1.5.3 BUILDING LOGBOOK

Project Number – Redcliffe PBSA

Client - Grainger

Building Logbook | November 2024

winvic

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1. Updates and Annual Reviews

The log book should be reviewed annually as part of the organisation's quality assurance system and an entry should be made for each review. Where the log book has been updated then the changed pages should be recorded.

Review date	Description of annual logbook review and updates made	Pages updated or added	Facilities manager's Signature	Date
21/05/24	Document distributed for completion			
07/2024	Document review			
08/2024	Final review			
29/11/2024	Document Handover			

1. Purpose and Responsibilities

Purpose of a building log book

This log book is an easily accessible focal point of current information for all those working in the building. It has four main functions:

- **Summary of the building:** it is a summary of all the key information about the building, including the original design, commissioning and handover details, and information on its management and performance. In being a summary, it does not wholly duplicate or replace the O&M manuals. The log book is necessary for compliance with Building Regulations Part L2.
- **Key reference point:** it is the single document in which key building energy information is logged. It may be regarded as the hub document linking many other relevant documents. The log book should provide key references to the detail held in less accessible O&M manuals, BMS manuals and commissioning records. It should therefore be kept in a readily accessible (designated) position in the main building operations room and should not be removed without the approval of the facilities manager.
- **Source of information/training:** it provides a key source of information for anyone involved in the daily management or operation of the building and to anyone carrying out work on the building and its services. It is relevant to new staff and external contractors/consultants and may play a role in staff training and induction.
- **Dynamic document:** it is a place to log changes to the building and its operation. It is also used to log building energy performance and continual fine-tuning commissioning. It is essential that it is kept up-to-date. Alterations should only be made with the approval of the facilities manager and should be signed and dated by that person.

Further guidance on using building log books is given in Action Energy Good Practice Guide GPG 348: *Building log books — a user's guide*, available from www.actionenergy.org.uk

This building logbook was prepared by:

Winvic Construction Ltd
Brampton House
Moulton Park
Northampton
NN3 6PZ

Dated: July 2022

Facilities manager responsible for logbook: Signed:…….

Contact No:……..

Signed:…… Date:……

Key responsibilities of facilities manager:

— To ensure that the logbook is correct and up-to-date at building handover and when passing it on to a successor
— To ensure that the logbook is kept up to date on an ongoing basis including any changes to the building fabric, services, operation, or management
— To ensure that building maintenance and energy performance are logged
— To ensure that all those working in the building are made aware of the information contained in the logbook
— To ensure that the logbook is always kept in its designated location.

2. Links to Other Key Documents

Document	Location
Emergency Procedures	Section 2.1 of the O & M Manual
Health and Safety	Section 2 of the O & M Manual
Schedule of Hazards Associated with Materials Used	Section 2.4 of the O & M Manual
Record Drawings	Section 7 of the O & M Manual
Equipment Logbooks (e.g., Boiler log book)	With Equipment
Testing & commissioning certificates & reports	Section 6 of the O & M Manual
Plant & Equipment data	Section 4 of the O & M Manual

3. Main Contacts

Emergency Contact Name 1	
Emergency Contact Name 2	
Electricity Emergency Contact	105
Gas Emergency Contact	National Gas Emergencies 0800 111 999
Water Emergency Contact	Bristol Water
Lead Designer Contact Name	ECE Westworks
Building Services Design Contact Name	-
Principle Contractor	**Winvic Construction Limited** Brampton House 19 Tenter Road Moulton Park NorthamptonNN3 6PZ Tel: 01604 678 960
Mechanical Services Installer	WMBS 657 Melton Rd, Thurmaston, Leicester LE4 8EB Tel: 0116 311 2477
Sprinkler Installer	A&F Sprinklers Ltd Unit 4 | Gorrells Way TransPennine Trading Estate Rochdale Lancs OL11 2PX
Commissioning Managers Name	Peter Read **Winvic Construction Limited** Brampton House 19 Tenter Road Moulton Park NorthamptonNN3 6PZ Tel: 01604 678 960
Electrical Services Installer	EBM Electrical Services Ltd 11 Medlicott Close, Corby, Northamptonshire, NN18 9NF

Smoke Vent Installer	Delta Ventilation Limited Unit 2.3 Central Point Kirpal Road Portsmouth Hampshire PO3 6FH
Planning Supervisor Name	
O&M and Logbook Author Name	**Winvic Construction Limited** Brampton House 19 Tenter Road Moulton Park NorthamptonNN3 6PZ Tel: 01604 678 960
Mechanical & Electrical Consultant	Couch Perry & Wilkes Interface 100 Arleston Way Solihull B90 4LH Tel: 0121 709 6600
Facilities Management Contractor Name	
Maintenance Contractor Name	

4. Commissioning, Handover and Compliance

Commissioning overview

CIBSE Commissioning Code	Followed? (Yes/No)	Certificate included in appendix? (Yes/No)
Code M: Commissioning Management	Yes	No Section 6 of the O&M Manual
Code A: Air Distribution Systems	Yes	No Section 6 of the O&M Manual
Code C: Automatic Controls	Yes	No Section 6 of the O&M Manual
Code L: Lighting	Yes	No Section 6 of the O&M Manual
Code R: Refrigeration	Yes	No Section 6 of the O&M Manual
Code W: Water Distribution Systems	Yes	No Section 6 of the O&M Manual

Commissioning results

Commissioning period **24.10.22 to 28.10.22** **Signed:**	**1. Were the system and its controls installed as shown in the design drawings? (Yes/No)**	**2. Did operation meet the design specifications in all the required modes? (Yes/No)**	**3. Did the system operate efficiently in all modes? (Yes/No)**	**Comments/problems?** Where the answer is NO, indicate any commissioning problems or significant changes that have been made to the designs during (or as a result of) installation/commissioning, or any value engineering exercises, including any significant commissioning failures and remedial work that took place.
Water Chlorination Certificate	Yes	Yes	Yes	
External Services Test Sheet	Yes	Yes	Yes	
MCW Pipework Test Certificates	Yes	Yes	Yes	
HWS Pipework Test Certificates	Yes	Yes	Yes	
AGD Pipework Test Certificates	Yes	Yes	Yes	
TMV Test Sheets	Yes	Yes	Yes	
AC Commissioning Sheets	Yes	Yes	Yes	
Ventilation Air Balance Sheets	Yes	Yes	Yes	
WC Extract Air Balance Sheets	Yes	Yes	Yes	
Energy Monitoring & Leak Detection Commissioning Certificate	Yes	Yes	Yes	
Booster Set Commissioning Sheets	Yes	Yes	Yes	
Fire Damper Certificates	Yes	Yes	Yes	

Air infiltration

A building air pressure test was carried out and showed a measured air permeability which was within the specified target refer to building manuals for full test report.

Handover

Handover took place on:	**/**/**
End of defects liability period:	**/**/**
The handover procedure was managed by:	Scott Lilley

The documents handed over are listed in section 3 – Key Documents

5. Overall Building Design

General description of building

Client requirements

The services to the building have been designed in accordance with all relevant building regulations And the design criteria detailed below:

Special design features

Design assessment

In accordance with the requirements of the Building Regulations Part L2 carbon emissions were assessed using the carbon emissions method. This showed the annual carbon emissions of the building were proved to be no greater than that of from a notional building of the same size and shape designed to comply with the elemental method.

The assessment carried out on the building and issued to Building Control verified that the building fabric meets with the minimum performance levels stipulated and the plant and equipment selected for the M&E services systems were within maximum carbon emission limits. The submission to Building Control also demonstrated that the M&E systems were controlled in such a way the energy wasted was minimised.

Design Criteria

The design of the services is in accordance with the following reference standards, good industry practices and relevant documentation: -

- CIBSE Guides, Codes, Technical Memorandums and Practice Notes
- Institute of Plumbing IOP -
- Water Regulations Advisory Scheme WRAS
- BS 8558 - Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
- BS EN 806 - Specifications for installations inside buildings conveying water for human consumption. The Building Regulations - Approved Document G – Sanitation, hot water safety and water efficiency. The Building Regulations – Approved Document F - Ventilation
- The Building Regulations – Approved Document H – Drainage and Waste Disposal
- BS EN 12056 - Gravity Drainage Systems inside Buildings (Parts 1, 2, 4 & 5)
- COSHH Regulations

The following mechanical services have been provided:

- External site wide mains cold distribution pipework & entry location to Plant Room & Sprinkler Infill in Bin Store
- DX heat pump comfort cooling systems to the GF Amenities, Comms Room & UPS Room, including wall mounted & ducted indoor fan coil units, outdoor condensing units, refrigeration tray, pipework, controls, and equipment.
- Primary supply and extract ventilation to GF Amenities, with heat recovery units, ductwork distribution incorporating attenuators, volume control dampers and room air terminals.
- Local extract ventilation fans to individual Studios to ensuites & kitchenettes, including ductwork. Plenum boxes and flexible connections
- Unitary Amenity toilet extract ventilation including ceiling surface mounted extract fan and ductwork distribution.
- Mains cold water services serves cold water storage tank in Plantroom.
- Mains cold water services serves Sprinkler cold water storage tank in basement Plantroom.
- Mains boosted cold water services system serving all cold outlets within the building, incorporating pipework, valves, controls, and thermal insulation.
- Mains boosted Hot water services system utilising District Heating PHEs & storage vessel providing boosted hot water with secondary return, incorporating pipework, valves, controls & thermal insulation.
- Supply, installation, and commissioning of boosted cold water system including cold water booster pump set and twin section cold water storage tank c/w all pipework infrastructure, pressure reducing valves associated.
- Supply, installation & commissioning of LTHW heating system, complete with District heating PHE, pumps, associated pipework infrastructure serving VT circuit radiators & CT circuit Domestic Hot Water System, complete with PHE, all associated controls valves.
- An above ground drainage public health system to remove wastewater from all sanitaryware appliances throughout the building to drain.
- Rainwater system to remove water from all outlets into storm drains.
- Thermal insulation to all domestic hot and cold-water services & LTHW Heating as necessary.
- The chlorination of all domestic hot and cold-water systems serving all new installations
- Flushing, Dosing & Softening of LTHW Heating System
- Commissioning and balancing of all MEVs, HRUs, plant & equipment.

