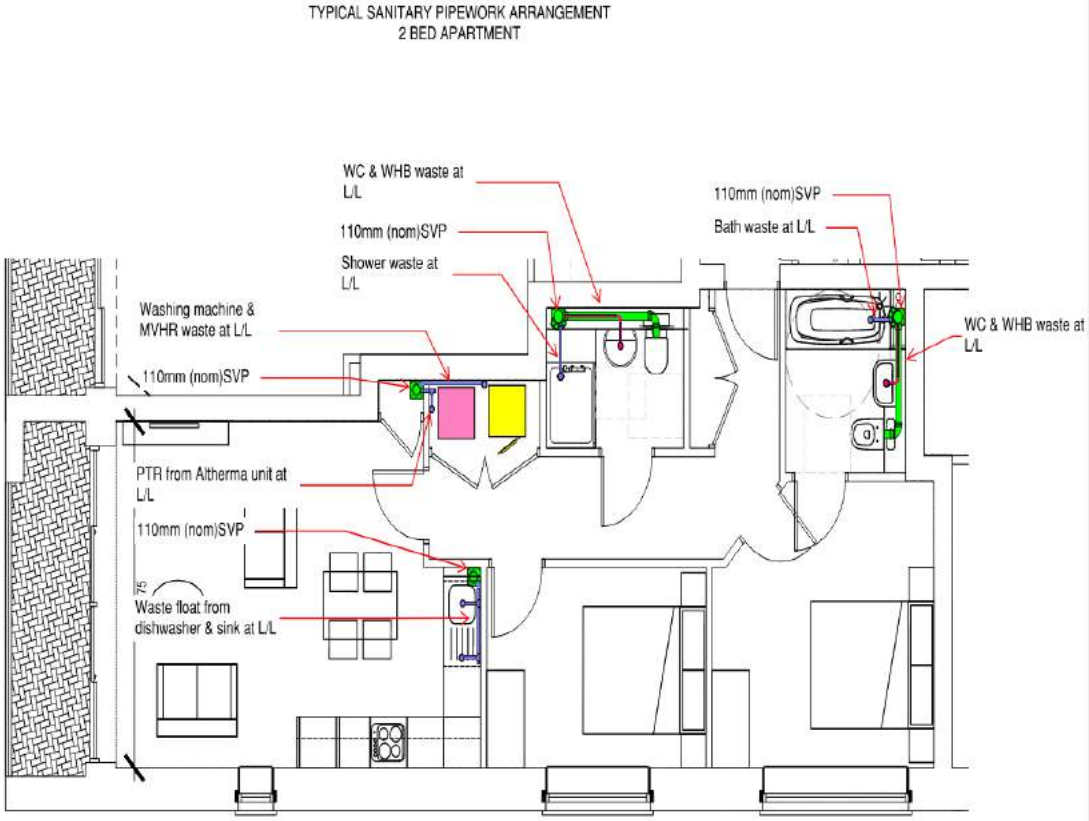


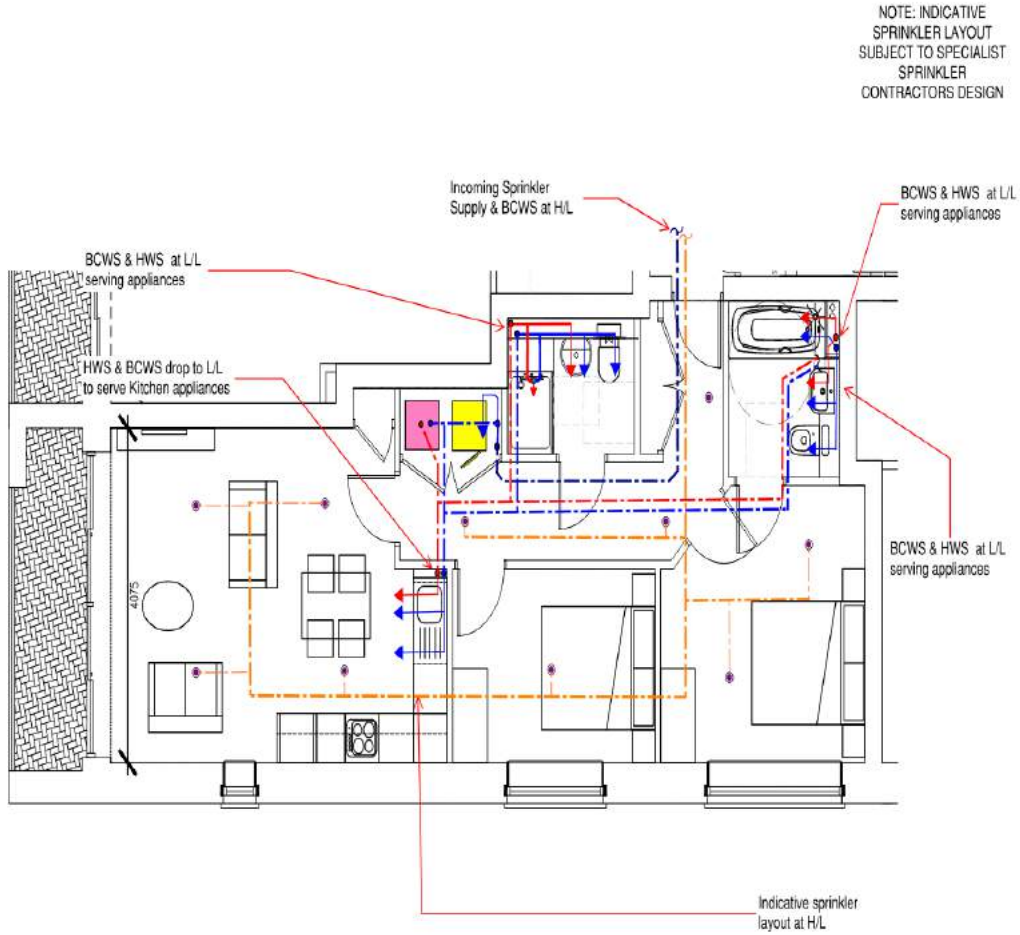


5.0 – PUBLIC HEALTH SERVICES

Typical Apartment PH Layout.

2 Bed Apartment

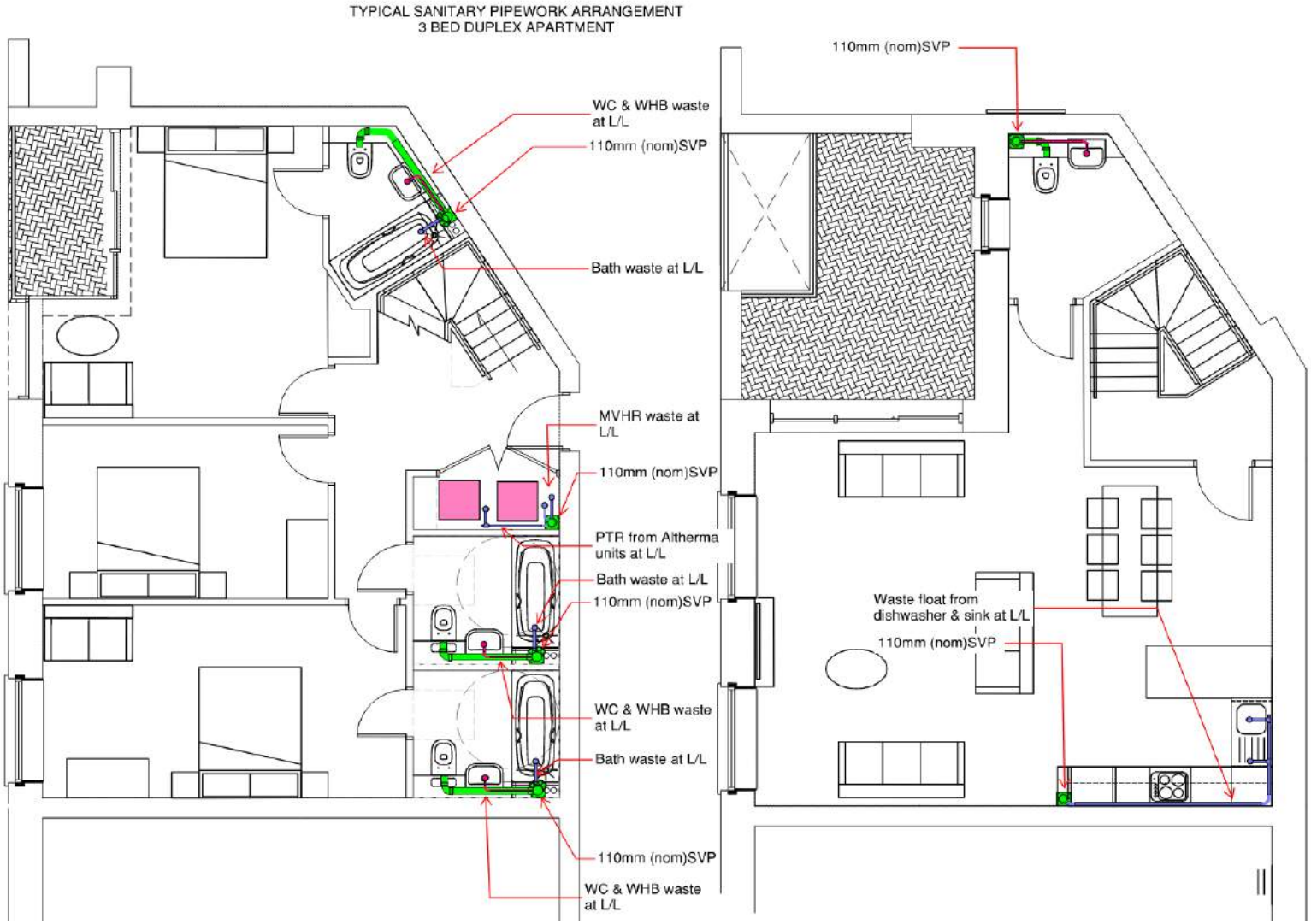




5.0 – PUBLIC HEALTH SERVICES

Typical Apartment PH Layout.

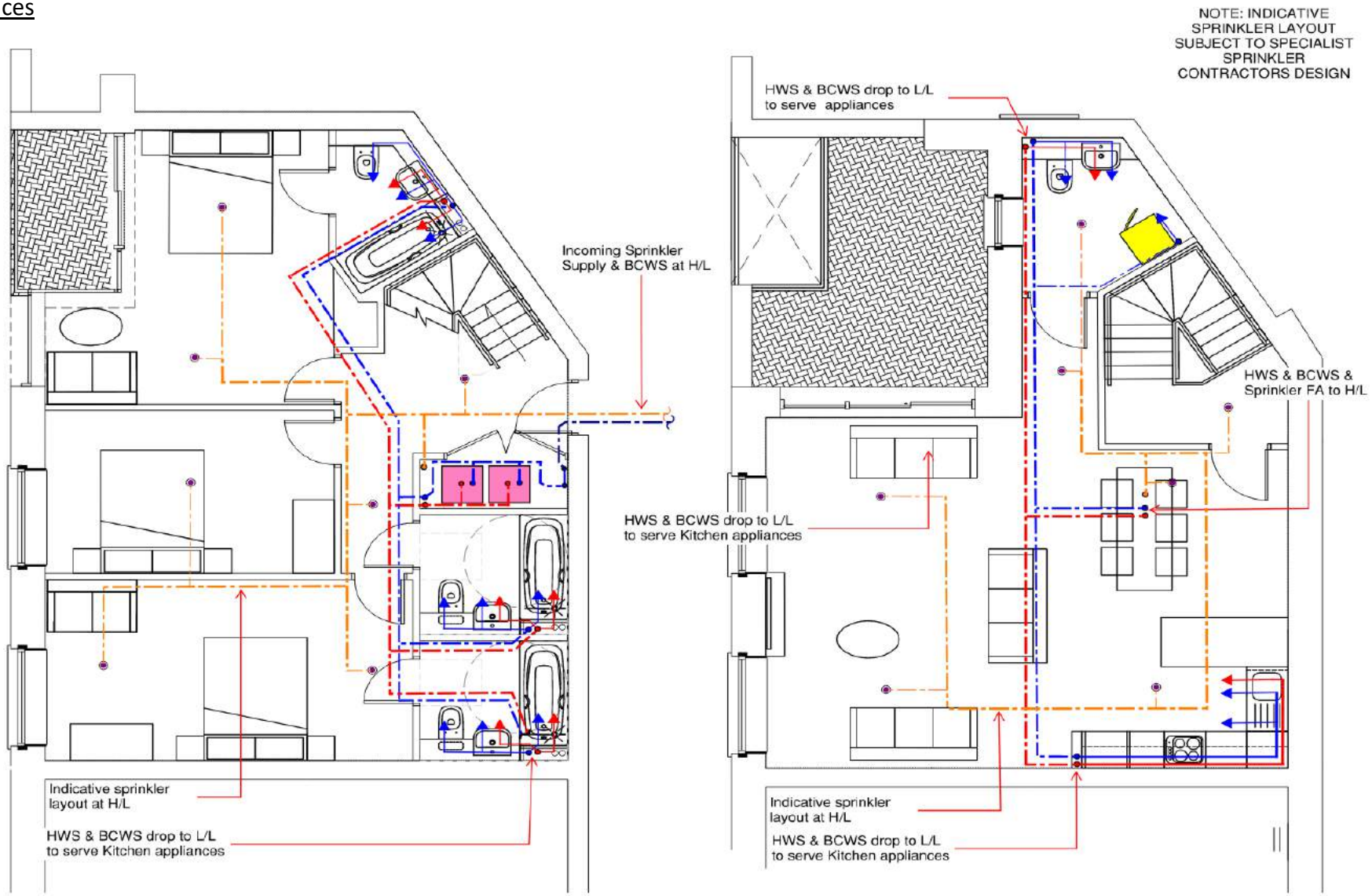
3 Bed Duplex Apartment
Above Ground Drainage



5.0 – PUBLIC HEALTH SERVICES

Typical Apartment PH Layout.

3 Bed Duplex Apartment
Water Services



SECTION SIX: ELECTRICAL SERVICES

6.0 – ELECTRICAL SERVICES

6.1 Incoming Electrical Services

The new incoming electrical supplies to the development will be derived from the local Community Network Operator's, Western Power Distribution (WPD), high voltage network. An externally sited brick-built substation including adjacent primary LV distribution switchroom will be established local to the site.

The substation will be located within the boundary of the development adjacent to the external carpark entrance thereby providing 24/7 direct access from public highway in accordance with WPD requirements. Subject to detailed discussion and agreement with WPD, low voltage supply cables will be taken from the substation switchroom, drawn through a 125mm black HDPE rigiduct underground duct and draw pit infrastructure installed by the developer terminating within intake rooms strategically located to serve the respective development load centres.