Client requirements

The services to the building have been designed in accordance with all relevant building regulations.
And the design criteria detailed below:

- CIBSE Guides, Codes, Technical Memorandums and Practice Notes
- Institute of Plumbing IOP -
- Water Regulations Advisory Scheme WRAS
- BS 8558 - Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

- BS EN 806 - Specifications for installations inside buildings conveying water for human consumption. The Building Regulations - Approved Document G – Sanitation, hot water safety and water efficiency. The Building Regulations – Approved Document F - Ventilation
- The Building Regulations – Approved Document H – Drainage and Waste Disposal
- BS EN 12056 - Gravity Drainage Systems inside Buildings (Parts 1, 2, 4 & 5)
- COSHH Regulations

Temperatures and Ventilation

External Design Conditions

Summer Conditions (for mechanical cooling system design):

1. Dry bulb temperature shall be 30ºC
2. Wet bulb temperatures shall be 21ºC
3. Cooling systems shall be designed to operate at full load at air temperatures of 35□C on to the condenser. Cooling equipment shall be capable of operating at temperatures up to 40ºC but with a reduced output.

Winter Conditions (for heating system design):

1. Dry bulb temperature shall be – 3ºC, 100% saturated for thermal heat loss calculations.
2. Heating elements in air handling plant will be designed for an external ambient air temperature of – 7ºC, 100% saturated.

Internal Ventilation Design Conditions

STUDENT RESIDENTIAL INTERNAL DESIGN CRITIERIA			
Area served	**Winter**	**Summer**	**Ventilation provision**
Studio Bedrooms (no Kitchenette)	22ºC ± 1ºC	Uncontrolled	Natural ventilation via openable windows and trickle vents
Cluster Kitchen / Living Room	22ºC ± 1ºC	Uncontrolled	38 l/s 'boost' per ensuite/bathroom Reduced to 30 / 35 l/s in 'trickle' mode.
Studio Ensuites	22ºC ± 1ºC	Uncontrolled	8 l/s
Studio Kitchenettes	22ºC ± 1ºC	Uncontrolled	13 l/s

Occupation Density

As defined in the Architectural Room Data sheets and layouts.

Thermal Load Calculations

Heat Loss Calculations

To be calculated as per the CIBSE method and the design criteria/margins within this

document.

Heat loss calculations for the bedrooms are to take into account the trickle ventilation rate from outside plus the infiltration and margins listed in this document.

Heat Gain Calculations

To be calculated as per the CIBSE method and the design criteria/margins within this document. The following heat gains shall be used in thermal load calculations: -
Lighting – To be calculated for as installed lighting.
Occupancy – 76W/person (sensible) and 56W (latent), based on defined occupancy within architectural room data sheets.
Solar gain – To be calculated.
Power – To be calculated from as installed equipment.

Note: In bedrooms the allowance for every occupant having a laptop has been allowed for in the overheating assessment.

Stage 1 & 2 – Heat Gain

Heat gain for the stage areas shall be taken from information provided by the media consultant and occupancy / fabric information from the architect. The design has been based on the following values available at the tender stage:

Stage 1 – 60kW (including 48kW of lighting gain)
Stage 2 – 28kW (including 24kW of lighting gain)

Water Storage and Pipework

Based guidance from The Institute of Plumbing

Cold Water

Student Residential - 35L per bedroom (based on 100L usage per bedroom and 30% storage) or 15 minutes draw off at peak demand whichever is higher.

Pipework Sizing

As per The Institute of Plumbing guidance. Use low frequency for the student residential buildings.

General

- Hot water temperature at showers and taps no more than 43 ºC.
- Hot water storage temperature no less than 60 ºC.
- Hot water distribution temperature in distribution pipework no less than 55 ºC although the temperature may drop at 2.0 m (max.) away from each outlet.

Design Margins

The following design margins shall be used for plant selections:

Heating

Add a 10% safety margin to all calculated heat losses.

Add an additional 10% margin to all emitter outputs for boost i.e. quick heat up.
Add an additional allowance (to be calculated) to plant loads to account for heat losses from system pipework.

Cooling

Add a 10% safety margin to all calculated heat gains.
Add an additional allowance (to be calculated) to plant loads to account for heat gains to system pipework.

Pump Sizing and Selection

The pump design pressure shall be the calculated resistance + 15%.
Pumps selected should be capable of achieving the calculated 'design flow rate plus 5%' at the 'design pressure + 10%'.

Noise

Environmental and M&E Noise Criteria

Refer to separate acoustic report.

Special design features

The project is unique by way of Utilising the Bristol District Heat Network to supply heat for the LTHW Heating System & Domestic Hot Water System via a Plate Heat Exchanger

The services are energy efficient based on Lo Carbon mechanical extract fans, inverter driven pumps, high efficiency heat recovery units, zoning of DX comfort cooling / heating, high efficiency DX heat pump cooling / heating systems and use of a building management system and high efficiency lighting.

Design assessment

In accordance with the requirements of the Building Regulations Part L2 carbon emissions were assessed using the carbon emissions method. This showed the annual carbon emissions of the building was proved to be no greater than that of from a notional building of the same size and shape designed to comply with the elemental method.

The assessment carried out on the building and issued to Building Control verified that the building fabric meets with the minimum performance levels stipulated and the plant and equipment selected for the M&E services systems were within maximum carbon emission limits. The submission to Building Control also demonstrated that the M&E systems were controlled in such a way the energy wasted was minimised.

Key interactions

The HVAC systems are generally standalone with user interface therefore occupants will be in control of their own heating, ventilation and air conditioning

The building management system is integrated to the energy saving controls employed within the building to provide monitoring, profile checks, logging and maintenance reporting.

Benefits and limitations of the design

All temperature-controlled areas of the building are provided with individual control zones fitted with adjustable temperature sensors. These include temperature sensors which operate the DX fan coils and can be used for mode selection, temperature adjustment, fan speed etc.
LTHW Radiator PITRVs have been fitted which individually control the output of the radiator, suited to the occupant.
Studio MEV System is 24/7 with integrated boost for Cluster / Living Space ensuring the correct air change rate is achieved without occupant interference.

Key 'dos and don'ts'

Do:

1. Monitor heating, cooling, and ventilation to ensure good operation.
2. Be aware of all risks.
3. Monitor energy usage within the building, this will enable the facilities manager to adjust timed starts/holiday periods etc to avoid excessive energy waste.
4. Follow the manuals regarding regular maintenance.
5. Consult the relevant person for advice and instruction if required.
6. Employ specialists to service and maintain major plant items and systems including AC systems and controls, this will ensure their continued efficiency and use.
7. Consult with control specialist to request further training and demonstrations, if necessary, this will ensure that the building management system is operating to its best with regards to the specific building.

Don't:

1. Operate the plant 24 hours/day, seven days a week unless occupancy hours dictate this.
2. Overheat the building.
3. Leave heat generating equipment/machines left on unnecessarily and have energy saving features enabled as this will prevent your space from overheating and save energy.
4. Open windows if cooling system operational.
5. Adjust set points or control logic from that set up without prior consultation with consultants or energy manager.

The installed mechanical smoke exhaust scheme has been supplied and installed by Delta.

This scheme will provide smoke and heat ventilation in the event of a fire to facilitate escape and firefighting.

The purpose of a firefighting stair is to provide clear access for the attending Fire Brigade such that they can approach the Fire Fighting floor via the stairway and form a bridgehead for their Firefighting Operations. Details of these requirements are provided in BS9999, BS5588 Part 5, & the BRE Technical Report reference 79204.

This system is therefore considered to be more than adequate for the protection of the code compliant central Fire Fighting Core / the escape staircase lobby.