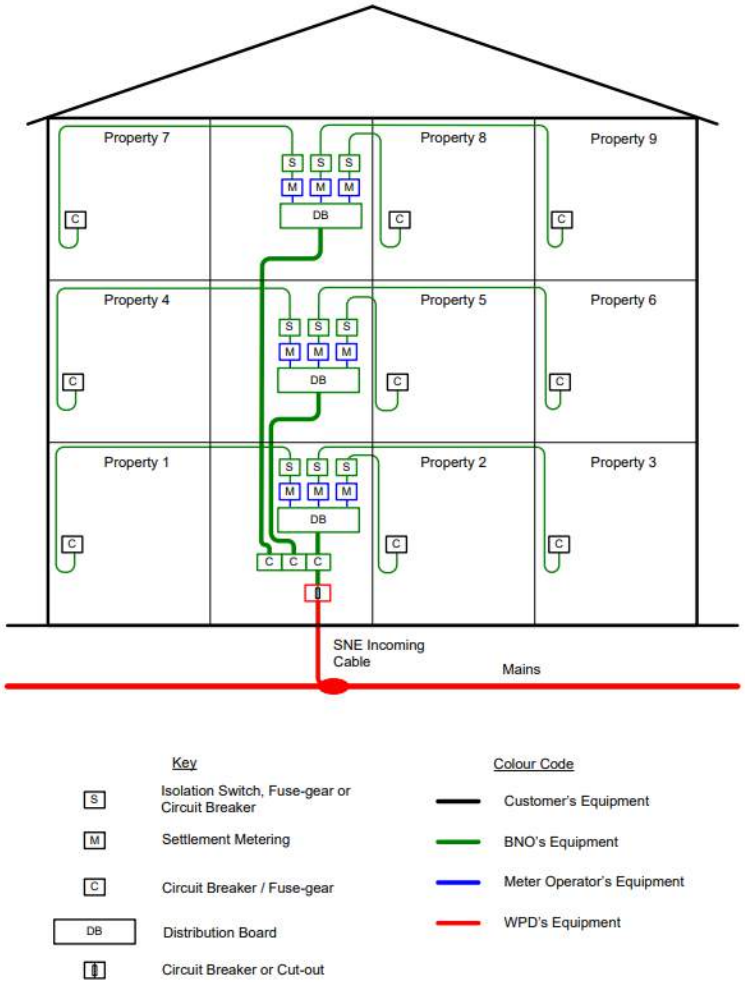
From the intake rooms, the new LV supplies will be distributed around the site and will be generally 400 volts, three phase, 4 wire 50Hz or 230 volts, single phase, 2 wire 50Hz. Supply arrangement is anticipated to be TN-C-S format subject to detailed design.

The 1.0MVA WPD Substation and infrastructure will have adequate supply capacity to serve the new development comprising Utility metered supplies to the following:

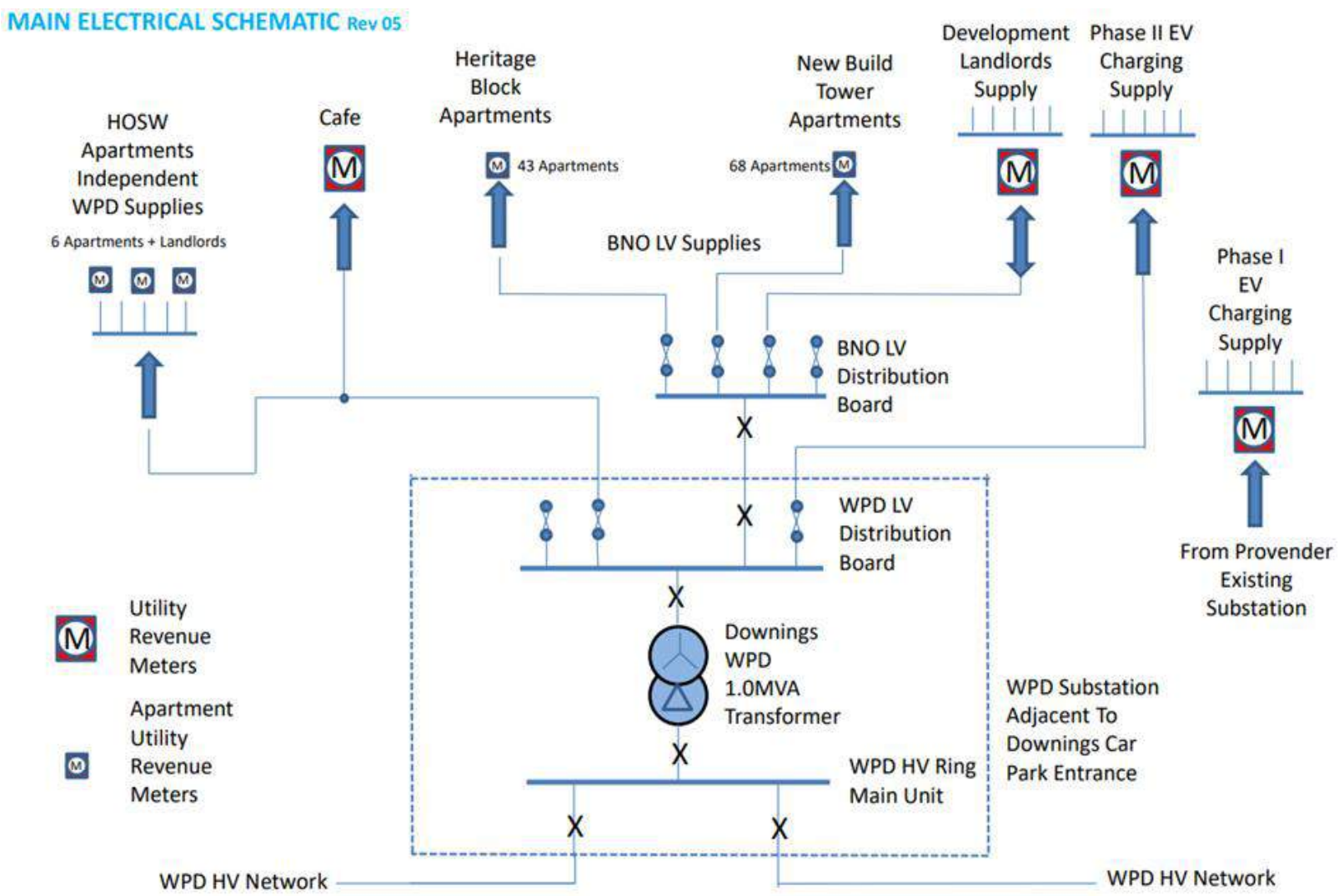
- High Orchard Street Warehouse Apartments.
- Heritage Block Apartments
- New build Tower Apartments.
- Development Landlord services
- Electric Vehicle Chargers (Phase II)
- Future Café.

Note: The Phase I Electric Vehicle Chargers metered supply shall be derived from the existing Provender WPD Substation.

DISTRIBUTION PRINCIPLE FOR APARTMENTS – SINGLE INCOMER, BUILDING NETWORK DISTRIBUTION WITH COMMUNAL METERING

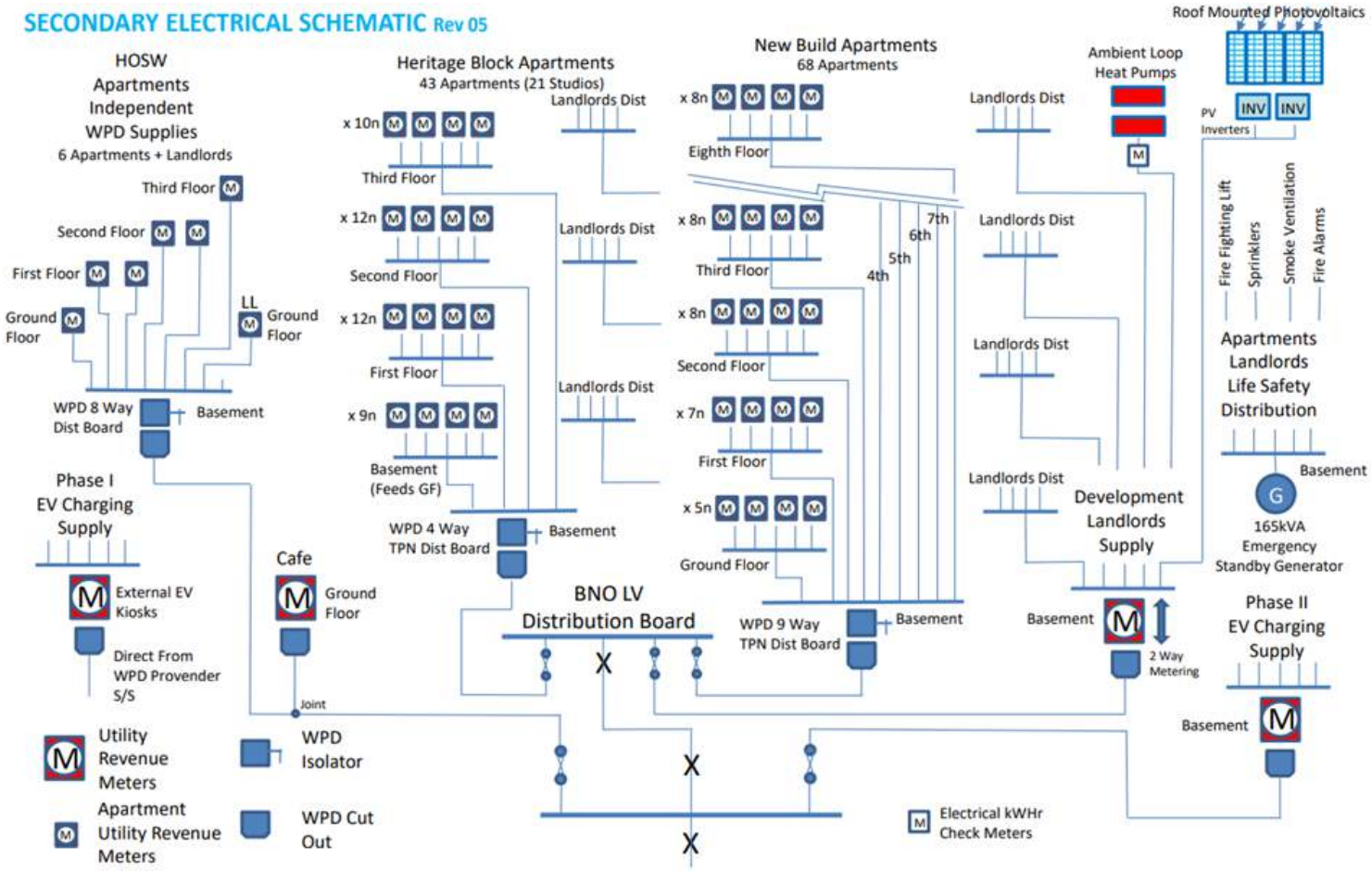


6.0 – ELECTRICAL SERVICES



6.2 Electrical Mains Distribution.

Three main incoming electrical supplies will be derived from the WPD substation, one will be established to serve both the future shell Café and the High Orchard Street Warehouse (6No. apartments) to be delivered in advance of the main project work, the second will be a bulk supply terminating in an Air Circuit Breaker (ACB) for further extension by a Building Network Operator to supply the residential apartments in both the main Tower and Heritage buildings plus associated Landlords systems and the third will be utilised to feed a managed Electrical Vehicle Charging infrastructure all as detailed in the overview secondary schematic below:



In addition to the WPD Utility incomers, there will also be an element of self-generation zero carbon electrical energy input, derived from two main photovoltaic (PV) roof top arrays established on both the Tower and Heritage buildings. It is proposed that this ZCT electrical energy will be introduced via DC/AC invertors complete with all necessary protection devices into the Landlords distribution network, which depending on load at the time will either be consumed directly by the Landlord connected systems or exported back onto and in to the local WPD network via a 2-way reversible metering tariff arrangement, thereby off setting and minimising the annual kWHr Landlords demand. Discussions are currently underway with a number of residential and commercial energy shippers/metering suppliers and as such this distribution arrangement will be subject to further detailed design development during the next design stage.

In respect the bulk residential electrical supply, the registered Building Network Operator (BNO) will be responsible for the Apartments LV distribution infrastructure from the WPD ACB to the customer Utility metered installations generally located external to the apartments within fire rated metering cupboard accessed from the communal landings at each respective floor level. The BNO is yet to be determined, however may be the DNO/ IDNO or another operator appointed by the client. At present the apartment metering is anticipated to be by Scottish Power.

RESIDENTIAL – APARTMENTS

A number of riser mounted, secondary multi service residential HRC distribution boards (MSDBs), selected and specified to suit the number of apartments to be served at each respective floor level (Ryefield Cabinet/ Lucy/ Schneider/ Mode), will be supplied directly from the BNO apartment switchgear located in the basement main LV Switchrooom. These distribution boards shall be top entry/exit and have multiple outgoing circuits. From these secondary riser cupboards, final Utility metered supplies will be routed via ceiling voids to the individual Apartment's internal customer consumer units. Metering arrangements including local 100A double pole isolators will be installed to the Energy/Metering Suppliers specific requirements. Current concept design proposals based on advice received from Scottish Power.

Typical HRC Multi Service Distribution Board (MSDB)

6.0 – ELECTRICAL SERVICES

The sub main cabling to the individual Apartments will be XLPE/SWA/LS0H installed on cable tray/basket concealed within landing ceiling voids, entering each dwelling above the front door through a purpose constructed and fire stopped electrical 'letter box' terminating into a 'Consumer' final circuit distribution board complete with local isolation all located within the combined apartment Utility Cupboard.

The 'Consumer' final circuit distribution boards shall be of the metal enclosure type, split load with RCD/RCBO/AFDD protected circuits in accordance with latest IEE Wiring Regulations and amendments.

Typical Split Load Consumer Unit

RESIDENTIAL - LANDLORD

The incoming residential 2 way (reversible) CT metered landlord service supply will terminate in the common basement LV switchroom onto an IP42, Form 4 Type 2 floor standing (with built in base plinth) landlord switchboard. This switchboard will be fitted with moulded case circuit breakers (MCCBs) as indicated on the outline secondary LV schematic complete with 10% outgoing spares for future installations. The landlord switchboard will feed all landlord distribution boards and systems serving common area lighting and power, ambient loop ASHPs, mechanical and electrical plant, lifts, security systems, IRS and any other landlord loads. It will also accept self-generated PV supply input and will interconnect with the on-site emergency standby generator and designated life safety installations. All electrical supplies from the landlord switchboard shall be multifunction metered to comply with the requirements of Part L.

A type 1, Class 3 400V TP&N surge protection device will be fitted on the incomer section of the landlord switchboard.

SUB MAIN DISTRIBUTION - LANDLORD

Sub main cabling to distribution boards and landlord plant loads shall be XLPE/SWA/LS0H installed on cable ladder/tray. Sub main cabling to all life safety loads will be served by fire rated FP600 cabling or similar (to be agreed).

Distribution boards will be situated within the main central core fire rated electrical risers, generally on intermediate floors, of each residential block, from where final circuits will be derived to serve local common part's small power, lighting and mechanical loads.

Distribution boards will typically be 100A TP&N 12way boards serving the immediate floor, floor above and floor below. Distribution boards will be provided with integral isolators, MCB's, RCD's, AFDD's and incorporate 10% spare outgoing ways.

6.3 Life Safety Installation

All designated 'Life Safety' installations will be provided with dual, diversly routed, independent electrical supplies in accordance with the requirements of Part B of the Building Regulations and BS 9999. Primary supplies will be derived from the WPD substation normal mains incomer through the main Landlords switchboard and the Secondary by means of an on-site emergency standby generator installation and respective dedicated Life Safety switchgear. Both normal mains and life safety switchrooms will be located at basement level.

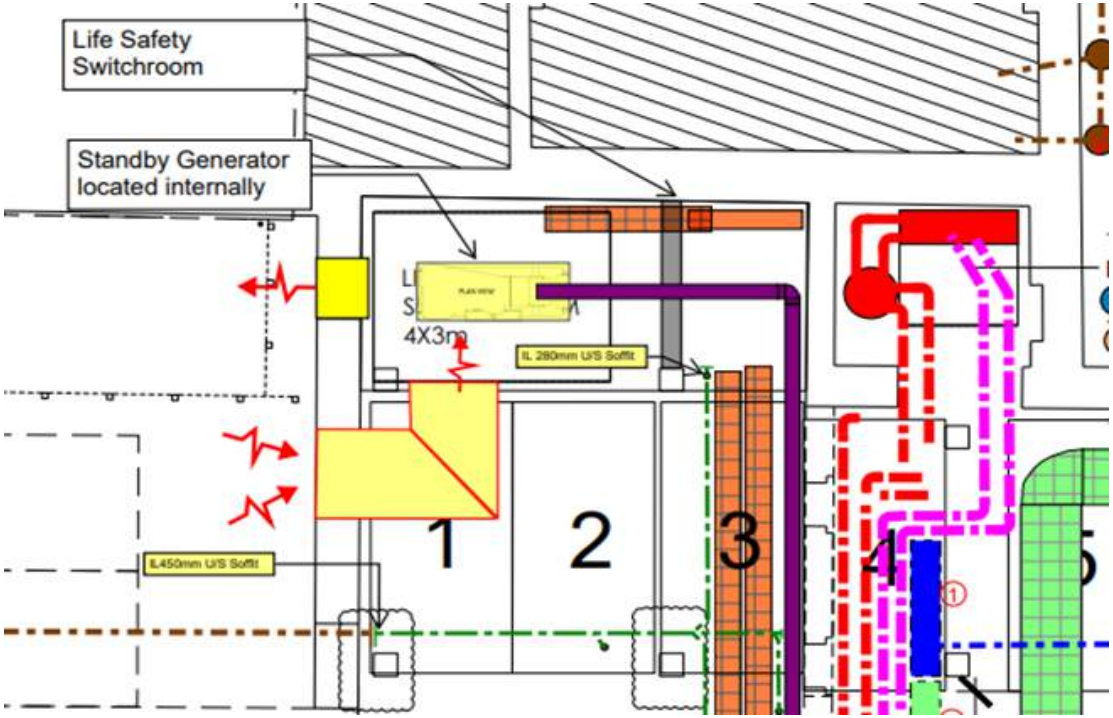
'Life Safety' systems/installations:

- Smoke Ventilation Installations
- Domestic and Commercial Sprinklers
- Firefighting/Evacuation Lifts
- Drainage Sump Pumps
- Fire Detection and Alarm Systems
- Refuge Alarm and Call Systems

For each of the above, the respective dual primary and secondary fire rated cable supplies will terminate onto an appropriately sized and specified Automatic Transfer Switch (ATS) strategically located as close as possible to the final connected load/device served. On loss of normal mains supply the ATS will automatically changeover to the secondary supply input and at the same time will send a generator start control signal to the standby generator and Life Safety switchboard.

6.4 Emergency Standby Generator

A close coupled emergency standby diesel generator set will be installed within a dedicated generator room at basement level located adjacent to the main car park access ramp. This emergency standby generator set will operate only in the event of a mains failure thereby alternatively supplying and supporting the Life Safety installations/systems listed above



Basement Generator Room

Air for combustion and cooling will be drawn through an attenuated inlet ventilation ductwork arrangement at high level in the basement carpark, forced radiator cooling will be expelled through appropriately sized acoustic louvres in the façade and combustion gases will be exhausted from the generator set through a flue arrangement routed across the carpark then rising vertically through a protected fire rated shaft to exhaust at roof level above the Heritage building.

The proposed 165kVA set sized suitable to accommodate the envisaged locked rotor starting currents imposed by the sprinkler installations, will be supplied complete with control system, battery starting, integral fuel tank, fuel polishing and all necessary emission controls including catalytic converter and blue lube to comply with all local pollution and noise restrictions.

Typical Close Coupled Packaged Standby Generator Set

6.5 Internal Lighting Installation

The lighting within each apartment building will comprise energy efficient lamp sources for both landlords and residential areas in accordance with the requirements of the Building Regulations Parts L1a and L2a.
In residential apartments this will include a combination of LED down lights and low energy ceiling roses to comply with the Building Regulations Part L1a combined with LED under unit lighting to kitchen specialists' requirements.

Lighting to the apartments will be conventionally locally switched with the provision of dimming in lounge/dinner and in master bedroom. Additional 5Amp table lamp circuits will be provided in 3 bed and duplex apartments.

Lighting within the residential communal areas will be by means of ceiling recessed LED down lighting in corridors and wall mounted LED luminaires to stair cores. The lighting levels will be designed to the Society of Light and Lighting (SLL) Code for Lighting.

Area	Lighting Level (lux)
Lobby/ Reception	200-300 (Contrasting Feature Lighting)
Corridor/ Lift Lobbies	200
Lift Landings	200
Stairs	150
Plantrooms	200
Bin stores/ Cycles stores	150

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Lobby/ Reception	200-300 (Contrasting Feature Lighting)
Corridor/ Lift Lobbies	200
Lift Landings	200
Stairs	150
Plantrooms	200
Bin stores/ Cycles stores	150

Light control to the corridors and stair cores will be provided by Passive Infra-Red (PIR) movement detection. In entrance reception lobbies, residential lounge and co-working areas the feature lighting will be selected suitable for the environment and controlled on a combination of PIR movement detection with time clock override dependant on the levels of usage and the perception of safety in these areas to the end users.

Within the basement car park, plant rooms, switch rooms, roof spaces, refuse and cycle store areas low energy vandal resistant LED bulkhead and batten luminaires will be selected, controlled with a combination of PIR detectors and manual switching. 10% of the internal basement car park lighting will be designated as 'security lighting' and will be independently controlled and operated via interlinked and time clock-controlled circuits so that luminaires are pre illuminated prior to personnel entering the car park during hours of darkness.

6.6 External Lighting Installation

The external lighting installation is part of the overall site wide masterplan lighting design. The lighting will be of a design and manufacture to match the range of external luminaires already established on and around the site consistent with previous development phases.

Street lighting shall be provided to adoptable standards for roadways and pathways. This will extend to residents parking areas and the parking area for future use by the Phase I Provender residents.

External Lighting will be provided at all residential entrances by means of surface mounted LED luminaires. This lighting will be controlled on dusk till dawn photocells (set at 70 lux) and will be provided with a manual override facility.

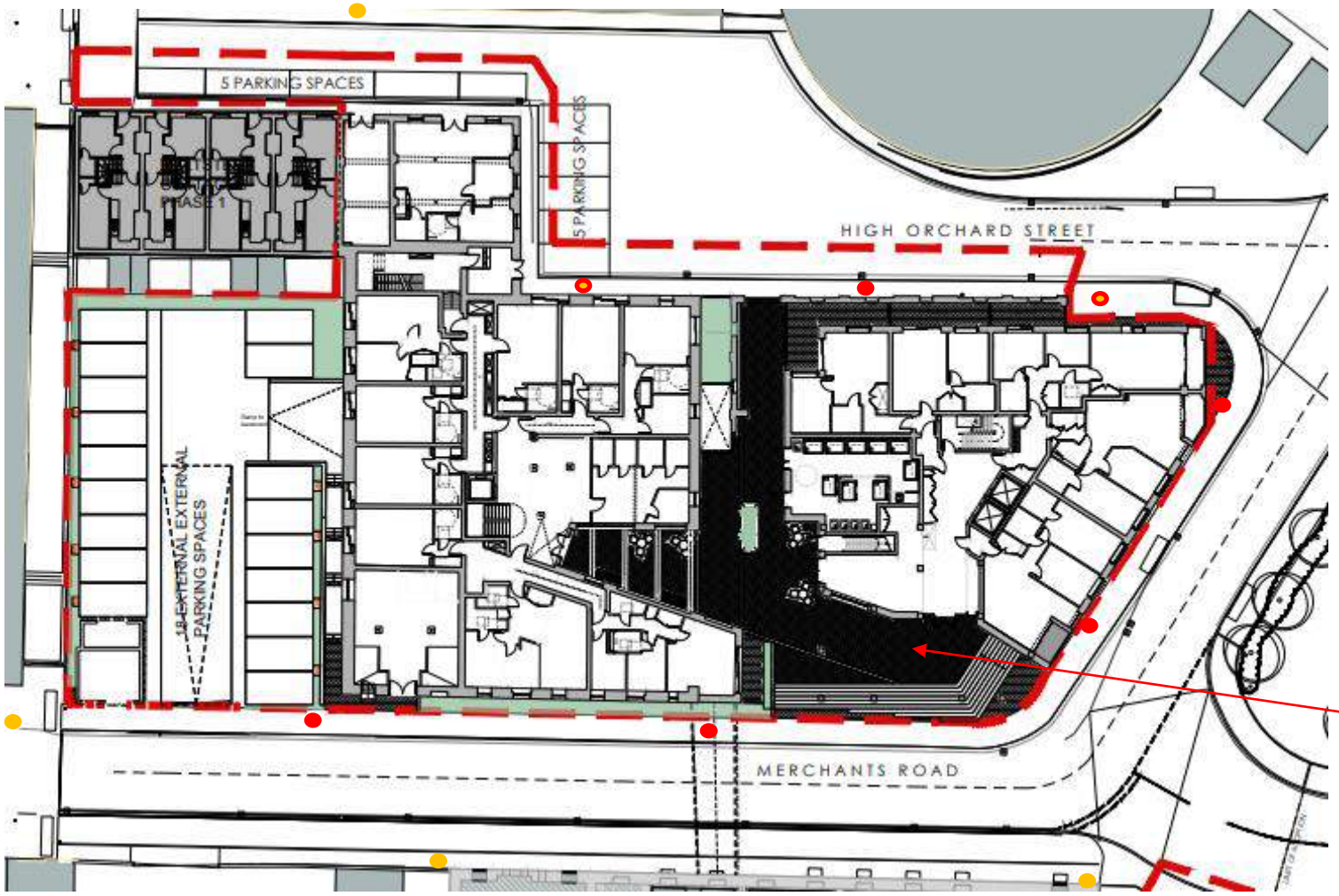
Additional amenity lighting will be provided along the Canal towpath, in communal green spaces and pedestrian areas. This will comprise low level architectural bollard and ground recessed lighting. Lighting control of these elements will be by dusk till dawn photocell with a manual override facility.

Lighting will be provided to balconies and on roof terraces utilising surface wall mounted and recessed floor mounted luminaires (complete with integral PV where available) controlled using conventional local switching.

For public realm courtyard and feature lighting proposals refer to Architects Design and Access Statement report produced in support of the Planning Application

EXAMPLE OF EXISTING STREET LIGHTING TO BE ADOPTED FOR THE DOWNINGS DEVELOPMENT

6.6 External Lighting Installation



Existing Lamppost Retained

Existing Lamppost Relocated

Proposed New Lamppost

Specialist Feature Lighting

PROPOSED EXTERNAL LIGHTING LAYOUT

6.7 Emergency Lighting Installation

Each apartment building will be provided with a comprehensive system of emergency/escape lighting. This will be provided in accordance with BS 5266 parts 1-7 and CIBSE TM12 recommendations utilising BS EN 60598-2-22 and ICEL approved luminaires, conversion kits, batteries and equipment.

The emergency lighting system will comprise luminaires designed to provide 3 hours operation in the event of mains or final-circuit failure. The emergency luminaires will be derived from standard luminaires complete with integral 3 hour battery inverter packs.

Each self-contained emergency lighting circuit will be provided with a secret key type test switch or automatic self-test facility. Where separate key switches are utilised, these will form part of the general lighting switch plate assembly in the area in which the emergency luminaires are connected.

In landlord and common areas emergency lighting will be provided on all designated escape routes and at final exits. Outside final exits external quality IP65 emergency luminaires will be located immediately adjacent to the exit doors.

There will be no emergency lighting provision within the residential apartments.

EDGE LIT LED ILLUMINATED EXIT SIGNAGE

LED EMERGENCY DOWNLIGHT

TYPICAL LED EMERGENCY BULKHEAD

6.8 Small Power Distribution

The small power installation in general will comprise a combination of switched socket outlets for general purpose use together with specific fused connection units and double pole isolators for equipment such as domestic appliances, mechanical services etc. All power outlets will be chrome finish or similar to be selected in accordance with interior design concept.

APARTMENTS

Within the apartments general-purpose twin socket outlets (some strategically located C/W USB outlets) wired in a ring main will be provided within all rooms and arranged to suit the furniture layouts. A dedicated ring main circuit will serve the kitchen with radial circuits supplying the cooking facilities. A separate radial circuit will be provided, not protected by an RCD to supply the fridge/freezer to prevent nuisance tripping. The number of outlets in each room will be in accordance with the Sales Specification to be developed in conjunction with the Client/Architect. Separate supplies will be provided for the ambient loop water to water heat pump, MVHR ventilation system, towel rail heater, heat/smoke detectors, kitchen appliances, shaver points etc.

Each apartment will include the following domestic appliances and primary mechanical equipment/systems:

- Microwave
- Single Oven
- Hob
- Extractor Hood
- Fridge/Freezer
- Dishwasher
- Washer/Dryer
- Direct Electric Intelligent Radiators (studio apartments only)
- Altherma Ambient Loop Heat Pump (Heating and Hot Water)
- 3kW Immersion Heater
- MVHR Ventilation Unit
- Under Floor Heating Manifold/Pump
- Broadband Router
- TV/Satellite Distribution Amplifier
- Fire Alarm ‘Smart Link’ gateway

6.0 – ELECTRICAL SERVICES

TYPICAL INTERNAL ALTHERMA HEAT PUMP
GEO UNIT FOT HEATING & HOT WATER

TYPICAL APARTMENT KITCHEN

Within each apartment the final circuit ‘Consumer’ distribution boards will be located in the electrical utility cupboards complete with all necessary MCBs, RCDs, RCBOs and AFDD devices selected sized to suit risers to serve the landlords lighting and small power services.