The system has been commissioned to ensure that it operates as intended prior to hand over. To safeguard operating efficiency hereafter, we strongly recommend that the building occupier enters into a maintenance contract.

Regular inspection and testing will ensure that the user gains maximum benefit from the installed equipment and is advised of modifications which should be made to the system to reflect changes in legislation and building usage.

The following Sprinkler services have been installed:

Sprinkler System Design Specification

Site Address:

Glassworks

St Thomas Street / Cross Street

Bristol

BS1 6ZD

Overview

The Glassworks has had an automatic fire sprinkler system installed throughout. The system is fed from the dedicated pump & tank within the Ground floor sprinkler plantroom. A sprinkler control valve has been installed on each floor, along with one for the ground floor ancillary areas. These consist of an isolation valve, drain valve and a flow detection switch. This flow switch is linked into a zone in the buildings fire alarm panel.

The system has been installed to BS9251:2021 Fire Sprinkler Systems for Domestic and Residential Properties. This has been designed for any 4 heads to operate, for a duration of 60 minutes. Within the Ground floor, the Bin Store has been designed to operate in accordance with BS EN12845 rules due to the area being an Ordinary Hazard area above 50m^2 and below 100m^2.

Ground Floor

Standard: BS9251:2021 (Clause 5.6) / BS EN 12845

Area of Operation: 72m^2

Duration of System: 60 minutes

Design Density: 5.00mm/min

Floors 1 to 11

Standard: BS9251:2021

Area of Operation: 4 Heads

Duration of System: 60 minutes

Design Density: 2.80mm/min

WHY SPRINKLERS ARE NEEDED

Sprinklers have become by far the most widely used and most reliable automatic means of fire protection. Sprinkler systems automatically detect fire. Transmit an alarm as a result of waterflow and suppress or extinguish the fire. They are located in places where people cannot always be present and operate only as needed in the immediate vicinity of the fire. Because of the care given to design, construction and assembly, and because of the rigid approval tests required, the reliability of conventional sprinkler systems are unequalled.

Time in firefighting is a critical factor. Automatic sprinklers give the firefighting effort a big jump on the fire. A building fire generally starts small, however, with sufficient fuel to feed it, the amount of heat, flame and smoke can increase to such a degree that manual firefighting can be severely hindered, if not totally ineffective. Sprinklers on the other hand, can detect and control fire effectively to minimise property loss.

The idea that automatic sprinklers introduce a serious water damage hazard is a myth. Properly installed, maintained and adequately supplied with water, the sprinklers system works with water saving efficiency. Only sprinklers needed over and immediately adjacent to the fire operate. On the other hand, hose streams directed through windows from out-doors often drench an entire floor area without beneficial effect particularly where fire is hidden by smoke. Hose streams also use more water and cause much more water damage than would be expected with sprinklers. Many sprinklers are so large or so high that much of their area is beyond the reach of outside hose streams.

In summary, automatic sprinklers can prevent fires from reaching destructive proportions and may mean the difference between a minor interruption and a prolonged of permanent shutdown.

DESCRIPTION OF A SPRINKLER SYSTEM

A sprinkler system consists of a water supply (or supplies) and one or more sprinkler installations; each installation consists of a set of installation main control valves and a pipe array fitted with sprinkler heads.

The sprinkler heads are fitted at specified locations at the roof or ceiling, and where necessary between racks, below shelves, and in ovens or stoves. The main elements of a typical installation are shown in Figure 1.

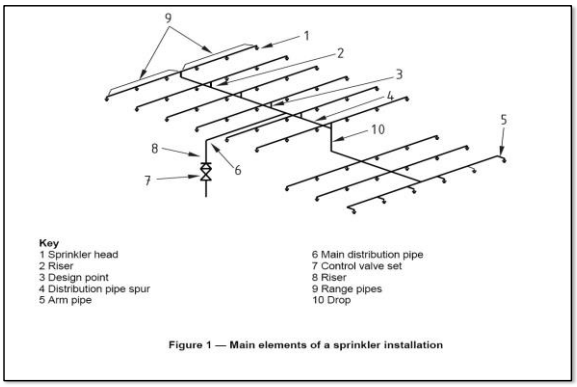


Figure 1 — Main elements of a sprinkler installation

The sprinklers operate at predetermined temperatures to discharge water over the affected part of the area below.
The flow of water through the alarm valve initiates a fire alarm. The operating temperature is generally selected to suit ambient temperature conditions.

ONLY SPRINKLERS IN THE VICINITY OF THE FIRE, I.E. THOSE WHICH BECOME SUFFICIENTLY HEATED, OPERATE.

The sprinkler system is intended to extend throughout the premises with only limited exceptions.

In some life safety applications, an authority might specify sprinkler protection only in certain designated areas and solely to maintain safe conditions for the evacuation of persons from the sprinkler protected areas.

It should not be assumed that the provision of a sprinkler system entirely obviates the need for other means of fighting fires, and it is important to consider the fire precautions in the premises.

Structural fire resistance, escape routes, fire alarm systems, particular hazards needing other fire protection methods, provision of hose reels and fire hydrants and portable fire extinguishers, etc., safe working and goods handling methods, management supervision and good housekeeping all need consideration.

It is essential that sprinkler systems should be properly maintained to ensure operation when required. This routine is liable to be overlooked or given insufficient attention by supervisors.

It is, however, neglected at peril to the lives of occupants of the premises and at the risk of crippling financial loss. The importance of proper maintenance cannot be too highly emphasized.

When sprinkler systems are out of service extra attention should be paid to fire precautions and the appropriate authorities informed.

The following electrical services have been provided:

- Landlords lighting and small power
- Landlords fire alarm
- Containment to landlords' areas
- Submains cable to apartments from MSDBs
- Lighting, small power and fire alarm to apartments
- External lighting
- Door intercom
- Security/CCTV
- Lightning protection
- Secondary life safety supplies
- Photo Voltaic array

Electrical Design Criteria

The following design parameters have been employed when carrying out of all design works.

Electrical Installation	
Apartments	**Landlords**
BS7671:A1 2020 (18th Edition)	BS7671:A1 2020 (18th Edition)
Part L1A Building Regs	Part L2A Building Regs
Part M Volume 1 Building Regs	Part M Volume 2 Building Regs
BS9991	BS9999

Fire Alarm	
Apartments	**Landlords**
BS5839-6	BS5839-1

Emergency Lighting	
Apartments	**Landlords**
n/a	BS5266

Lightning Protection	
Apartments	**Landlords**
n/a	BS62305

Landlord Lighting	**Average Lux Level**
Circulation & Corridors	100
Staircases	150
Lifts	100
Rest Rooms	100
Washrooms / Bathrooms / Toilets	200
Plant rooms & switch rooms	200
Store rooms	100
Refuse	200
Entrance areas	200
Kitchen	--
Apartment	**Average Lux Level**
Main Areas – Living Room / Kitchen	Non-dimmable downlight adequate number of light fittings
Bedroom	150 – Via Downlights
External Lighting	**Average Lux Level**
Pathways, Main Access	10
Pathways, Secondary	10

6. Summary of Areas and Occupancy

Occupancy and activities

The total number of occupants in the building is…… (Based on core hours of use)

Main occupied areas	Weekday hours	Saturday hours	Sunday hours	Total hours/week	Flextime (Yes/No?)	Late working sometimes (Yes/No?)	No. of occupants
Office Block							

Insert a summary of the main activities in each different zone of the building. Insert a summary of the likely occupancy patterns including numbers of people and occupancy periods.

Floor areas

The total floor area is m^2 (based on gross floor area)

	% Of total area by servicing system						Total %	Total area (m^2)
Area type	Untreated	Naturally ventilated	Mechanically ventilated	Heating Only	Heating & Cooling	Heated & Ventilated		
Total (%)								
Total area (m^2)								

Tenancies
Not applicable

Separately managed and special areas
Not applicable

Floor plans

Copies of the electrical service drawings are available in the electrical section of the Building O&M manual provided under separate cover.

7. Summary of Main Building Services Plant

The main energy using plant (above 5Kw) installed at the site at handover is the

Main plant items are shown below. The operation & maintenance manuals provide further detail.

Main plant	Location	Input (kW)	Output (kW
Main Switch Panel	GF Switch Room		
Secondary Switch Panel	GF UPS Room		
Sprinkler System Electric Pump Set	GF Plant Room		
Booster Set	GF Plant Room		
AOV Extract Fans			
Air Conditioning Unit			
MCWS Booster Set	Plantroom	23	
BMS Panel	Plantroom	10.8	
UPS AC Condenser RZASG100MY1	Bin Store	10	
UPS AC Condenser RZASG100MY1	Bin Store	10	
Amenity AC Condenser REYQ16U	L12 Roof	15.2	
Amenity AC Condenser REYQ8U	L12 Roof	6.4	
HWS Immersion Heater	Plantroom	12	
HWS Immersion Heater	Plantroom	12	
Sprinkler pumps (Residential)	Sprinkler Plantroom	7.5(x2)	
Sprinkler pumps (Commercial)	Shared with Residential	--	

SYSTEMS:

Mechanical Services

Incoming Water
A new blue protectaline water main has been installed into the plantroom from the main road site boundary. This main terminates within the plantroom complete with isolation & double check valve, draincock and water check meter. Externally we have installed a stopcock isolation valve with a water authority meter provided by the water authority on the boundary.

A new protectaline fire main supply has been installed from the site boundary complete with isolation valve. The pipework enters the Bin Store via a grated pit, turns up and into the Bin Store complete with isolation valve, check valve and draincock. The pipework converts to copper where it rises to high level, runs round to the sprinkler plantroom, and serves the sprinkler tank.

Boosted Cold Water
Located within the tank room is a new 18,000 litre nominal insulated, sectional GRP cold water storage tank with internal division for ease of maintenance, new pipework has been extended from the tanks to a new cold water booster pump set which serves the hot and cold water to the entire building.

Each dedicated cold water booster set is mounted on a common steel base frame and fitted with three pumps sized at 50% of the duty to provide run, assist and standby provision. The three pumps are inverter driven and controlled from the booster pumps integrated control panel. The control panel contains main door interlocked isolator, pump selector switches, duty/share timer facility, run and trip lamps for pump, low water alarm lamp and allow run and fault indication.

The inlet to the booster set is fitted with isolating valve and flexible connection. The discharge side of the booster is fitted with a tied flexible connection and emergency isolating valve.

From the cold-water booster, the copper pipework rises through a scale inhibitor to high level to split and serve the packaged hot water heater. The boosted cold water distributes through the GF corridor to serve outlets at this level and then up within the riser to FF where it distributes to serve FF Bedrooms and rises within pod riser to serve all other floors.

Copper pipework rises vertically through the building with copper branches to each POD valve connection set, each POD is fitted with isolating valve & pressure reducing valve to regulate the pressure of the system to that required on each floor.

Boosted cold water pipework is provided to all outlets fitted with a service valve to allow for local isolation.

All pipework where concealed, within voids, plantroom or risers are fitted with isover mineral section thermal insulation with identification applied, Armaflex insulation is applied to apartment concealed pipework to prevent heat gain or condensation.

Hot Water Services
The ground floor plantroom contains the main heat generating equipment, the district heating network is extended into the dedicated plantroom and terminated at BDHN plate heat exchangers. From the secondary side of these heat exchangers LTHW heating pipework is extended through a twin variable speed pump set which will circulate the LTHW heating to the hot water heat exchangers. The cold feed to the water heater passes through a further 3rd plate heat exchanger (boosted cold pre-heat exchanger) to assist in reducing the Primary return temperature to the district heating plantroom & ensuring maximum efficiency of the system

The heating system is provided with a pressurisation unit, expansion vessels & air and dirt separator including all necessary components to ensure system is free of air and available for dosing.

Located within the plantroom is a packaged plate heat exchanger to generate hot water from the supplied district heating LTHW. Each packaged unit is fitted with two plate heat exchangers linked to a common copper potable storage vessel / hot water storage calorifier. Each heat exchanger has two port control valve and differential pressure control valve arrangement linked to integral controls system to maintain flow temperature Boosted cold water serves the heat exchanger arrangement fitted with unvented kit and expansion vessel. The primary heat source to the plates is from the district heating connected from the network.

A secondary circulating pump is provided within the plantroom to provide circulation around the building.

An anti-legionella pump is also provided to ensure the entire volume of the buffer vessel is brought up to 60°C once a week in line with 65-degree temperatures received from the network.

To ensure hot water is provided to the draw off without delay, lengths of uncirculated pipework will be kept to a minimum and draw off times shall be a maximum of 30 seconds to each maximum temperature, thermal balancing valves are fitted on each circulating branch.

Copper pipework rises vertically through the building with copper branches to each POD valve connection set, each POD is fitted with isolating valve & pressure reducing valve to regulate the pressure of the system to that required on each floor.

Hot water is provided to all outlets and fitted with a service valve to allow for local isolation.

All pipework where concealed, within voids, plantroom or risers is fitted with Isover mineral section thermal insulation with identification applied, Armaflex insulation is applied to apartment concealed pipework to prevent heat gain or condensation.

CAT 5 Boosted Cold Water Services
Located within the tank room is a CAT 5 boosted cold water system serves the refuse store & associated GF landlord areas.

The system incorporates a PVC cold water storage tank, access lid, 20mm inlet ball valve, screened overflow and warning pipe, screened vent, outlet to single booster pump & flexible discharge and low-level float switch.

The CAT 5 booster is supplied packaged on a common frame with inlet, outlet and overflow connected and extended from the unit.

From the cold-water booster, the copper distribution pipework drops to low level to exit to hose union bib tap with stainless steel cover box within the refuse room.

All pipework where concealed, within voids, plantroom is fitted with Isover mineral section thermal insulation with identification applied.

LTHW Heating
The ground floor plantroom contains the main heat generating equipment, the district heating network is extended into the dedicated plantroom and terminated at their plate heat exchangers. From the secondary side of these heat exchangers LTHW heating pipework is extended through a twin, variable speed pump set which will circulate the LTHW heating to the hot water heat exchanger & heating system.

Two twin head inverter driven electronic floor mounted circulation pumps are fitted from the heating flow header to serve the following circuits:

• Constant temperature circuit serving hot water heat exchangers as detailed above

• Variable temperature heating to radiators

Each pump is mounted on an anti-vibration pad to a freestanding support fixed to structure. The pump suction pipe is fitted with isolating valve, strainer, test points, pressure gauge, and flexible connection with the discharge pipe incorporating flexible connection, pressure gauge, test point and isolating valve.

An air and dirt separator is mounted within the common heating flow pipework, the separator traps micro bubbles of air in the water and moves them vertically through the component to vent at the automatic air vent. Any dirt collected is deposited in the blow down section to the bottom for regular removal.
The variable temperature radiator circuit is fitted with a three-port valve on the suction side of the pump set. The three-port valve modulates in accordance with the external temperature sensor linked to the BMS to provide the correct water flow temperature as set by the controller. This circuit is optimised to ensure the occupied space is at the correct temperature at the set time. This pump set is electronic and will reduce speed to accommodate the closing of thermostatic radiator valves or two port control valves.

To ensure the correct return water temperature to the district heating network, differential pressure sensors are installed 2/3's of the way on the risers on the index circuits linked back to the BMS. The differential pressure sensor shall, via the controller, vary the speed of the pumps to maintain a minimum/maximum pressure across the flow and return of the heating system to ensure that the return water temperature is constant, and the pump speed strategy will be adjusted to match the temperature requirements.

A floor mounted pressurisation unit and floor mounted expansion vessel are fitted to provide the make for the system and accommodate the expansion during heat up. The pressurisation unit also houses pressure switches to act as a safety cut out.

A chemical dosing pot is fitted and linked across the main boiler heating flow and return and 50mm flushing valves installed to the main headers to enable circuit flushing and cleaning prior to commissioning.

All floors are heated from the variable temperature circuit. All circulation spaces, core areas, studios, apartments and cluster kitchens and non-conditioned spaces are fitted with steel panel radiators.

Automatic bypass valves are fitted to ensure minimum pump volume flow rates are accommodated.

Isolating valves and draincocks have been installed to the systems to enable ease of isolation and draining for maintenance.

Mild steel pipework and fittings are used to distribute the LTHW heating around the building vertically and horizontally to suit available void space. At each studio, kitchen or temperature control zone the pipework branch is fitted with a pressure independent thermostatic radiator valve (PITRV) or two port electrically operated control valve and adapt to PEX push fit microbore pipework where pipework will be routed in ceiling void and wall voids to serve each radiator.

The PITRV will enable occupants to have independent temperature control to their individual space via the radiator valve.

Public Health Services
A public health installation is installed throughout the building to collect the soil and waste from each sanitary appliance. The installation also prevents the transmission of foul air into the building. Ventilated stacks and branch pipes are installed throughout the floors generally in POD risers and discharge to atmosphere.

All appliances discharge foul water into stacks installed to concealed locations within boxings or voids etc, each stack is fitted with an inspection cover at 1.5m a.f.f.l. to every third floor. Fire collars or cast in fire collars are fitted where the UPVC pipework passes through fire compartments.

The soil and waste pipework is grey UPVC soil pipework and white MUPVC waste pipework all manufactured by Polypipe Terrain and solvent welded throughout.

Apartment, Studio & Cluster Ventilation
To meet building regulations the apartments and cluster kitchens are provided with continuous running extract ventilation from ceiling mounted extract fans, each fan is wired to the lighting circuit or remote switch and set to run in boost when lighting circuit activates the fan.

Rectangular PVC ductwork and fittings are used, mechanically fixed and sealed. The ducts adapt to the fans and then route to the nearest external wall face where they terminate to a ventilation louvre above the window.

Atmosphere Ductwork from the MEV up to and including the plenum box are insulated with 25mm duct wrap to prevent condensation of the ductwork.