TYPICAL UTILITY CUPBOARD WITH ELECTRICAL CONSUMER UNIT

Cabling within the apartments will be LSF/LSF twin & earth type cables, concealed within the building fabric and additionally mechanically protected for all vertical drops and in particular for unprotected Fridge/Freezer circuits. The minimum conductor size will be 1.5mm2 copper solid or stranded conductors.

LANDLORD COMMON AREAS

RESIDENTIAL

In the Residential block's common areas low level single gang 'cleaners' sockets and will be provided at each stair landing, within the adjacent corridors and in the main entrance foyers/lobbies. These socket outlets will be dedicated for cleaners use and served from the landlord's supply. Each socket outlet will be lockable to prevent misuse. Additionally, each main entrance lobby/foyer will be provided with further high-level general-purpose socket outlets for potential TV Monitors/Information Displays, Christmas lights etc. The Co-Working office type facility within the Heritage Block will be fitted out and served by a combination of wall and floor mounted socket and data outlets wired back to a dedicated distribution board and Comms data cabinet. The Residents lounge within the new build Tower will additionally be served with programmable time clock controlled 5Amp circuits for localised feature lighting/table lamps, floor and wall general purpose 13Amp socket outlets to suit internal furniture/seating layouts.

BASEMENT CAR PARK & PLANTROOMS

Power and small power supplies will be installed to serve Electric Vehicle Charging Points, Security shutters/entrance barriers etc., with all lighting and power circuits wired as LSF singles drawn through or laid in galvanised steel conduit and trunking. The minimum conductor size will be 1.5mm2 LSF copper stranded conductors.

GENERAL

Ancillary small power supplies to all areas will be provided to serve CCTV equipment, WiFi Routers/Access Points, Concierge door entry and access control equipment, trace heating, secondary mechanical equipment supplies, TV/Satellite amplification equipment etc.

LV power submain distribution will be provided for the Landlord primary mechanical services plant, ambient loop roof mounted reversible ASHPs, ambient loop pumps, boosted cold water pumps, sprinkle pumps, lifts, access control equipment, CCTV equipment etc. General lighting and small power distribution boards will be located in the electrical riser cupboards/plantrooms to suit the final circuit cable lengths and loadings. All distribution boards will be located in lockable risers, plant rooms or store cupboards.

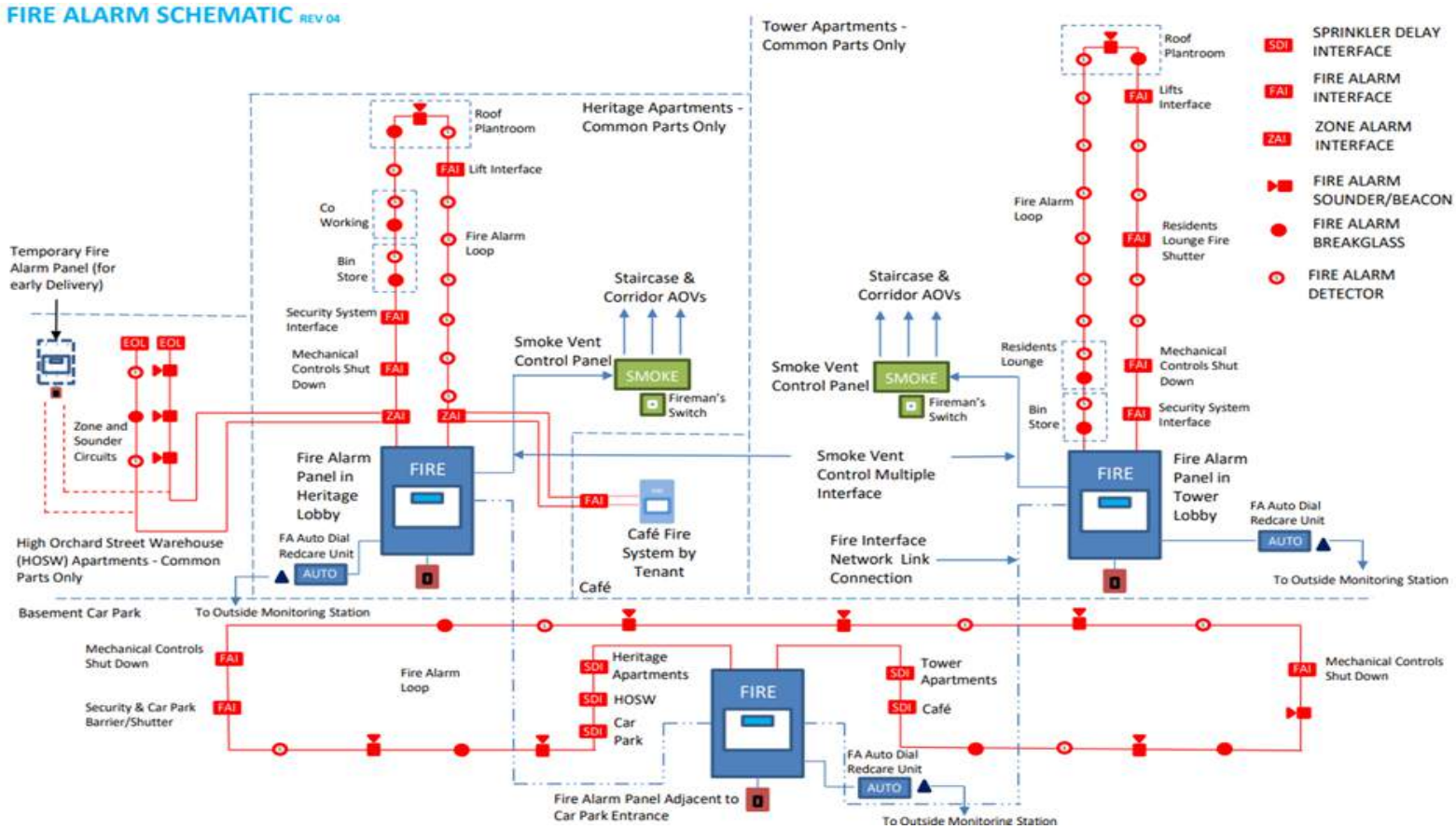
Sub-main distribution cabling will be carried out using XLPE/SWA/LSF c/w copper stranded conductors. These will be routed on cable ladders, heavy duty cable trays or clipped direct to the building fabric to final equipment locations.

Final circuit cabling within the common areas and basement carpark will be LSF singles drawn through or laid in galvanised steel conduit and trunking. The minimum conductor size will be 1.5mm2 LSF copper stranded conductors.

6.9 Fire Alarm System

The development fire strategy will be in accordance with the Concept Fire Strategy Report, Building Control requirements and in compliance with BS 5839: Part 1, BS5839: Part 6 and BS 9999 and BS EN 54.

The confirmed advice received from Building Control/Fire Engineer is that the fire strategy to be employed for the above podium level apartment block occupiers is stay in place until evacuated under controlled conditions by the attending Fire Brigade or other responsible authority. Refer to Fire Engineers Report and Building Control Sign Off. Each residential block together with the basement car park will be treated as standalone entities, fire separated, with each served by its own individual discrete but data linked analogue addressable fire alarm control panels. Refer to indicative fire alarm schematic below.



6.0 – ELECTRICAL SERVICES

Each of the 3No. main fire panels will be connected to an auto dial central monitoring station as well as interfacing with the respective automatic smoke ventilation systems, sprinklers, lifts, security systems, fire curtains and mechanical controls. Also refer to the following 'Cause and Effect' matrices. The central 'Landlord' fire alarm systems will not connect to or interface with the individual apartment domestic fire detection and alarm installations.

TOWER CAUSE & EFFECT MATRIX

Downings (Gloucester Phase II)

FIRE ALARM CAUSE & EFFECT MATRIX REV 01

BUILDING: **TOWER APARTMENTS** [redacted]

FLOOR	AREA/ZONE LOCATION	DEVICE TYPE	CONDITION	FIRE PANEL STATUS	EFFECT/ACTION								
					SOUNDER CIRCUIT AUDIBLE ALARM	AUTO DIAL REMOTE MONITORING	SMOKE VENT PANEL INTERFACE	RESIDENTS LOUNGE FIRE SHUTTER	SECURITY INTERFACE	MECH SHUT DOWN	LIFT INTERFACE	HERITAGE PANEL FIRE SIGNAL	BASEMENT CAR PARK PANEL FIRE SIGNAL
GROUND FLR	BIN STORE	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	NO	NO	NO	NO	NO	NO	NO
GROUND FLR	BIN STORE	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	NO	YES	NO	NO	NO	NO	NO	NO	NO
GROUND FLR	RESIDENTS LOUNGE	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES	YES
GROUND FLR	RESIDENTS LOUNGE	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES	YES
GROUND FLR	ENTRANCE LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES	YES
GROUND FLR	LIFT LOBBIES	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	NO	YES	YES	YES	YES	YES
FIRST FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 1st	NO	YES	YES	YES	YES	YES
SECOND FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 2nd	NO	YES	YES	YES	YES	YES
THIRD FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 3rd	NO	YES	YES	YES	YES	YES
FOURTH FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 4th	NO	YES	YES	YES	YES	YES
FIFTH FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 5th	NO	YES	YES	YES	YES	YES
SIXTH FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 6th	NO	YES	YES	YES	YES	YES
SEVENTH FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 7th	NO	YES	YES	YES	YES	YES
EIGHTH FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 8th	NO	YES	YES	YES	YES	YES
NINTH FLR	ROOF PLANT RM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	YES	YES	YES	YES	YES
NINTH FLR	ROOF PLANT RM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	YES	YES	YES	YES	YES
TENTH FLR	ROOF PLANT RM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	YES	YES	YES	YES	YES
TENTH FLR	ROOF PLANT RM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	YES	YES	YES	YES	YES
N/A	HERITAGE FA PANEL	INTERFACE	INDICATION	TEXT INDICATION	NO	NO	NO	NO	NO	NO	NO	N/A	N/A
N/A	CAR PARK FA PANEL	INTERFACE	INDICATION	TEXT INDICATION	NO	NO	NO	NO	NO	NO	YES	N/A	N/A
N/A	TOWER SPRINKLER DELAY	INTERFACE	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	NO	NO	NO	NO	NO

6.0 – ELECTRICAL SERVICES

HERITAGE CAUSE & EFFECT MATRIX

Downings (Gloucester Phase II)

FIRE ALARM CAUSE & EFFECT MATRIX Rev 01

BUILDING: **HERITAGE APARTMENTS** [redacted]

FLOOR	AREA/ZONE LOCATION	DEVICE TYPE	CONDITION	FIRE PANEL STATUS	EFFECT/ACTION							
					SOUNDER CIRCUIT AUDIBLE ALARM	AUTO DIAL REMOTE MONITORING	SMOKE VENT PANEL INTERFACE	SECURITY INTERFACE	MECH SHUT DOWN	LIFT INTERFACE	TOWER PANEL FIRE SIGNAL	BASEMENT CAR PARK PANEL FIRE SIGNAL
GROUND FLR	BIN STORE	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	NO	NO	NO	NO	NO	NO
GROUND FLR	BIN STORE	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	NO	YES	NO	NO	NO	NO	NO	NO
GROUND FLR	CO-WORKING	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES
GROUND FLR	CO-WORKING	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES
GROUND FLR	CAFÉ	ZONE INTERFACE	FIRE	BUZZER & TEXT INDICATION	NO	TBC	NO	NO	NO	NO	NO	NO
GROUND FLR	MALTINGS UTILITY METER RM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	NO	NO	NO	NO	NO	NO
GROUND FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES
GROUND FLR	ESCAPE CORRIDOR	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - GRD	YES	YES	YES	YES	YES
GROUND FLR	MALTINGS APARTMENTS FIRE ZONE	ZONE INTERFACE	FIRE	BUZZER & TEXT INDICATION	NO	YES	TBC	YES	NO	NO	YES	YES
FIRST FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 1st	YES	YES	YES	YES	YES
FIRST FLR	ESCAPE CORRIDOR	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 1st	YES	YES	YES	YES	YES
SECOND FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 2nd	YES	YES	YES	YES	YES
SECOND FLR	ESCAPE CORRIDOR	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 2nd	YES	YES	YES	YES	YES
THIRD FLR	LIFT LOBBY	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 3rd	YES	YES	YES	YES	YES
THIRD FLR	ESCAPE CORRIDOR	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	NO	YES	YES - 3rd	YES	YES	YES	YES	YES
FOURTH FLR	ROOF PLANT RM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	YES	YES	YES	YES	YES
FOURTH FLR	ROOF PLANT RM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	YES	YES	YES	YES	YES
N/A	TOWER FA PANEL	INTERFACE	INDICATION	TEXT INDICATION	NO	NO	NO	NO	NO	NO	N/A	N/A
N/A	CAR PARK FA PANEL	INTERFACE	INDICATION	TEXT INDICATION	NO	NO	NO	NO	NO	NO	N/A	N/A
N/A	HERITAGE SPRINKLER DELAY	INTERFACE	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	NO	NO	NO	NO
N/A	MALTINGS SPRINKLER DELAY	INTERFACE	FIRE	BUZZER & TEXT INDICATION	YES	YES	NO	NO	NO	NO	NO	NO

BASEMENT CAR PARK CAUSE & EFFECT MATRIX

Downings (Gloucester Phase II)

FIRE ALARM CAUSE & EFFECT MATRIX Rev 01

BUILDING: **BASEMENT CAR PARK** [redacted]

FLOOR	AREA/ZONE LOCATION	DEVICE TYPE	CONDITION	FIRE PANEL STATUS	EFFECT/ACTION							
					SOUNDER CIRCUIT AUDIBLE ALARM	AUTO DIAL REMOTE MONITORING	SMOKE VENT PANEL INTERFACE	SECURITY INTERFACE	MECH SHUT DOWN	LIFT INTERFACE	TOWER PANEL FIRE SIGNAL	HERITAGE PANEL FIRE SIGNAL
BASEMENT	CAR PARKING SPACES	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	CAR PARKING SPACES	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	ELECTRICAL SWITCH ROOM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	ELECTRICAL SWITCH ROOM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	LIFE SAFETY SWITCH ROOM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	LIFE SAFETY SWITCH ROOM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	GENERATOR ROOM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	GENERATOR ROOM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	MECH PLANT RM (HERITAGE)	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	YES	N/A	YES	YES
BASEMENT	MECH PLANT RM (HERITAGE)	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	YES	N/A	YES	YES
BASEMENT	MECH PLANT RM (TOWER)	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	YES	N/A	YES	YES
BASEMENT	MECH PLANT RM (TOWER)	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	YES	N/A	YES	YES
BASEMENT	WATER TANK ROOM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	WATER TANK ROOM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	HERITAGE UTILITY METER RM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	HERITAGE UTILITY METER RM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	CAR PARK EV CHARGER ROOM	BREAKGLASS	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
BASEMENT	CAR PARK EV CHARGER ROOM	SMOKE DETECTOR	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES
N/A	TOWER FA PANEL	INTERFACE	INDICATION	TEXT INDICATION	NO	NO	N/A	N/A	NO	N/A	N/A	N/A
N/A	HERITAGE FA PANEL	INTERFACE	INDICATION	TEXT INDICATION	NO	NO	N/A	N/A	NO	N/A	N/A	N/A
N/A	CAR PARK SPRINKLER DELAY	INTERFACE	FIRE	BUZZER & TEXT INDICATION	YES	YES	N/A	YES	NO	N/A	YES	YES

6.0 – ELECTRICAL SERVICES

In order to be able to deliver the 6No. High Orchard Street Warehouse (HOSW) Apartments 'for sale' earlier then the main development, it is proposed that the common parts of this annex block be initially connected to and protected by a temporary single loop Fire Alarm Panel. Once the main development is completed and commissioned the HOSW apartment system will be integrated onto the main Heritage Block analogue system by means of an appropriate Zone Interface Unit, with the temporary panel then removed. The Café commercial unit will be initially provided as a shell for fitting out by others and hence be provided with a Fire Alarm Interface and temporary automatic smoke detection within the space until such time as fitted out and trading.