Communal Area Heating & Cooling
The communal areas are provided with DX heating & cooling systems to maintain internal comfort conditions.

The indoor ceiling mounted ducted unit systems are split into suitably sized zones depending on numbers of units required within the space.

Refrigerant grade pipework with Armaflex insulation on galvanised steel tray is connected to all units back to external condensing units located externally at L12 roof level or within the ground floor Bin Store

Each space or zone is provided with a room controller to allow local user interface for occupants to use for mode and operation.

Condensate pipework has been installed in PVC pressure pipe within the ceiling void and routed to a waterless dry trap which is connected to the local soil vent pipework.

Communal Area Ventilation
The ground floor communal areas are provided with multiple packaged heat recovery units suspended from the slab structure and exposed. The heat recovery units are provided and packaged control system linked to operate with comfort cooling.

Ductwork runs in ceiling voids to the occupied space. Exhaust and fresh air inlet ductwork are extended to louvres in external elevations, complete with insulation.

Fresh air ventilation - 10 l/s/person supply and extract

All ductwork is installed in galvanised sheet metal throughout. All atmosphere ductwork, supply & return air ductwork is insulated to unheated areas or where condensation or excessive heat gain/loss occur.

Four-way louvre faced, or circular diffusers are provided throughout all areas, with extract ductwork distributed at high level to multiple bell mouth returns within separate spaces.

Toilet areas are provided with extract ventilation via an inline extract fan within the Bin Store mounted to the slab with galvanised ductwork extended to louvres in the external elevation.

Dry Risers
To facilitate a reliable and immediately available distribution of water for Fire Brigade firefighting purposes and in accordance with BS 9990, a dry riser system has been supplied and installed to the three stairs accessing the main offices.

The dry riser system ensures water is available at each designated level of the relevant stair core areas to satisfy the local Fire Authority's requirements. Dry riser landing valves are fitted at each level with the centre office core having architrave landing valve boxes in riser.

The inlet breach valves serving the dry risers are located on the ground floor front façade adjacent each of the stair access doors and to the rear of the ground floor store (red steel inlet box 'Dry Riser Inlet')

Galvanised pipework with grooved clamp fitting will be used to connect inlet breeching valves to landing valves with U bolt clamp brackets at each floor level, a 25mm automatic air valve will be fitted at the top of riser.

Pipework to be pressure tested and certified on completion.

Automatic Control System
A fully automatic direct digital control system (DDC) utilising Trend IQ4E series controllers has been installed to operate the mechanical plant. The DDC controller and I/O expansion modules are provided with 10% spare capacity.

The system control panel is provided with a Trend IQ4E microprocessor direct digital controller complete with automatic backup for at least 72-hour duration.

The data (firmware, strategy, parameters) is stored in flash memory which is non-volatile in the case of power failure.

Changes to the Address module are stored immediately. Other changes are generally stored around midnight, in addition structural changes (e.g., module interconnections) are stored 15 s after the last change, and critical data changes (e.g., strategy values), are stored on power failure or other similar fault conditions. The tools (e.g., IQSET) send an archive instruction after parameter changes causing immediate storage of changes.

A super cap is used to maintain the real time clock (time and date). In the event of power failure this supports the clock for 8 days (typically)

The mechanical services control panel is installed in the following location to control and monitor the items of plant as described in full Controls O&M Manual

- 'MCP1' Plant Room 2 - Form 2 Construction (Grey)

MCP1 – Plant Room 2

MCP1 is a single section, wall mounted, painted mild steel control panel. The control panel houses all mains voltage control gear and terminals to equipment, a Trend IQ411 DDC controller and all other low voltage equipment and terminals. The control panel fascia has LED type indication lamps for equipment status, a lamp test facility, fire smoke damper test facility and leak detection alarm. The panel is supplied with an engineer's RCD socket outlet.

MCP1 controls and/or monitors the following plant.

- CWBS01 Cold Water Booster Set
- WC01 Electromagnetic Water Conditioner
- PU01 Pressurisation Unit
- P/00/01 Constant Temperature Variable Volume Pump
- P/00/02 Constant Temperature Variable Volume Pump
- P/00/03 Constant Temperature Variable Volume Pump
- P/00/04 Variable Temperature Variable Volume Pump Set
- P/00/05 HWS Circulation Pump
- P/00/06 Constant Volume Vessel Charging Pump
- CAL/00/01 Domestic Hot Water Buffer Vessel and Electric Immersion Heater
- EF/00/01 Extract Fan
- EF/00/02 Extract Fan
- EF/00/03 Extract Fan
- SF/00/01 Supply Fan

- Sprinkler System
- UPS
- 12no. Fire Smoke Dampers

MCP1 Monitors the following sensors.

- Outside Air Temperature
- LTHW Primary Flow Temperature
- LTHW Primary Return Temperature
- LTHW Heating Flow Temperature
- LTHW Heating Return Temperature
- DHWS Primary Flow Temperature
- DHWS Primary Return Temperature
- DHWS PHX Secondary Flow Temperature
- DHWS PHX Secondary Return Temperature
- DHWS Flow Temperature
- DHWS Return Temperature
- DHWS Constant Volume Buffer Vessel BCWS Feed Temperature (T1)
- DHWS Fill at Constant Volume Buffer Vessel Charging Pump Temperature
- DHWS Constant Volume Buffer Vessel Temperature (T2)
- DHWS Constant Volume Buffer Vessel Temperature (T3)
- DHWS Constant Volume Buffer Vessel Temperature (T4)
- 1F Space Temperature
- 11F Space Temperature
- Cold Water Storage Tank Section 1 Temperature
- Cold Water Storage Tank Section 2 Temperature
- Constant Temperature Variable Volume Pumps Differential Pressure Transducer
- LTHW VT EOL Differential Pressure Transducer

MCP1 Monitors the following meters.

- Boundary MCWS Water Meter
- Incoming Water Meter
- HWS Fill Water Meter
- Landlord Water Meter
- LTHW Heating Heat Meter
- HWS Heat Meter
- 18no. Electric Meters

Communal areas heating and comfort cooling is provided by a Mitsubishi AE200 VRF/VRV system controlled under the dictates of a packaged central controller. The controller is mounted on the control panel facia.

Testing & Commissioning
On satisfactory completion of all installations the systems are fully commissioned in accordance with BSRIA, CIBSE Guidance & Manufacturer's instructions.

The works include the pre-commissioning of the automatic control system, filling, flushing and chemically cleaning and dosing of all heating pipework and system components, air & water balancing, chlorination and provision of certification and reports on completion.

SYSTEMS:

Electrical Services

We have installed one MCCB panel boards in the main switch room along with the secondary supply board in the UPS room, all on the ground floor.

(MP1) – MAIN SWITCHPANEL

(SSPB1) – SECONDARY SUPPLY PANELBOARD

Each Switch Board comes with MCCB incoming devices and all the necessary outgoing devices to suit the building requirements/power demands. The panel board come complete with any necessary blanking modules.

Main LV panel board (MP1) is a floor mounted panel, located within the PBSA ground floor LV switch room, suitable for the supply capacity and complete with the necessary outgoing MCCBs and a minimum of 25% allowance spare capacity. Refer to the LV schematic for full details.

Secondary Supply DB (SSPB1) is a wall mounted panel, located within the UPS room on the ground floor of the PBSA suitable for the supply capacity and complete with the necessary outgoing MCCBs and a minimum of 25% allowance spare capacity. Refer to the LV schematic for full details.

Several Landlord's distribution boards are provided in risers & back of house rooms to serve the communal small power and lighting requirements on each floor / area. We have utilised a range of single and three phase split metered distribution boards throughout the landlord's areas. Refer to the LV schematic for full details.

Consumer Units

Within each apartment we have installed a metal consumer unit c/w MCB's and combined RCBO & AFDD devices to protect final circuit to serve small power and lighting requirements with spare ways for future capacity.

The consumer unit is surface mounted and located in the utility cupboard of the apartment.

We have provided the supply to each consumer unit from the local DB from the landlord supply. This supply is routed in Low Smoke Zero Halogen (LSZH) Non-Armoured double (NYY) cable within the ceiling void supported by non-combustible fixing and containment.

Within each consumer unit there is a separate meter that is available to view the lighting energy usage only.

Small Power – Communal Areas

Within the communal areas and landlord areas we have installed the following accessories.

Metal-clad – Riser cupboards, Stairwells, Store/Plantrooms and within Ceiling Voids to include, light switches, double socket outlets, switched fused connection units, and unswitched fused connection units.

White Plastic – All apartments, Corridors and amenity areas to include light switches, single socket outlets, double socket outlets, switched fused connection units, Cooker switches, unswitched fused connection units.

Small Power – Apartments

Within the apartments we have installed electrical accessories with white plastic finish throughout. This includes.