The fire systems for the 'Residential' common parts in each block will be designed and installed to category 'L5' protection standards with minor exceptions such as roof top plant rooms, bin stores and within common resident's lounge and co-working areas, where in addition to dual optical smoke detectors supplemental breakglass units, sounders and visual alarm and warning devices will be installed, all in accordance with Fire Officer approval. For the basement car park and all associated plant rooms below podium level, the design and installation will be to L1 standard including breakglass units, dual optical detectors, linear heat detection cables, audible sounders and visual warning devices.

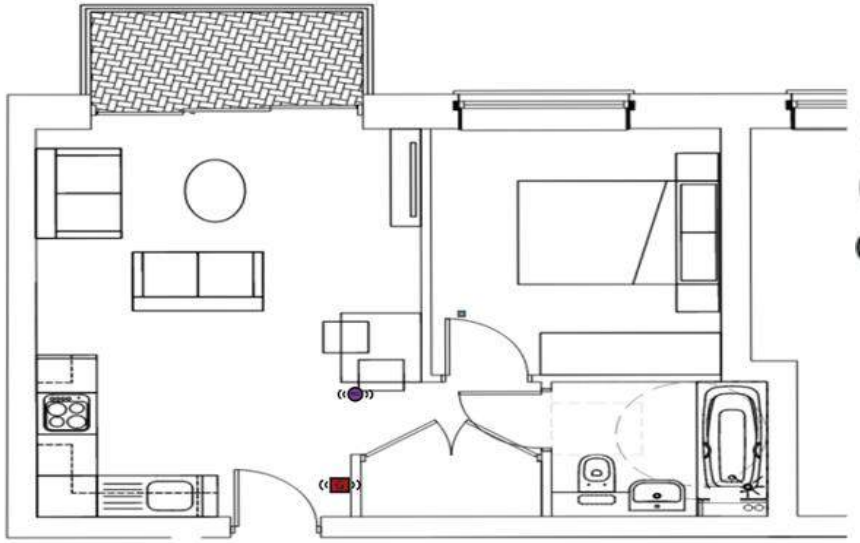
In the Residential common areas automatic smoke ventilation will be provided in accordance with the Fire Engineer's Concept Fire Strategy Report and as indicated on the Architect's Fire Strategy drawings. Each smoke vent system will interface with the respective fire detection system programmable on a floor by floor basis and will be complete with motorised actuators, automatic vents, control panels, automatic smoke detection, manual override facility and secondary 'Life Safety' supplies as required by the system specialist.

The basement car park will be sprinkler protected and naturally ventilated. Individual Residential apartments will sprinkler protected to domestic standards. Common residential areas will not be sprinkler protected.

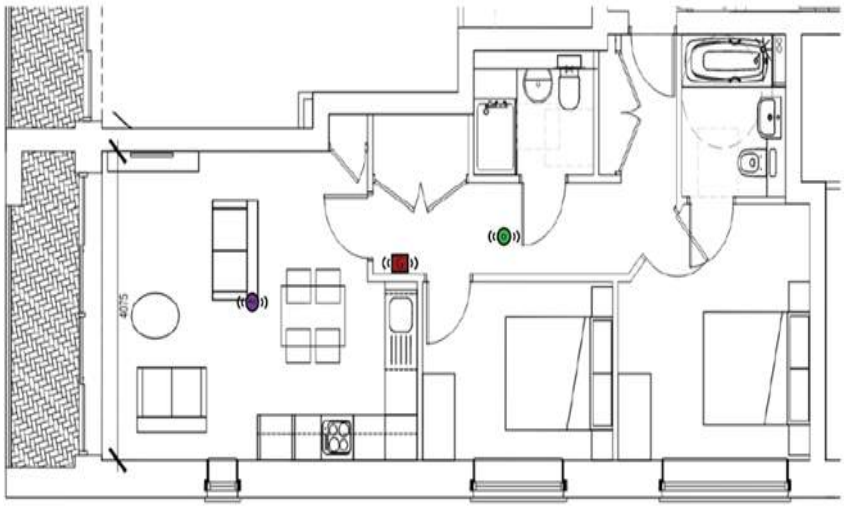
The fire alarm and smoke detection within the Residential apartments will be designed in accordance with BS5839 Part 6 to category Grade D LD1 (residential). For an LD1 (Single Floor) Standard fire alarm and detection system, each apartment will be provided with a single sounder/smoke detector in the living room, heat detector in the kitchen area with supplementary linked sounder/detectors provided in all habitable rooms and utility cupboards containing plant and equipment. A separate sounder will be provided on the balcony if it cannot be demonstrated that the audible noise levels on the balcony comply with BS5839 requirements. Additionally, each individual apartment system will be provided with a wireless 'Smart Link' gateway device in order that a fire condition can be communicated automatically via 'Text Message' through a 4G GPS Portal App network to a designated outside location, similar to that currently in place and operational on the completed Phase I Provender development.
In all areas the fire alarm system will be wired in an approved CWZ soft skin fire resistant cable.

6.0 – ELECTRICAL SERVICES

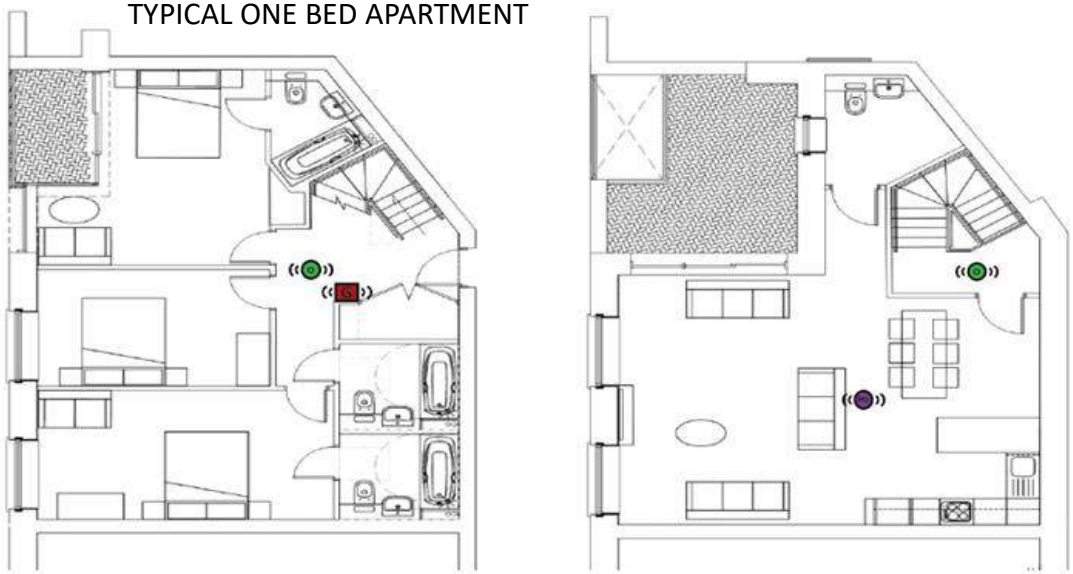
TYPICAL STUDIO APARTMENT



TYPICAL ONE BED APARTMENT



TYPICAL 2 BED APARTMENT



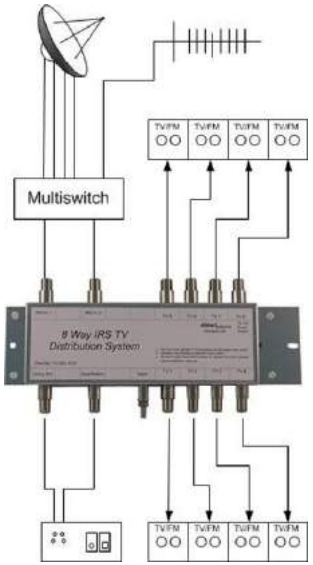
TYPICAL DUPLEX APARTMENT

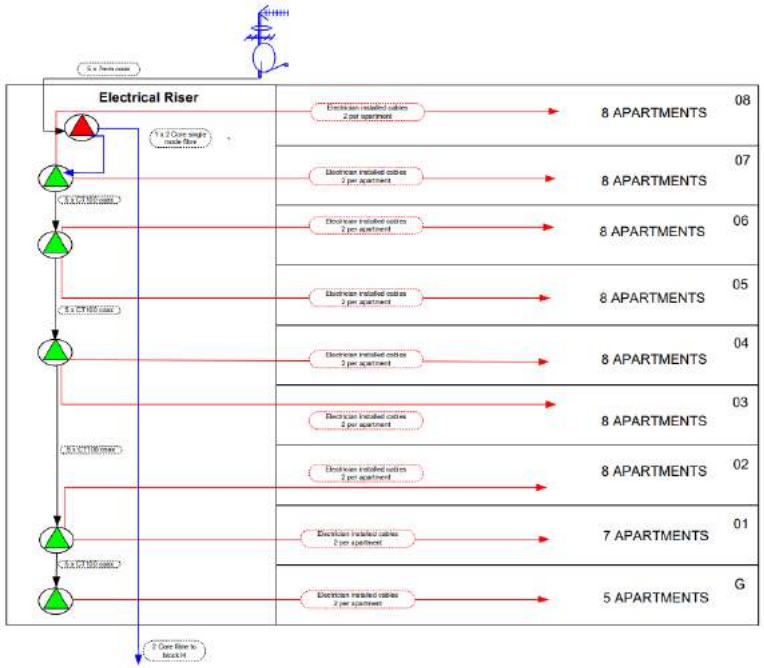
7.10 Satellite/TV/DAB Integrated Reception System (IRS)

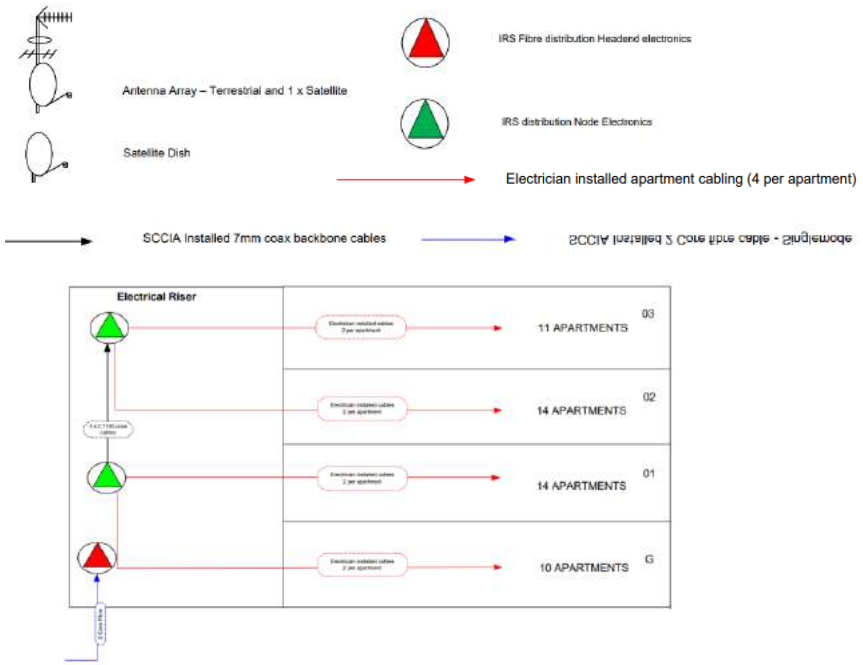
A complete TV/FM/DAB and Sky Q Integrated Reception System (IRS) installation will be installed, complying with the requirements of Building Regulations Part R (Latest Edition) and CAI standards. The installation shall be fully wired and allow for future upgrade to Sky Q by the occupier if required by the purchase of a set top box.

Location of main TV Points: Living Room, supporting TV, FM, DAB, Freeview, Freesat, Sky+/Q – Bedrooms, supporting TV, FM, DAB, Freeview.

In summary the installation will comprise roof mounted DAB, UHF TV & FM Aerials & Astra 28.2 (Sky) Satellite Dishes, distribution equipment, backbone infrastructure cabling and final combined outlet plates within the dwelling. Multi switches, amplifiers, and splitters will be strategically located in the main LV riser with a local adaptable box within the utility cupboard of each apartment containing TV splitters and Quad Euro module.







It will be the responsibility of the specialist installer to locate all roof mounted equipment within the confines of the roof top plant enclosures with final positioning subject to both signal strength survey (to be undertaken by the specialist) and in accordance with any planning restrictions imposed.

6.11 Earthing

A fully fault rated and comprehensive earthing installation sized/appropriate for the various incoming supply capacities and installed systems will be designed and installed in compliance with the IET Wiring Regulations, British Standards and local DNO (PME) regulations as applicable.

From the main earthing terminal for the building provided by the DNO, electrically separate Neutral and Earthing conductors will be maintained throughout the installations. The earthing system configuration from this point will be designated TNC-S.

7.12 Security, CCTV and Access Control (inc Bringme Virtual Concierge

VIRTUAL CONCIERGE (Bringme)

Each apartment block entrance and respective apartments will be provided with an integrated virtual digital Concierge service comprising:

- Video/Voice entry phone system
- Card/Fob readers
- Apartment video/voice answer phone units
- Apartment smart phone and tablet answer phone App.
- Residential lobby 'Bringme' smart delivery parcel box unit

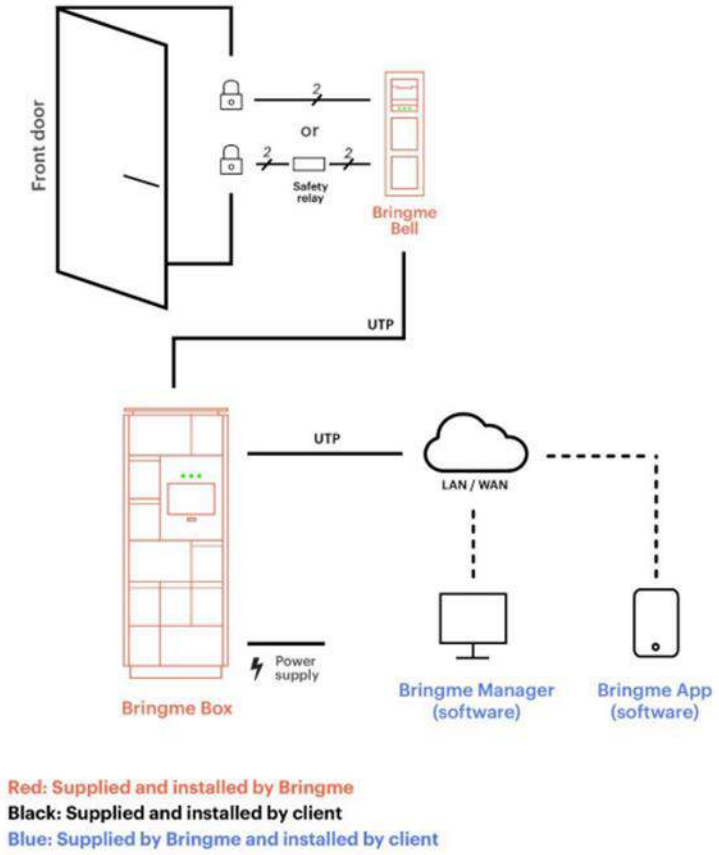
VIDEO ENTRY SYSTEM

A wall mounted 'BringMe' external control panel housing an alphanumeric keypad, microphone/speaker unit and a colour camera unit will be positioned at the main entrance of each residential block.

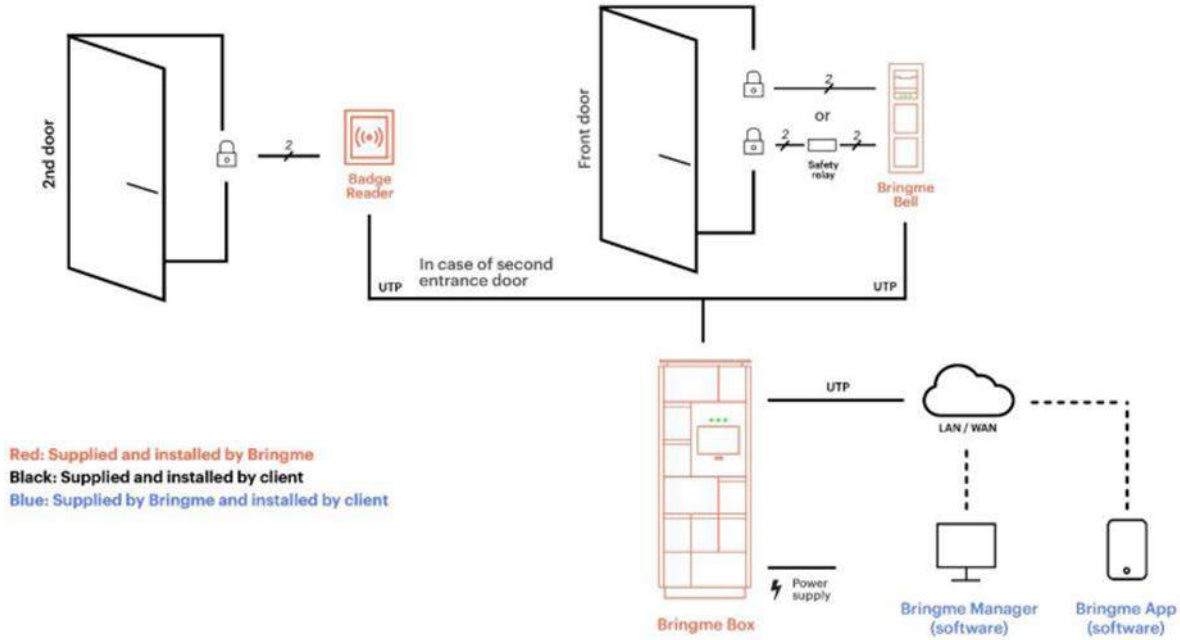
All controlled access entrance and lobby doors will be fitted with heavy-duty magnetic door keep/mag lock with a conventional key override. Access to the building by residents will be by proximity fob with key override provided for management use. Proximity fob readers will also be provided to secondary residential access inner lobbies/cores, refuse stores, cycle stores and basement car park. Access to plantrooms and apartment front doors will be via conventional multiple key lock.

Within each apartment an answer phone unit incorporating a wall mounted video monitor will enable the occupiers to see as well as communicate with visitors or delivery couriers etc., before granting entry either just to the outer lobby and 'Bringme' delivery boxes or through both inner and outer lobbies to core areas. All these entry control features and functionality can and will be available to apartment residents/occupiers through the use of their respective smartphones and tablets utilising the 'Bringme' App.

6.0 – ELECTRICAL SERVICES



TYPICAL SINGLE ENTRANCE DOOR ARRANGEMENT



TYPICAL INNER & OUTER LOBBY DOOR ARRANGEMENT

SMART DELIVERY PARCEL BOX UNIT

A smart managed ‘Bringme’ parcel delivery unit will be provided within the outer entrance lobby areas of each residential block.

Each compartment will be equipped with sensors which register that the compartment door has been opened, parcel/food box inserted, and door closed. Receiving parcels, post or food delivery, the smart system will automatically choose the right appropriately size compartment by means of the ‘Bringme Box’ scanner/control panel and App. This smart system App acts and organises everything as a virtual concierge. As with the door entry system, all above can be monitored and controlled by apartment occupiers through the ‘Bringme’ App via their smart phone or tablet
The ’Bringme’ manager software and control system will allow easy and safe means to add or remove users, manage exceptions and communicate with residents, while also respecting the rules required by GDPR. The system shall be ISO 27001 IT-Security certified and ISO 27701 GDPR compliant.

SECURITY CCTV

A dedicated Landlord CCTV security network (to be further developed) will be installed in accordance with, BSEN 50131-1, BSEN 50132-7, BSEN 8148, Data Protection Act 1998 and all other relevant guidelines as necessary for the sitewide CCTV system.
Security cameras will be installed at all points of entry to the individual blocks, covering the perimeter of the blocks themselves, podium central courtyard, external car park and strategically within the basement car park areas.

CAR PARK BARRIER / SHUTTER

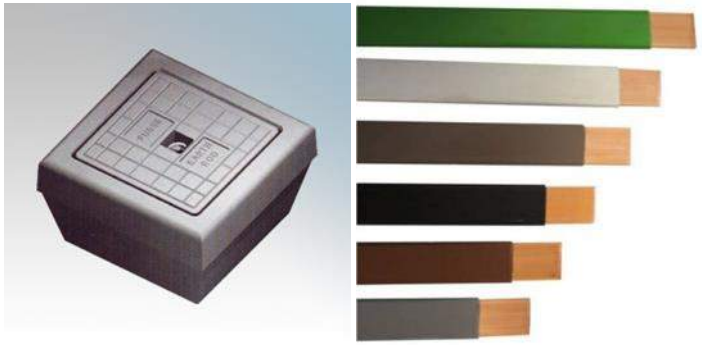
A car park shutter /barrier will be provided to the main basement car park ramp entrance (Refer to Architectural Design and Access Statement (DAS) for more details). It is envisaged that control and operation of the barrier/shutter will be linked to the 'Bringme' access control system, so that on either presentation of the Resident's proximity fob or by pressing the video intercom button the barrier or shutter will raise. Automatic free exit from the basement carpark will be by vehicle sensors buried in the basement floor slab. The entry system will be dual fed (generator supported) and linked to the Landlords fire alarm system so as to automatically release and raise under emergency conditions.

7.13 Lightning Protection

The building will be provided with a comprehensive lightning protection system in accordance with BS EN/IEC 62305 where identified as necessary.

The system will generally comprise a roof mounted air termination tape network connected to structural steelwork and/or reinforcement if suitable to be utilised as the main down conductors or by means of independent down conductors concealed behind cladding/external finishes, all subject to detailed design.

All extraneous metal work at roof level and within the structure will be bonded to the lightning protection system. This will include but not be limited to; TV/Satellite dishes, Photovoltaic panel arrays, roof mounted plant, high level metalwork, metal balconies and balustrades, lift guide rails, any window cleaning cradle rails, man safe systems and generator exhaust flues.

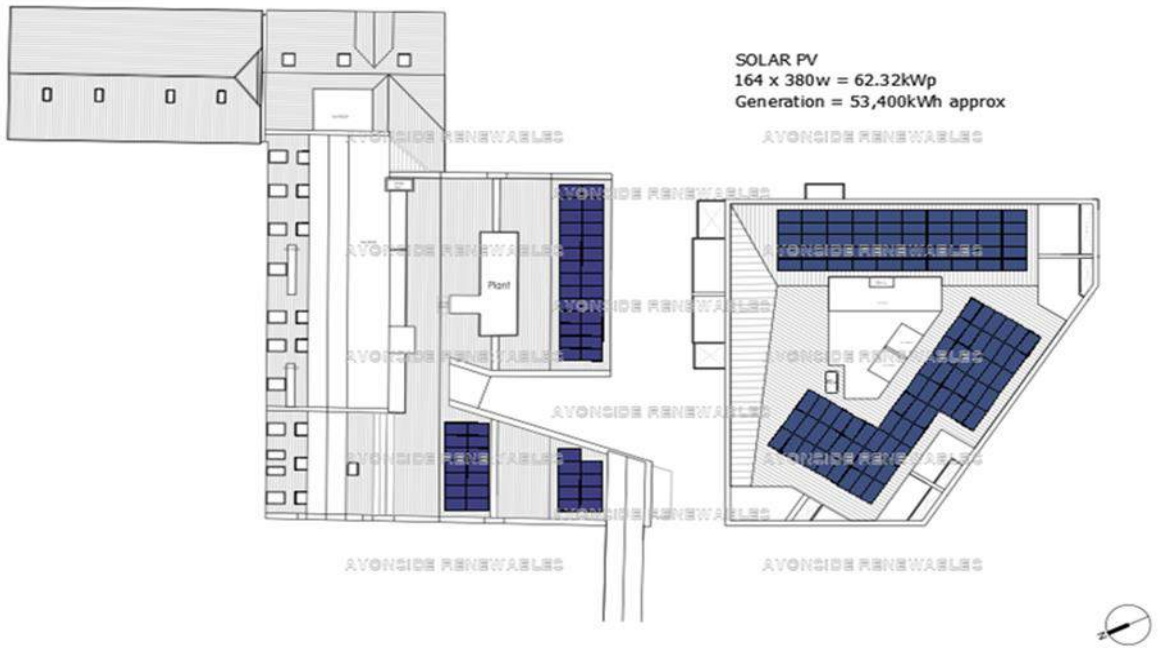


Typical Lightning Protection Pit & Tape

6.14 Photovoltaic (PV) Installation.

A Landlord's integrated Photovoltaic (PV) roof top array installation will be installed by a registered, approved and accredited Photovoltaic (PV) Specialist Contractor who will be responsible for the detailed system design, supply, delivery, installation, connection and on-site testing and commissioning.
The interconnected PV System will comprise roof mounted monocrystalline photovoltaic panels, AC and DC switch-disconnectors, system inverter(s), smart energy generation kWh meters and interconnecting cabling generating electrical power which will feed into the developments overall Landlords electrical infrastructure, either to be utilised and consumed by the site load itself or under low load conditions export outside the site onto the wider WPD LV/HV network. In this respect the Specialist will liaise with the local Distribution Network Operator (DNO), in this case WPD, to negotiate the acceptance and connection of the grid connected PV System including, but not necessarily restricted thereto, submission of the system and metering proposals. Preliminary advice received from WPD has confirmed an imposed export limit of 200kW onto their wider infrastructure. The Landlord's LV system will be provided by kWh Import/Export smart meters (OFGEM Approved suitable for the chosen energy tariff scheme) and to the DNOs specific requirements.

From preliminary design assessments undertaken by Avonside Renewables, the PV arrays as indicated below will provide approximately 62kW peak generation with an estimated yield of 53,400kWHrs per annum.



6.0 – ELECTRICAL SERVICES

The entire system will be split into appropriate strings to suit the recommended inverter parameters and to minimise losses due to partial shading. The strings will be integrated into a suitable number of inverters to feed into the developments Landlord's three-phase supply via the main Landlord LV Switchboard in the basement. Each PV string will be connected to a DC switch-disconnector. Also, each inverter will be supplied with suitably designed DC and AC circuit breakers on either side (DC&AC).

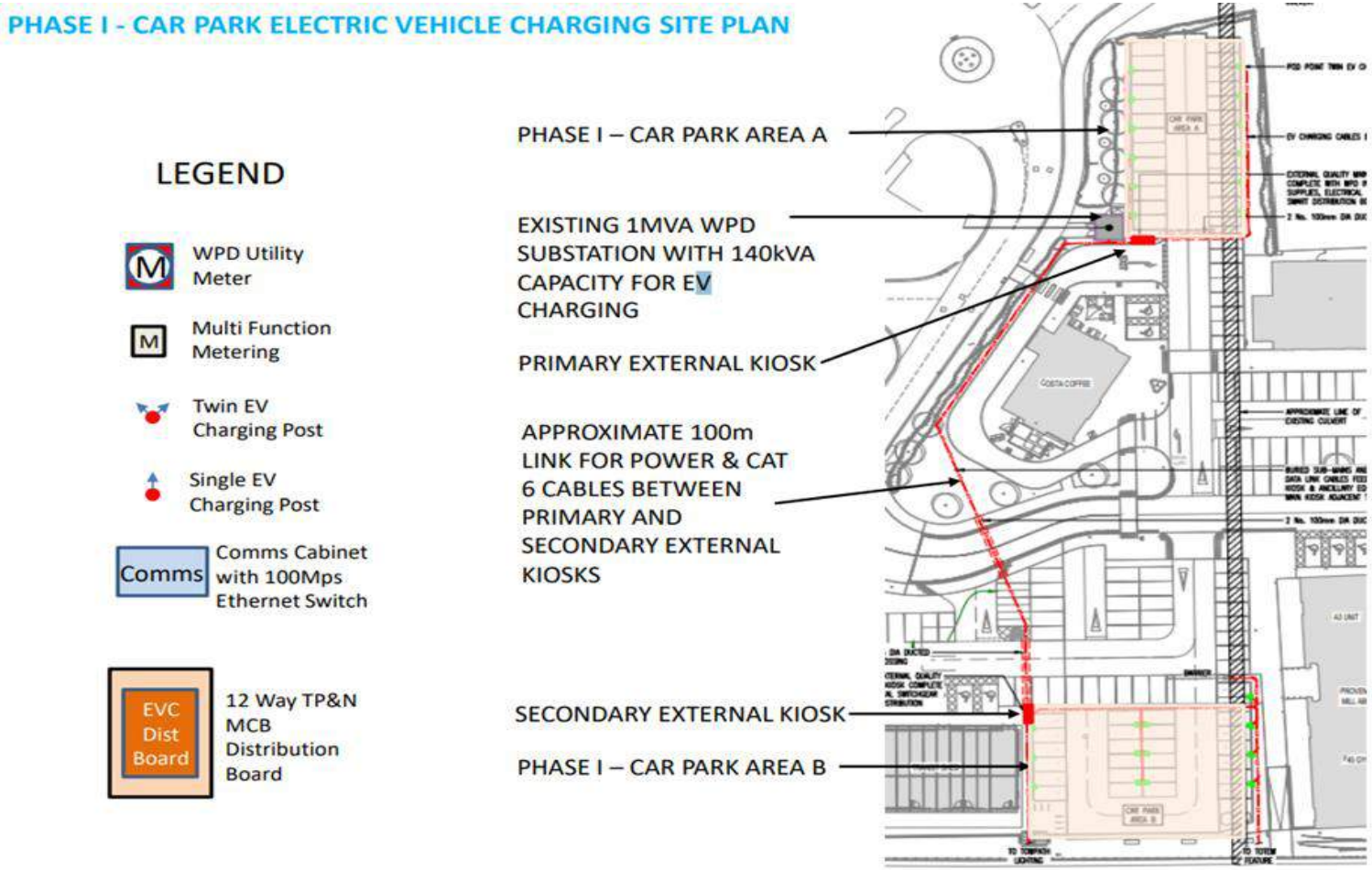
The PV system will be further protected by means of an appropriate protective relay system. This protective relay package will trip the AC supply to the inverters if the AC output from the PV system or the local Landlord's electrical network itself strays outside of the voltage or frequency limits set by the DNO. The relay(s) will also disconnect the PV system in the event of phase failure or a grid failure, removing any danger of the buildings network remaining live despite the loss of the main distribution network.