- 13A 1 Gang Switched Socket
- 13A 1 Gang Unswitched Socket
- 13A 2 Gang Switched Socket
- 13A 2 Gang Switched Socket c/w USB A/C
- 45A Cooker Switch
- 32A Hob Switch
- 32A Hob Connection Plate
- Multi Gang Appliance Grid switches
- 13A Switched Fused Connection Unit
- 10A 1 Gang 1 Way Light Switch
- 10A 2 Gang 2 Way Light Switch
- 1 Gang Blank Plate
- 2 Gang Blank Plate

General Lighting – Communal Areas

Storerooms & Plant Rooms

All Back of house rooms and plant rooms we have installed standard LED and emergency type anti corrosive fittings with IP65 rating and 4000K colour temperature.

Stairwells

Within the stairwells we have installed emergency type surface circular LED fittings with IP20 rating and 4000K colour temperature. These all have integral microwave sensors built in.

Corridors, Reception

Within the corridors, we have installed standard recessed downlights and recessed downlight LED fittings with IP20 rating and 4000K colour temperature.

The reception area has a track lighting system with spotlights installed.

We have installed ceiling mounted occupancy sensors to provide automatic control of the lighting. Functioning as a presence detector the units will turn the lights on when the room is occupied and off when the room is unoccupied.

Within the corridors we have installed recessed mini-presence detectors / long range microwave sensors to provide automatic control of the lighting.

Ground Floor Amenity

Within the ground floor amenity spaces, we have generally installed mixture of client specified decorative lighting alongside standard recessed downlight LED fittings with IP20 rating and 4000K colour temperature. Full details can be seen on the layout drawings All emergency lighting is by directional spots.

Emergency Lighting

Emergency lighting is either integrated into the main light fittings or provided as separate fittings. Throughout the site we have installed emergency exit fittings with running man legends to highlight points of egress. On the ground floor there are intelligent exit signs that change the directional arrow based on the fire strategy and fire alarm inputs that are received. External to final exit doors we have installed LED emergency bulkhead fittings.

Locations of electrical accessories as denoted on 'Layout Drawings' of the O&M manual.

General Lighting Control – Communal Areas

Emergency Lighting

Emergency lighting is manual test and can be tested with key switches located adjacent to the distribution board servicing the lighting circuit provided.

Emergency light fittings are fitted with a visible green LED charging indicator and the system is designed in accordance with BS 5266. LEDs should be checked periodically (as defined in BS5266 logbook) as these will change colour / flash should there be a problem during the testing procedure.

General Lightning and Lighting Control – Apartments

Within all lounges, kitchens, and bathrooms we have installed ceiling recessed LED spotlights with IP65 rating and 3000K colour temperature. The fittings are controlled via wall mounted light switches.

Within bedrooms we have installed ceiling mounted hanging pendant sets with LED lamp of 3000K colour temperature. The fittings are controlled via wall mounted light switches.

External Lighting and Lighting Control

The external lighting is illuminated with the use of wall mounted lighting and bollards. The fittings are controlled via an astronomical timeclock relevant to each circuit.

Fire Alarm – Communal

Automatic & Manual Fire Detection and Alarm System

An analogue addressable automatic fire alarm system is included within our proposal to the aforementioned premises. This system is to be considered as an independent system from the rest of the Redcliffe Quarter development as the systems are not connected whatsoever.

The proposed system will provide the premises with a **Category L5** system in accordance with BS 5839-1:2017 and to

follow the instruction provided within the 'Fire Strategy' and the 'Specification' documents provided to us.

The accommodation entrances into the building will be provided with Control & Indicating Equipment with the main

control panel being located within the reception area. Each location will be provided with 'Zone Plans' for the emergency services to quickly establish where the fire is located within the premises.

As directed by the 'Fire Strategy', the proposed system will work in conjunction with other life safety systems within

the building to form a comprehensive overall fire safety solution.
As instructed, the proposed AFDS system will provide varying levels of detection throughout the premises, which can be generalised as the following:
− **Category L5** to all apartment floors (the part of the system is to be provided as detection for the initiation of smoke extraction systems only) Manual call points and warning devices are not provided to apartment floors in accordance with the 'Fire Strategy' recommendations.
− **Category L2** 'type coverage' to Communal / Public areas in accordance with BS 5839-1:2017.
The proposed system also includes sounder/beacon devices to external roof levels and to the external courtyard /
garden areas.
This system will interface with other electrical and mechanical systems within the building to provide 24hr monitoring of specific safety system functions, or to perform pre-programmed Cause & Effects' once the fire alarm.
has been activated, including:
− Monitor the sprinkler system throughout the building for pump activation, providing a general location of the activation at the fire control panel.
− Initiation of AOV's (Automatic Opening Vents) to the apartment floors and stair cores.
− Unlocking of access-controlled doors to allow unrestricted emergency escape from the building.
− Lift control – to return the lift to the designated floor.
− Inform the BMS (Building Management System) that the fire alarm has activated.
− Inform the Retail Units & Affordable Housing (separate systems not part of this proposal) that the fire alarm has activated.

Smoke/Heat Detectors/multi sensors – Apartments

Within the apartment bedroom[s] and utility cupboards we have installed standalone mains powered smoke or Heat detectors with a button to test & silence. The alarms are certified to EN 14604:2005+AC:2008 and provide a sound level of 85db[A] at 3m [minimum].

CCTV System

A full HD CCTV system has been installed to internal and external areas as per drawings in the O&M manual. Camera types vary depending on their locations but are all fixed dome cameras with a fixed focal lens, All cameras are powered by the 24TB NVR (network video recorder) wired in ethernet cabling
The NVRs will give 31 days' recording at excellent quality. A 28" colour monitors have been installed. The monitor has a HDMI extender to the NVRs and USB extender for mouse control of the NVR.

Access Control and Audio Intercom

The resident and staff access control system is a PC based system with proximity readers on various doors

The door access controllers are located local to each door denoted on the 'as built' drawings. Each door has a proximity reader, request to exit button, green break glass and magnetic lock. Each door controller is supplied with battery backup.

The access system is PC based [PC supplied by others] for the software to be installed on. The software will allow staff to add and remove user from the system via a desktop reader. Cards / Fobs have been provided with the system.
NSP Access Control Have provided apartment door handle sets with fobs provided.

TV System - Apartments

The TV system has been designed and installed to provide Freeview and Sky Q satellite. Coaxial cables are installed to locations identified on the As Fitted layouts, this is all fed form the head end equipment.

Lightning Protection

A level I lighting protection system has been installed conforming to BS EN 62305:2011.

	BS EN 62305:2011 Level I Lightning Protection System
Air Termination Work	A faraday cage system compromising of an amalgam of 25x3mm bar aluminium roof conductors fixed to all roof areas with appropriate fixings
Down Conductor[s]	The rebar within the concrete pillars has been utilised as the conductive discharge path to earth
Bonds	Various bonds at roof at roof level to extraneous metalwork/plant etc Various structural steel at low level Various structural connections at high level
Joints	As necessary, bolted and clamped
Test Points	Clamps with within inspection housing
Earth Termination[s]	2.4m x 16mm copper / Aluminium bonded steel earth electrodes complete with concrete/polymer lockable inspection pit

SYSTEMS:

AOV System

System Operation.

On system activation the shaft AOV opens (on the floor of first detection), the head of stair and head of shaft vents open. Smoke is naturally drawn through the lobby through the damper and rises through the smoke shaft and out to atmosphere through the head of shaft vent. Clean make up air enters through the inlet vent at the head of the stairs. The break glass switch can override the need for a fire alarm signal and open the head of stair vent. It is designed to be used at anybody's discretion when tackling the fire. Note: All the other shaft AOV's on the other floors will be locked out to prevent the possibility of cross floor contamination.
Operation of the system can be monitored on the HMI panel located in the firefighter's entrance/adjacent to FA panel located on Level 00.

Head of Stair Ventilators.

Delta ECO ventilators sized to provide 1.0m² free area when opened.
Ventilator high base suitable for fixing directly onto an upstand.
Frame and body aluminum mill finish
Louvres twin skin insulated aluminium
Operation 24v dc power reverse polarity
ECO ventilator is tested to EN12101-2

Commented [H1]: Update model no based on sizes

Smoke Control Dampers.

Delta Smoke Control Damper & Grilles (one per level for each lobby) to allow smoke to be extracted from the fire floor upon activation of system.
Fire rated construction comprising galvanised steel frame and blades operated by a 24v dc reverse polarity actuator.
Damper – front face matt black as standard.
Grille – aluminium polyester powder coated white RAL9010 as standard.
Operation 24v dc power open power close, failsafe current position.
Damper free area: 1.0m²
Certified to EN 12101-8.
Operation 24v dc power reverse polarity
ECO ventilator is tested to EN12101-2

Shaft Termination AOV

Delta ECO ventilators sized to provide 1.5m² free area when opened.
Ventilator high base suitable for fixing directly onto an upstand.
Frame and body aluminum mill finish
Louvres twin skin insulated aluminium
Operation 24v dc power reverse polarity
ECO ventilator is tested to EN12101-2

Commented [H2]: Update model no based on sizes

Control System

- Zone Interface Panels located within electrical riser (one per floor). They control smoke and environmental dampers as well as the roof ventilators.
- Battery Backup units to provide 24Vdc power upon 230Vac mains failure. It will do so for a limited period and the controls design will ensure that the standby current is of a correctly low level.
- HMI Touch Screen Mimic Panel located at the Ground Floor adjacent fire brigade entrance. The screen can be used for visual indication of the system status, for setting up operation and control parameters, and operating the system for testing and maintenance purposes.
- Break glass to enable manual operation of head of stair ventilator – located ground floor in each stairwell.

SYSTEMS:

Sprinkler System

Care & Maintenance

Within the Glassworks building there are 12 Residential valve controls (one per floor), that will require a flow and pressure test undertaken from at each service to ensure the water supplies are still meeting the requirements. There are also two pumps within the plantroom, one Duty pump and on Stand-by. These run on a 28-day automatic test and will inform management of any faults. These pumps should be checked as part of the 12-month service by a competent person.

In accordance with the relevant governing body Loss Prevention Council (LPC), Factory Mutual (FM), National Fire Protection Association (NFPA) etc. All sprinkler systems must be checked tested and maintained regularly.
The user shall ensure that a programme of inspection and checks is carried out, arrange a test, service and maintenance schedule and keep records of all work completed. These records shall be held on the premises.
The user shall arrange for the test, service and maintenance schedule to be carried out under contract by a sprinkler servicing contractor.

Any alarm receiving station(s) shall be notified of any system tests which will result in the transmission of an alarm. The alarm receiving station(s) shall be requested to verify that alarm signal(s) have been received. The alarm receiving station(s) shall be informed immediately that the test procedure has been completed.
After an inspection, check, test service or maintenance procedure the system, and any automatic pumps, storage tanks shall be returned to the normal operational condition.

PREVENTATIVE MAINTENANCE
Preventative maintenance is conducted to keep equipment working and/or extend the life of the equipment. The primary goal is to avoid or mitigate the consequences of the failure of equipment. This may be by preventing the failure before it occurs. It is designed to preserve and restore equipment reliability by replacing worn components before they fail. The objective ideal would be to prevent all equipment failure before it occurs.

CORRECTIVE MAINTENANCE
Corrective maintenance is defined as maintenance necessary after equipment or component failure and should be acceptable if the cost or consequence of failure is less than that of preventative maintenance or the consequence of failure is minimal.

SATISFACTORY SPRINKLER PREVENTATIVE REGIME
A satisfactory sprinkler system preventative maintenance regime including a thorough review of hazard is critical to the continued dependable performance of all sprinkler systems.
This part outlines procedures for the care and maintenance of a sprinkler system to ensure that it remains fully operational and that periodic assessments are carried out to verify that the protection is appropriate to the hazards.
This document should be read in conjunction with the following:

A. Care & Maintenance
B. Precautions & Procedures when a system is not fully operational
C. Replacement Sprinklers

REPLACEMENT (spare) SPRINKLERS (SEE A&F CLEARANCE CERTIFICATE)
A stock of spare sprinklers shall be kept on the premises as replacements for operated or damaged sprinklers. Spare sprinklers, together with sprinkler spanners as supplied by the supplier, shall be housed in a cabinet or cabinets located in a prominent and easily accessible position where the ambient temperature does not exceed 27 degrees Celsius.

The number of spare sprinklers per system shall be no less than:
- **4 of each kind of concealed sprinkler head**
- **9 of each kind of exposed sprinkler head**

The stock shall be replenished promptly after any spares have been used.

The testing and maintenance to the sprinkler system is to be done at regular intervals. (With the exception of the weekly test) the testing and maintenance is to be carried out by a competent person i.e., engineer of fitter from an LPC accredited sprinkler company.

YEARLY ROUTINE (aligned with BS9251:2021 rules)
The following checks and inspections shall be made at intervals of no more than 12 months The checks and inspections shall be done by an LPC accredited sprinkler company, the checks and inspections shall include:

1. **System to be checked for leaks.**
2. **System Modifications to be checked against BS9251 rules.**
3. **Checking of fire pump signals**
4. **Inspection of sprinkler head cover plates (where practical)**
5. **Exercise Priority Demand valve.**
6. **Any installed sprinkler heads that are damaged shall be replaced.**
7. **All check valves are to be inspected and exercised where practical to do so.**
8. **Tank Ball Valve/s to be exercised.**
9. **The tank Infill pipe flow rate to be tested to meet criteria stated upon the system data plaque in the pumphouse / tank room**
10. **Car Park and Bin Store Trace heating to be checked and tested.**
11. **Water storage Tank water level and exterior to be visually inspected.**

25 YEARLY ROUTINE
The sprinkler heads and pipework's should be inspected and tested in accordance of Annex E in BS9251:2021

PLANNING FOR MAINTENANCE
Where maintenance of a sprinkler system or building fabric is anticipated that will result in impairment of the sprinkler protection, a written maintenance plan shall be prepared by the user and agreed with the authorities prior to commencement of the maintenance work. The requirements shall be in line with "Precautions & Procedures When a System is Not Fully Operational" (within this manual) shall be met.

Where relevant the record cards in this section are provided by A & F Sprinklers Ltd. to enable you to record the results of the tests & procedures which must be carried out as a condition of your insurance.

PROCEDURES FOR SHUT DOWN OF THE WATER SUPPLY OR ANY INSTALLATION

Your premises are vulnerable whenever your Sprinkler System is inoperative; thus, it is essential that the following precautions be taken. Any shut down of the water supply to the sprinkler system or any

action that results in the protection being rendered inoperative must be notified to your insurers IMMEDIATELY.

1. Alterations & repairs to the water supply or the installation should be carried out only during normal working hours so far as is practicable, & all efforts must be made to ensure the sprinklers remain inoperative for as short a time as possible.

2. As much of the sprinkler system as possible must remain operative during progress of the work, particularly where the work cannot be completed in one day.

3. Before the water supply is turned off, a thorough examination of every part of the premises must be made to ascertain that there is no indication of fire.

4. When sprinkler protection is shut down during working hours, Managers & Supervisors must be notified, so that vigilance can be maintained. Where practical, fire doors must be closed, smoking prohibited & hazardous operations controlled, suspended or avoided.

5. When sprinkler protection is shut down outside working hours, before the water supply is turned off, in addition to the precautions outlined in 4 above, a special fire watch by trained personnel may be advisable. In this event fire extinguishers & hose reels should be strategically deployed in readiness for immediate use.

6. The Public Fire Brigade should also be informed.

7. After completion of the work, test the installation & water supply to ensure that they function correctly & that all blank flanges or spades have been removed.

Whenever practicable, maintenance work should be planned in advance & only undertaken after consultation with your insurers.

Always follow installer & manufacturer's instructions.
Only trained personnel or an LPCB approved contractor should undertake tests or maintenance.

8. Occupant Information

Your working environment

In order to achieve a good working environment, it is important that you understand how to control the building services in your space.

Heating:

Cooling:

Ventilation:

Simple energy 'dos and don'ts'

- Avoid blocking electric panel heaters or ventilation grilles with furniture and books as this will result in a lack of heating/ventilation.
- Set thermostats to the required temperature then leave them alone. Do not use them as ON/OFF switches.
- Do not overheat your space as these increases running costs and causes extra emissions of CO_2 into the external atmosphere, contributing to global warming.
- Only switch the lights ON as and when necessary as they result in significant emissions of CO_2 into the external atmosphere, contributing to global warming.
- Shut windows at night for security purposes and to prevent heat loss that could make your space cold when you come in the next day.
- Switch off all manually controlled fans and equipment when not in use; designate a person to ensure this is carried out.
- Ensure that P.C.'s, printers etc. are not left on unnecessarily and have energy saving features enabled as this will prevent your space from overheating and save energy, thereby reducing CO_2 emissions to the external atmosphere.

9. Metering, Monitoring and Targeting Strategy

Metering schedule

The following provides a list of meters and design estimates of the likely end use consumptions. See Action Energy General Information Leaflet GIL 65: *Metering energy use in new non-domestic buildings*, for an example, including how to arrive at a good metering schedule. A copy is provided on the CD-ROM associated with CIBSE TM31 and printed copies are available from (www.actionenergy.org.uk). CIBSE TM22 also provides a means of assessing energy use in buildings.