PV panels will be located on the roof to maintain adequate maintenance routes and without obstructing roof penetrations, flues and other mechanical and/or electrical Services indicated on the Architect's Planning drawings. PV array installations will be installed on the roof, compatible with roof finishes utilising propriety fixings and mounting frames all to the approval of the Architect and Structural Engineer and to satisfy health and safety requirements. The specialist contractor will be required to submit all information in respect to the system weights including point loads for review by the structural engineer at an early stage in the design process.
The PV System shall be designed in accordance with the current relevant British Standards.

6.15 Electric Vehicle Charging (EVC).

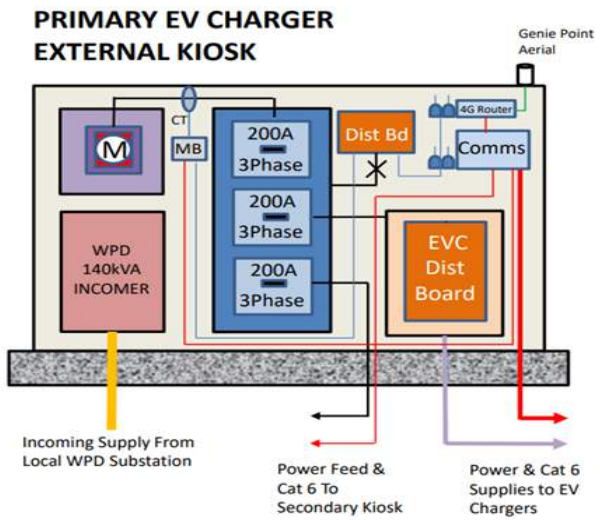
Managed Electric Vehicle Charge (EVC) points will be provided for both Gloucester Phases I and II Provender and Downings respectively as part of one single Planning Application. Phase I comprises two distinct and separated external car parking areas numbering 52 spaces in total and Phase II a mixture of both external surface and internal basement areas numbering 68 in total.

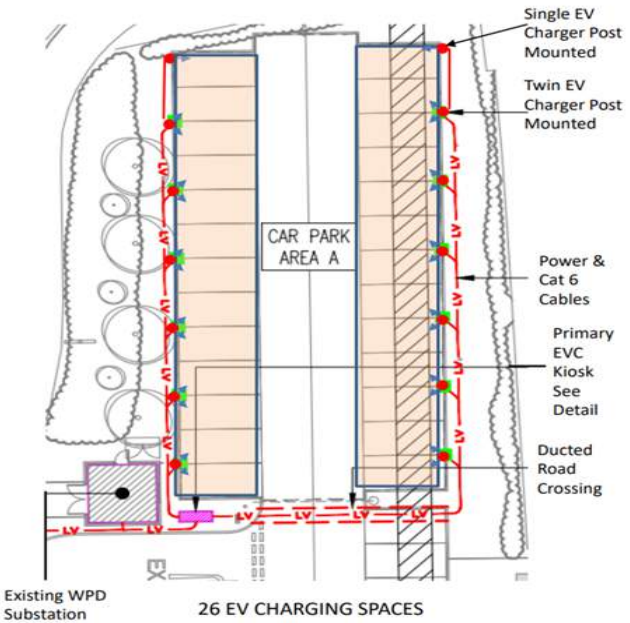
PHASE I PROVENDER CAR PARKING



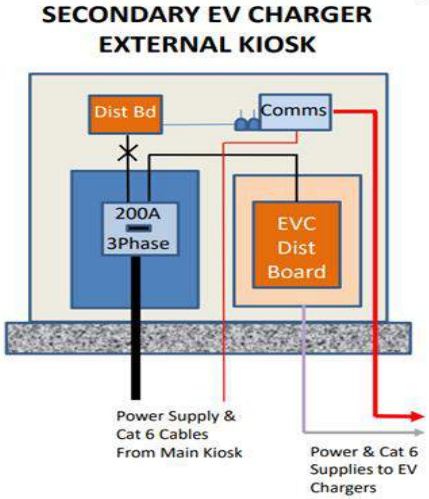
6.0 – ELECTRICAL SERVICES

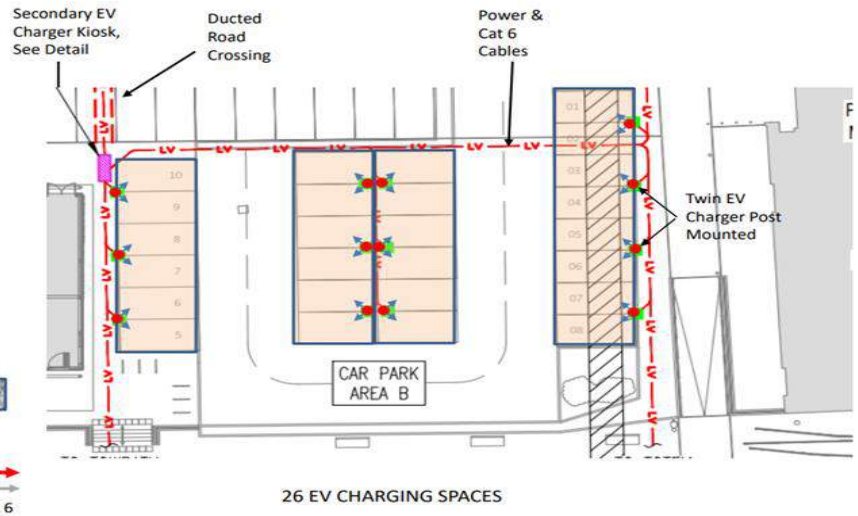
CAR PARK AREA A ELECTRIC VEHICLE CHARGING LAYOUT