Total estimated incoming fuel			Electricity: kHz/yr. Other: Litres					
Energy			**Meters**		**Method**		**Meter location**	
Type of incoming energy	Main end-use	Estimated end-use consumption (kHz/yr.)	Meter no./code	End use/ area/system/ circuit or tenancy to be measured	Measurement method and calculation where appropriate	Estimated consumption through each meter (kHz/yr.)	List of meters	Location
Gas								
Water							Incoming BREEAM	Plantroom
Water							Landlord	Plantroom
Water							Hot Water	Plantroom
Water							Water Authority	Boundary
Water							Heat	Plantroom
Water							Heat	Plantroom
Electric	Main LV Switch panel		MP1					LV Switch room
Electric	DB-C-00		DB-C-00					LV Switch room
Electric	DB-LAUNDRY-00		DB-LAUNDRY-00					LV Switch room
Electric	DB-MECH-00		DB-MECH-00					LV Switch room
Electric	DB-LP-00		DB-LP-00					GF Riser
Electric	PV		PV					LV Switch room
Electric	DB-LP-01		DB-LP-					L1 Riser

			01					
Electric	DB-LP-03		DB-LP-					L3 Riser
Electric	DB-LP-05		DB-LP-05					L5 Riser
Electric	DB-LP-07		DB-LP-07					L7 Riser
Electric	DB-LP-09		DB-LP-09					L9 Riser
Electric	DB-LP-11		DB-LP-11					L11 Riser

10. Building Performance Records

(Not more than three pages)

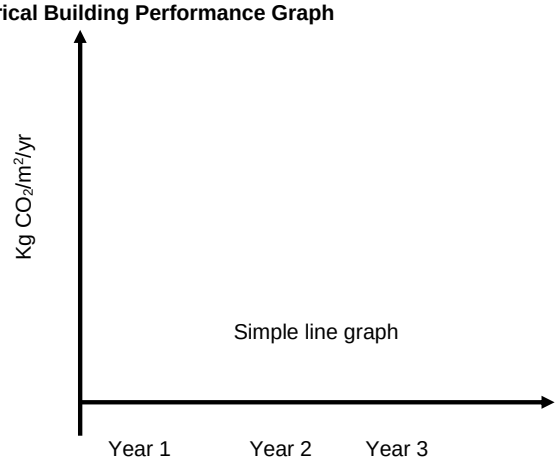
Overall annual energy performance

Summary of overall annual electricity, fossil fuel consumption and CO_2 against simple benchmarks. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building logbooks – a user's guide*. A copy is included on the CD-ROM associated with CIBSE TM31; printed copies are available from (www.energyaction.org.uk).

Building energy performance for period from *[date]* **to** *[date]* **Based on a treated floor area of** ***4027*** **m²**							
Fuel	**Quantity**	**(A)** (kW·h)	**(B)** **CO_2 ratio**	**(C)** (Kg CO_2)	**(D)** **Actual** (Kg CO_2/m^2)	**(E)** **Design estimates** (Kg CO_2/m^2)	**(F)** **Good practice benchmark** (Kg CO_2/m^2)
Gas							
Electricity							
TOTAL							

Ensure that actual consumption figures do not include estimated bills and ensure they relate to a full exact 12-month period. (If not then record actual and adjust by number of days missing/extra). Use the total gross floor area shown in section 5. Multiply column (A) by column (B) to get (C) then divide by treated total building floor area to get (D) for comparison with benchmarks in columns (E) and (F). One overall performance indicator can be established by totalling column (D). Avoid adding column (A) as the fuels have different costs and CO_2 factors.

Historical Building Performance Graph



CIBSE TM22: *Energy assessment and reporting methodology* provides software to help assess building energy performance using either a simple or a detailed approach. This includes benchmarks for a variety of buildings. A wider range of benchmarks is available in the series of Energy Consumption Guides produced by Action Energy

(www.actionenergy.org.uk), e.g. ECG19: *Energy use in offices*, and CIBSE Guide F: *Energy efficiency in buildings*

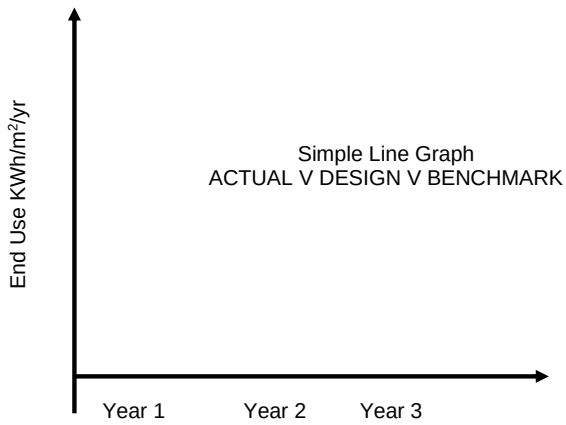
Energy end use comparison

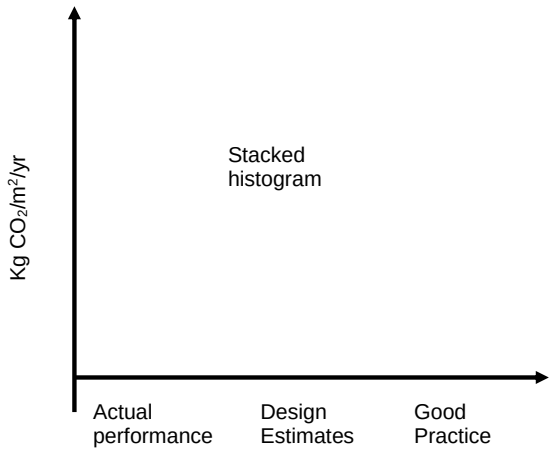
Annual summary of actual metered consumption per square metre and the design team's estimates versus benchmarks broken down by main end-uses. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building logbooks – a user's guide*. A copy is included on the CD-ROM associated with CIBSE TM31; printed copies are available from (www.energyaction.org.uk).

Building energy performance for period from *[date]* to *[date]* **Based on a treated floor area of *38015* m²**					
Fuel type	**Main end use**	**Actual** Metered incoming consumption ((Kw·h)/yr)	**Actual** Sub-metered main end use energy consumption ((Kw·h/m²)/yr)	**Design estimates** Main end use energy consumption (Kw·h/yr	**Good practice benchmark** Main end use energy consumption ((Kw·h/yr)
Electricity	Incoming				
	Lighting				
	Machines				
	General Power				
	Pumps & Fans				
	AC Heat & Cool				

Keep the fuels separate as they have different costs and CO_2 emissions

Historical Graph of End-Use Performance





References

a. *Energy efficiency in offices* Energy Consumption Guide ECG19 (Action Energy) (2000) (www.actionenergy.org.uk)

(2) *Energy Assessment and Reporting Methodology – Office Assessment Method* CIBSE TM22 (London: Chartered Institution of Building Services Engineers) (2003)

(3) *Building logbooks — a user's guide* GPG 348 (Action Energy) (2000) (www.actionenergy.org.uk)

11. System of Maintenance

Emergency maintenance action

Emergency Contact No. 1 **Emergency Contact No. 2**

Maintenance overview

The building is managed by a specialist maintenance contractor and they are responsible in ensuring the correct periodic and preventative maintenance regimes are followed to ensure correct plant and system operation.

Maintenance review

Review period …… **Signed:** ……	**1. Are you reasonably satisfied with the maintenance on this system? (Yes/No)**	**2. Is this system capable of working in all the required modes? (Yes/No)**	**3. If not, is this due to poor maintenance? (Yes/No)**	**Comments/problems?** e.g. maintenance not carried out (give reason) Indicate any major changes to the general arrangement for maintenance including any changes in maintenance regimes or contracts
Above Ground Drainage				
Electric Panel Heaters				
Ambient Air Curtain				
Air Conditioning Unit				
External Condenser Unit				
Dampers (VCD's and Fire)				
Air Terminals & Louvres				
Main Office Toilet Extract Fan				
Water Management Procedures				
Rainwater Harvesting System				

Shower Unit				
Break Tank & Booster Set				
Cat 5 Break Tank & Booster Set				
Hot Water Heaters				
Zip Hydrotap				
Energy Monitoring Control System inc Water Leak Detection System				
Gas Installation				
Electrical Installation				
Fire Alarm				
Emergency Lighting				
Disabled Refuge				
Assisted Toilet Alarm				
EV Chargers				
Lightning Protection				
Lift				

Maintenance/plant failures

Facilities manager to insert a summary of any major plant failures and how these relate to the maintenance regimes or contracts. This should describe what happened, when, why and what action was taken to overcome the problem.

12. Major Alterations

Any major alterations made to the building, its services, its operation or management should be logged below, e.g. boiler replacement, BMS upgrade, changes in use, new management regime etc. Each change should be signed and dated by the facilities manager alongside the other page numbers of the logbook that have been updated/added to reflect the alteration.

Description of alteration	Other logbook pages updated or added	Signed	Date

13. Results of In-use Investigations

Defects liability work

Facilities manager to insert a summary of any major remedial work in the period between practical completion (handover) and the end of the defect's liability period

Post occupancy evaluations

Facilities manager to insert a summary of any post occupancy evaluations, e.g. investigations of energy performance and/or occupant satisfaction.

Surveys

Facilities manager to insert a summary of results from any maintenance, condition or energy surveys.

Appendix: Relevant Compliance and Test Certificates

This appendix should act as a focal point to hold copies of all relevant key certificates/test reports etc, including:

Please refer to mechanical and electrical operation and maintenance manuals Section 6 for all relevant commissioning and test results applicable to the main contract.