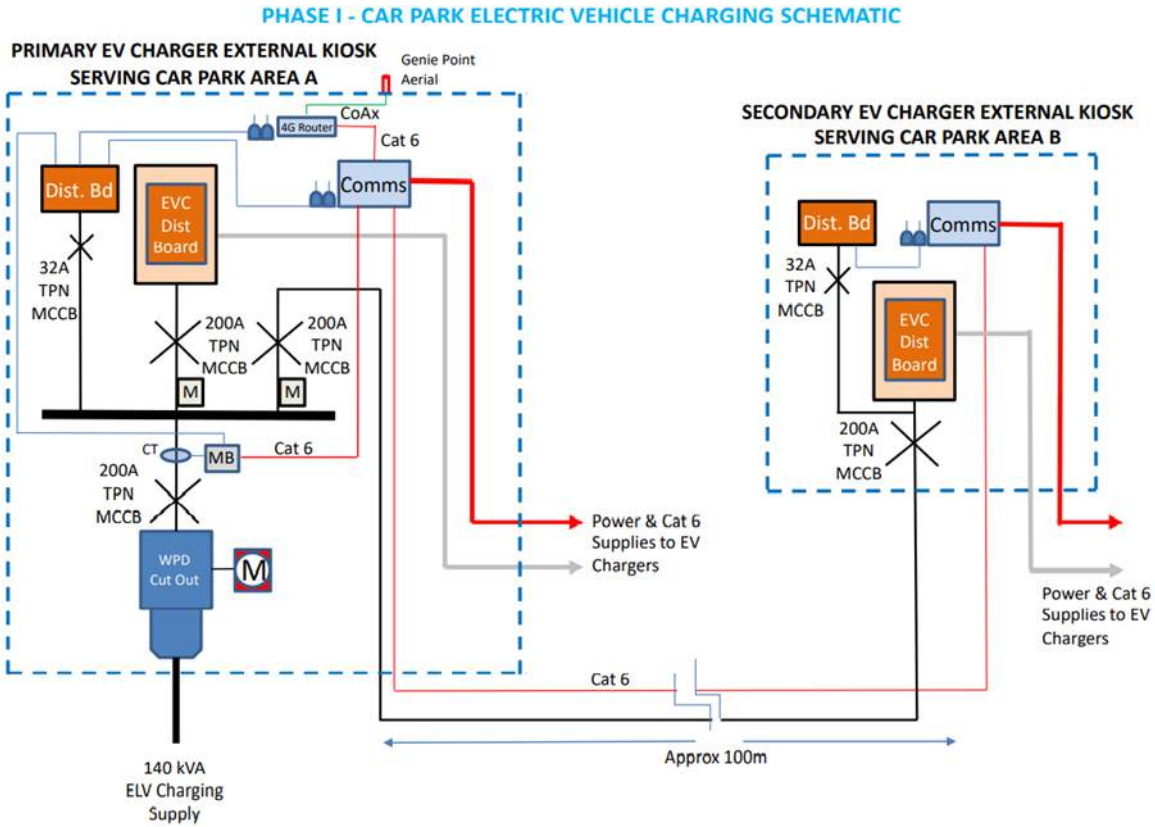




CAR PARK AREA B ELECTRIC VEHICLE CHARGING LAYOUT



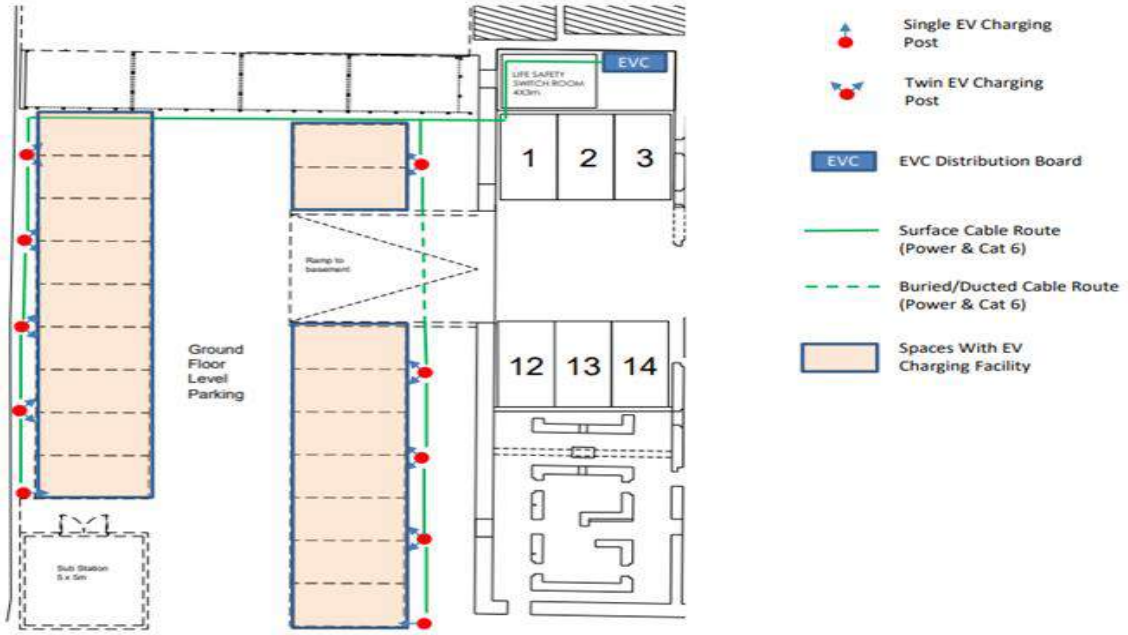




PHASE I PROVENDER CAR PARKING

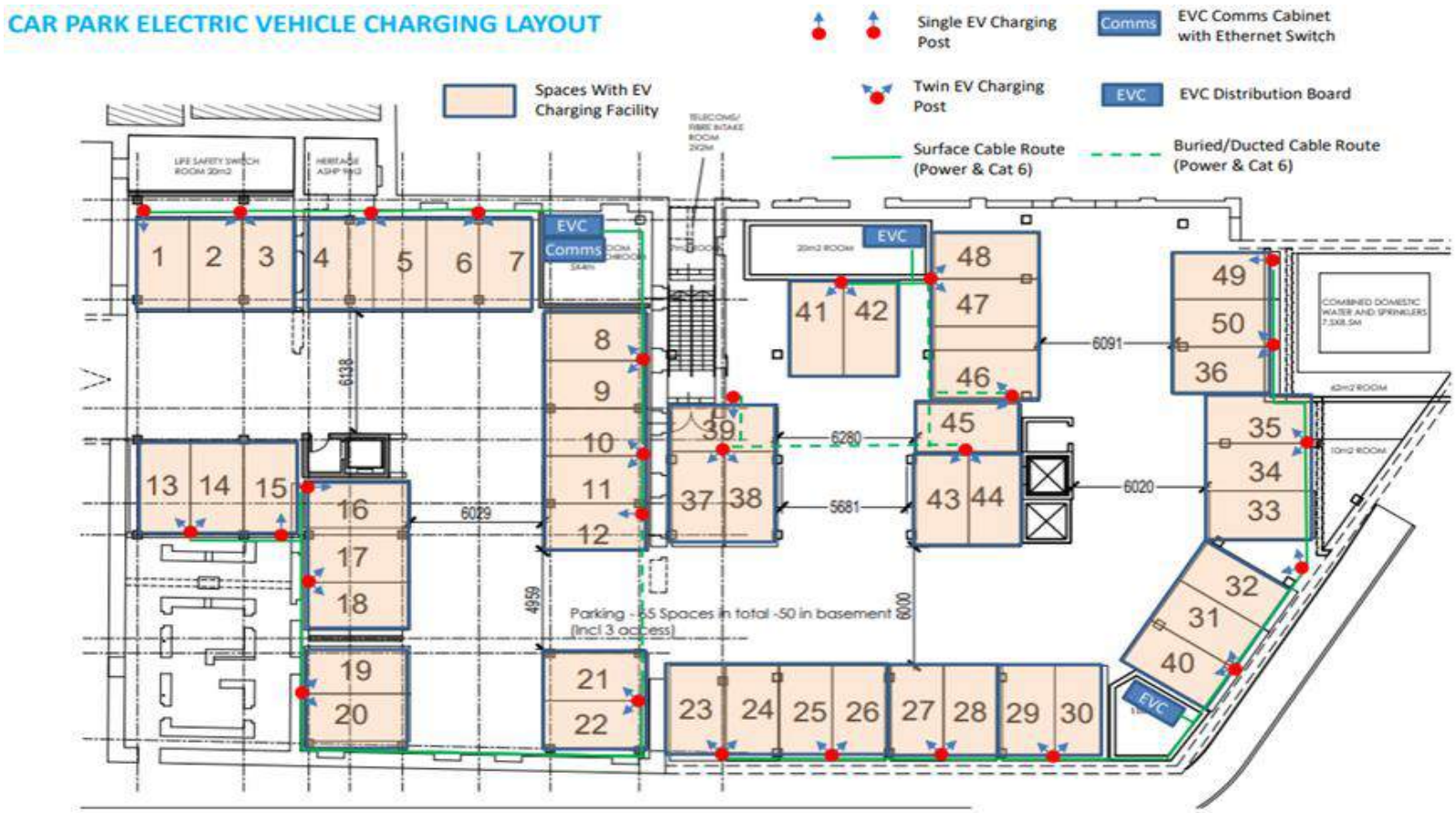
PHASE II DOWNINGS CAR PARK

CAR PARK ELECTRIC VEHICLE CHARGING LAYOUT



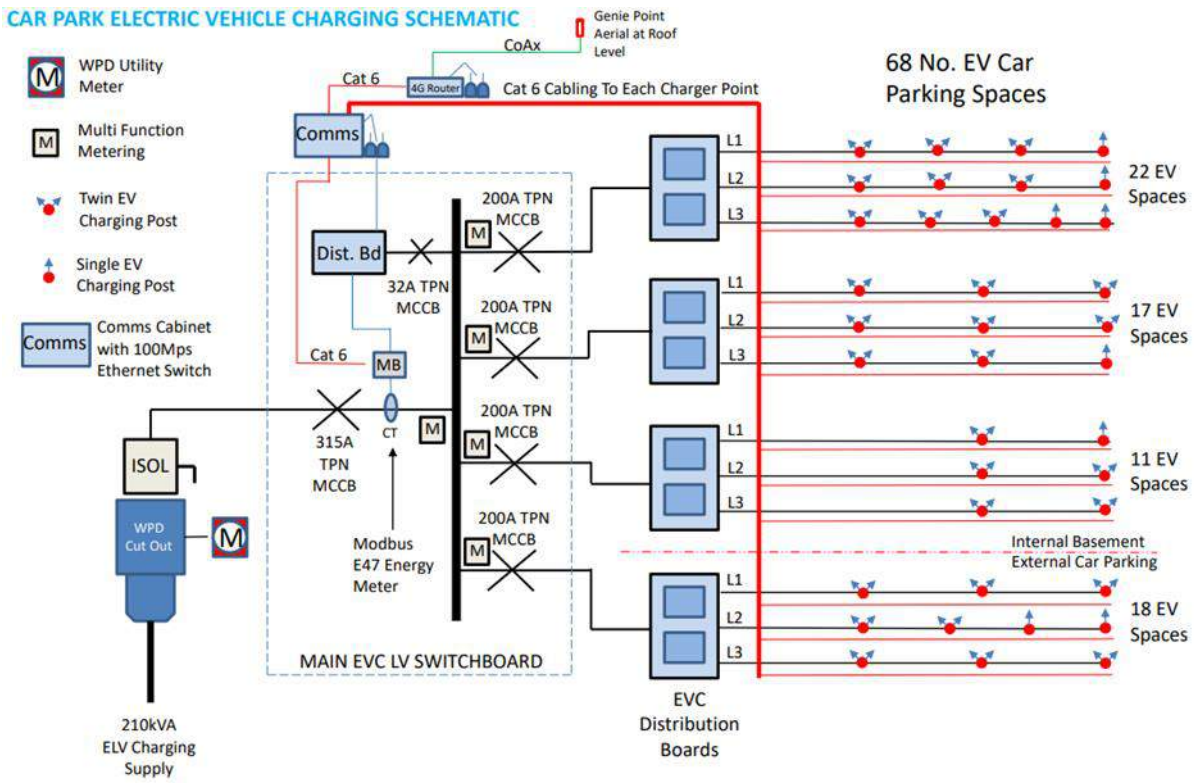
EXTERNAL CAR PARKING SPACES

PHASE II DOWNINGS CAR PARK



INTERNAL BASEMENT CAR PARKING SPACES

6.0 – ELECTRICAL SERVICES



The managed electric vehicle charging system will be designed to comply with international standards for conductive charging systems for electric vehicles is the IEC-61851-1. All charging equipment will be installed according to the IEC-61851-1 standard and IET Wiring Regulations 18th Edition inc Amendment 2, March 2022.

Each of the managed EVC systems indicated and described above will allow each of the charging ports/sockets to deliver 7.4kW output provided the overall incoming declared supply capacities are not exceeded.

6.0 – ELECTRICAL SERVICES

TYPICAL SINGLE EVC POINT

TYPICAL TWIN EVC POINT

TYPICAL NETWORKED CAT 6 SMART CHARGING

General information on charging station

① The charge point ID: Identification is determined by the reseller or maintainer of the central management system. You can, for example, use this ID to convey to a helpdesk for which charging point you need support.
② Date and time: these are set through a maintenance system (automatically) or during installation, using the Service Installer Application. If the product does not have a current time, this field is invisible.

Status and information screen

The charging station informs the user of its current status and provides the user with a response to the actions performed. The following information is available:

③ Status information.
④ Status indicator (symbols)
⑤ Current charging capacity to the connected vehicle.
⑥ Maximum charging capacity of the outlet.
⑦ Energy picked up during the current transaction.
⑧ Duration of the current transaction.

Instruction field

⑨ Usage instructions will be displayed in this location. Where an error occurs, an error code and instruction will be shown (see Appendix A for more information).
⑩ Progress bar displays the progress of the authorization process in which (the) user is involved. A full progress bar indicates the necessary steps are completed and charging will start.

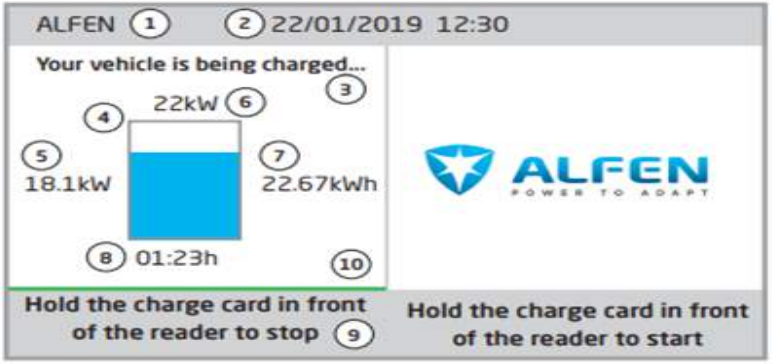


Figure 1a: Display of Eve Double Pro-line during charging with one socket

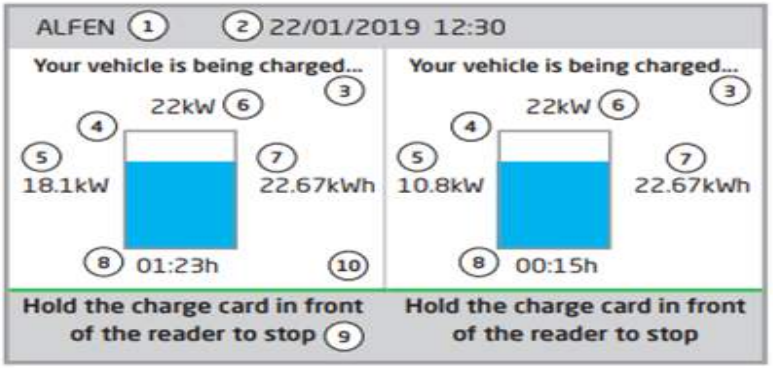


Figure 1b: Display of Eve Double Pro-line during charging with two sockets

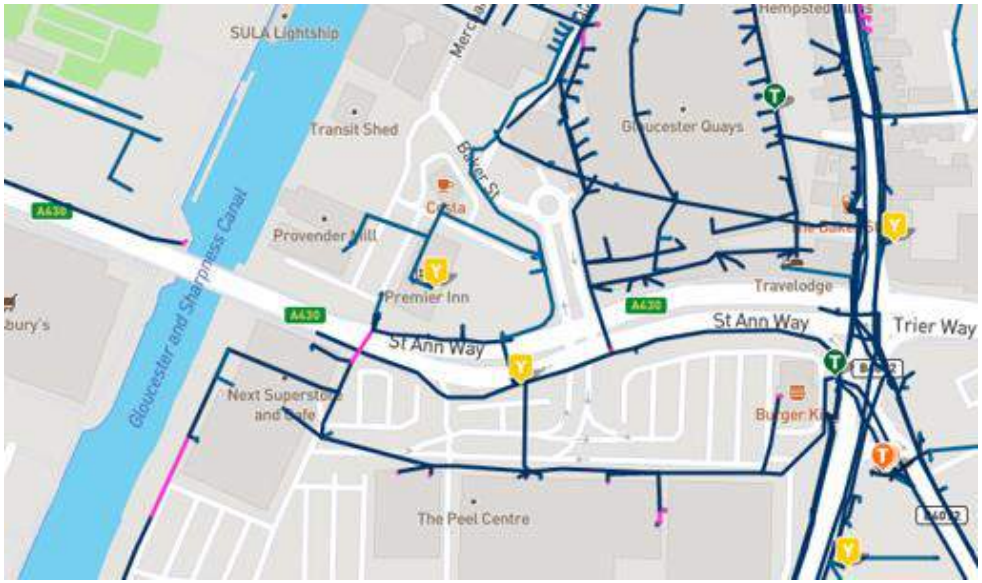
6.16 BT and Backbone Fibre Connected ISP Distribution

It is proposed that a full fibre backbone connected infrastructure will be provided to both Residential Apartment Blocks as well as Landlord managed WiFi connectivity to the communal areas including future Café, Residents Lounge and Co-working spaces, as well as provision for BMS systems and to support the Bringme virtual Concierge, EVC Charging, Security and Fire systems.

The Solution – end to end delivery & support

This fibre backbone connected infrastructure will be installed and configured by a Specialist company taking full responsibility of the WIFI performance utilising CISCO Meraki WIFI hardware for reliability and to provide at least a circa 6-year lifespan. BT Openreach is proposed as the primary fibre carrier in the area.

New BT incoming ducts will be provided from the external network to the dedicated Telecoms/Data intake position and then from there to the apartments and Landlord areas via the main services risers on a separate dedicated containment system.



The blue lines represent the fibre pipe leading to the various buildings. A line runs through to Provender Mill which will likely be an adequate route to use. Potential dig works to bring the fibre into the building will be confirm during a site visit.

6.0 – ELECTRICAL SERVICES

BASEMENT LAYOUT

- The Backbone Landlord Central Cabinet that houses all the equipment will be located within this secure location, a potential comms room in the basement (we will confirm the exact location during the site survey)
- The central building riser will be the location in which the fibre backbone cabling will be mounted.
- Internet will be fed up through the central riser, with the inbound fibre network from the fibre carrier terminated in the basement.

6.0 – ELECTRICAL SERVICES

GROUND FLOOR LAYOUT

- The WIFI access points will be installed at ceiling height and cabled back to the central Backbone cabinet within the basement comms room.
- The connectivity will offer network access to building staff and residents, providing a full connection access in all common areas.
- The WIFI access points will provision for the BMS system offering smart building enablement.

SECTION SEVEN: LIFT SERVICES

7.0 Lift Services

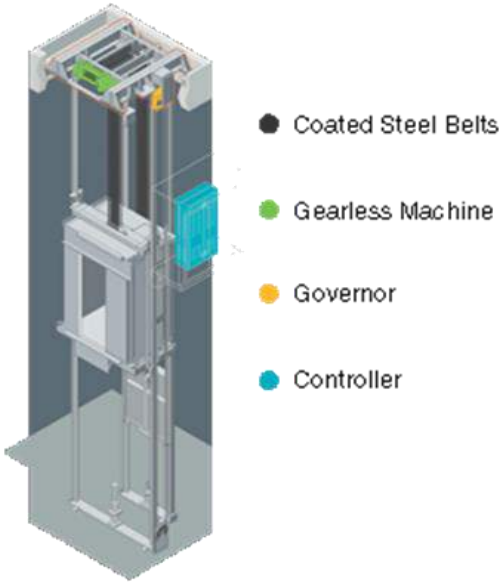
The following apartment blocks will be provided with lifts as follows:

BUILDING	NEW BUILD TOWER		HERITAGE
LIFT REF	N1	N2	H1
Shaft Size	2000mmm (w) x 1900mm (d)	2000mmm (w) x 1900mm (d)	2000mmm (w) x1900mm (d)
Pit Depth	1400mm	1400mm	1400mm
Overrun (From FFL last landing Served	3800mm	3800mm	3800mm
Capacity	10 – Person 800Kg	10 Person 800Kg	10 Person 800Kg
Serving	B-8 (10)	G – 8 (9)	G 3 (4)
Speed m/s	1.6	1.6	1.0
Door Opening	900mm Centre / Opening 2200mm High Doors	900mm Centre / Opening 2200mm High Doors	900mm Centre / Opening 2200mm High Doors
Additional Requirements	Fire Fighting / Evacuation inc. Ramped Access plus sump pit in shaft		

7.0 – LIFT SERVICES

Each lift will be suitable for disabled use in accordance with BS EN 81 Pt 70.

The lifts will be machine room less and complete with front and rear centre opening doors with a minimum 800 x 2100mm clear opening. Internal car sizes will be 1100mm wide x 2000mm deep. Heights will be 2200mm with a half-height mirror to the side wall and a hand rail to both sides.
All car and landing finishes will be agreed with the client and will be from the manufacturer's standard range of finishes.



It is outlined within the fire strategy that one of the lifts within the new build Tower shall be each be designated and used for firefighting/evacuation purposes and will comply with the relevant British Standard requirements.

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