2.2.7 Building Log Book

Project Number – P22-036

Plot 4000 Gateway 14 – Stowmarket

Building Logbook | November 2023

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Contents

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
	Document handed over			06.11.23

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: November 2023

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	ESP Utilities Group – 0800 7316945
Gas Emergency Contact	Not Applicable
Water Emergency Contact	Anglian Water - 03457 145 145
Lead Designer Contact Name	Frank Shaw Associates – Matthew Bentley
Building Services Design Contact Name	W M Building Services (Leicester) Ltd - Lee Sutton
Principle Contractor	Winvic Construction Limited
Mechanical Services Installer	W M Building Services (Leicester) Ltd
Commissioning Managers Name	Winvic Construction Ltd - Lee Evans
Electrical Services Installer	Walter Miles Electrical Engineers Ltd – Daniel Pick
Planning Supervisor Name	
O&M and Logbook Author Name	WMBS (Lee Sutton) & WMEE (Daniel Pick)
Mechanical & Electrical Consultant	Hydrock KTA
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 Pipework Test Sheet	Yes	Yes	Yes	
Hot & Cold Water Pipework Test Certificates	Yes	Yes	Yes	
TMV Test & Hot Water Balancing Reports	Yes	Yes	Yes	
VRF Heating & Cooling Test & Commissioning Certificates	Yes	Yes	Yes	
Ventilation Air Balance Reports	Yes	Yes	Yes	
WC Extract Air Balance Sheets	Yes	Yes	Yes	
Energy Monitoring & Leak Detection Commissioning Certificate	Yes	Yes	Yes	
Fire Damper Certificates	Yes	Yes	Yes	
Rainwater Harvesting Commissioning Sheets	Yes	Yes	Yes	
Electric Water Heater Commissioning Reports	Yes	Yes	Yes	
Electric Panel Heater	Yes	Yes	Yes	

Commissioning Reports				
Electric over door heater commissioning report	Yes	Yes	Yes	

Air infiltration

A building air pressure test was carried out on the 31st October 2023 and showed a measured air permeability 1.46 which was within the specified target refer to building manuals for full rest report.

Handover

Handover took place on: 06/11/23

End of defects liability period: 05/11/24

The handover procedure was managed by: Mick Bacon (Project Manager)

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

5. Overall Building Design

General description of building

The following mechanical services have been provided:

- External site wide mains cold distribution pipework & entry locations to Warehouse.
- External 125mm MDPE sprinker infill main from dedicated branch from incoming fire main with isolating valve to future sprinkler tanks.
- External 180mm MDPE hydrant ring main from dedicated branch from incoming fire main with isolating valves and 12No hydrants
- Main offices rainwater harvesting system to serve flushing cisterns c/w external 5,000 litre storage tank, pumps, UV filtration, pipework, insulation and controls with pipework routed to main office sanitaryware.
- Main Offices electric panel heaters to cores, toilets and circulations with electric over door heater to main reception.
- Distribution Offices electric panel heaters to cores, toilets and circulations
- Main offices VRF heating & cooling system with cassette indoor units, external condensers located on internal plant decks & all condensate disposal systems.
- Distribution offices VRF heating & cooling system with cassette indoor units, external condensers located on internal plant decks & all condensate disposal systems.
- Welfare DX split heating & cooling system with cassette indoor units, external condensers located on internal plant decks & all condensate disposal systems.
- Primary supply and extract ventilation serving main offices, with heat recovery air handling units to plant deck, ductwork distribution incorporating attenuators, fire dampers, volume control dampers and room air terminals.
- Primary supply and extract ventilation serving distribution offices, with heat recovery air handling units to plant deck, ductwork distribution incorporating attenuators, fire dampers, volume control dampers and room air terminals.
- Void mounted heat recovery supply and extract ventilation serving welfare office, with heat recovery air handling unit within the ceiling void on each floor, ductwork distribution incorporating attenuators, fire dampers, volume control dampers and room air terminals.
- Toilet extract ventilation to main offices & distribution offices including, twin toilet extract fan to plantrooms, ductwork distribution incorporating attenuators, fire dampers, volume control dampers and room air terminals.
- Mains cold water services system to serve all cold outlets within the building, incorporating pipework, valves, controls and thermal insulation.
- Hot water to main offices and distribution offices by local electric hot water heaters including pipework, valves, controls and thermal insulation.
- An automatic controls system and BMS to monitor and control the complete building services package c/w front end.
- An above ground drainage system to remove waste water from all sanitaryware appliances throughout the building to drain.
- Thermal insulation to all domestic hot and cold water services as necessary.
- The chlorination of all domestic hot and cold water systems serving all new installations.
- Commissioning and balancing of all 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:

Mechanical Design Criteria

Design Criteria

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

External	
Winter	-3.0°Cdb, 100%RH
30	28°Cdb / 20°Cwb for thermal loads

Internal				
Area	**Temperature**		**Infiltration**	**Mechanical**
	Winter	***Summer***		
Offices	21°C	23°C	0.5	12l/s/p
Reception	21°C	23°C	0.5	12l/s/p
Toilets	19°C	N/A		10 ach
Cleaners	16°C	N/A		10 ach
Circulation Areas	18°C	N/A		N/A
Warehouse	N/A	N/A		N/A

Internal Heat Gains	
Occupancy	85W/person 55W/person latent
Office Lighting	15W/m2
Main Office Power	25W/m2
Occupancy	
Offices	1 Person per 10 m²
Fresh air temperatures	
Winter	21°C db
Summer	Ambient
Air filtration	
Office fresh air supply	G4/F7
Noise Criteria	
Office Areas	< NR 38
Toilets	< NR 40
Circulation Areas	< NR 40
Cleaners	< NR 40
External	NR65 @ 1MTR from Building
Hot & Cold-Water Services	
Max Velocity	1.5m/s 15 – 50mm DIA
Pressure Drop	To suit available head requirements
Ductwork	
General Supply & Extract Systems	
Max duct velocities	Plantroom ducts: 6m/s Riser ducts: 6m/s Main ducts: 5.5m/s Branch ducts: 4.5m/s Final connections: 3m/s
Max louvre face velocity	Air Intakes 3.0 m/s through free area Air Exhausts 3.4 m/s through free area
Max duct pressure drop	1.0 Pa/m

The following electrical services have been provided:

- HV Switchgear
- HV cabling
- HV/LV transformers
- LV tails from transformer to main LV panel
- Main LV panel boards
- Installation of local DB's
- Installation of small power and lighting to the offices
- Installation of warehouse exit door emergency exit lighting
- Installation of dock door busbar and isolators
- Installation of L1 fire alarm system to the offices
- Installation of M1 (manual only) fire alarm to warehouse
- Installation of Disabled refuge system
- External lighting
- Installation of power and fire alarm containment to the offices
- Installation of containment to warehouse
- Mechanical supplies in the offices
- Installation of EVC points to car park

Electrical Design Criteria

Design Criteria

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

Internal Lighting

Area	Lux
Offices	400
Circulation	150
Reception Desk	500
Reception area	300
Toilets /lockers	200
Plant Areas	200
Stairwell	150
Tea Room/Kitchen	400

External Lighting

Area	Lux
Roadway	20
Car Park	20
Pedestrian walkways	10
Pedestrian Crossing	100 (horizontal 50 Min (vertical)
Cycle store	20
Main Entrance	50
Gatehouse	50
Lorry Park	50
Loading/unloading	50

Emergency Lighting

Designed to comply with BS5266

Fire Alarm System

L3 system designed in accordance with BS5839.

Distribution Boards

Sized to suit number of connected circuits plus 25% minimum spare capacity.

Lighting Protection

System in accordance BS EN 62305: 2011

Special design features

The services are energy efficient based on high efficiency heat recovery air handling units, rainwater harvesting zoning of VRF heating and cooling to open plan offices, 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 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.

Key interactions

The HVAC systems will interact with the building, zone and individual room occupancy to offer increased energy savings.

The VRF central controls system is paramount in ensuring that the high efficiency & modern technologies employed on this building are used to their maximum effect to maintain indoor air temperature and quality during variances in outdoor weather and occupancy changes. The offices are split into several heating/cooling zones throughout the building to ensure optimum conditions and energy efficiency.

Office lighting is controlled via PIR's with a maximum of 6 fitting / PIR. Daylight override is provided to the main offices consisting of perimeter zones to the windows 4m deep by 6m long maximum with adjustable level sensing to provide dimming to 10% of maximum.

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

Supply ventilation to comply with building regulations has been installed to the occupied offices and areas, it should be noted that occupancy densities over the stated design criteria and occupancy levels figures may result in insufficient air quality to this space and this should be monitored, and corrective balancing measures taken to comply with building regulation Part F.

The building provides excellent natural lighting to the offices due to large expanses of external glazing and glazed partitions to internal cellular offices.

All temperature-controlled areas of the building are provided with small or individual control zones fitted with adjustable temperature sensors, these temperature sensors operate the VRF fan coils and can be used for mode selection, temperature adjustment, fan speed etc. The core areas are fitted with electric panel heaters with integral temperature control.

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 air source heat pumps, rainwater recovery 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.

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 1048020.90m^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**		
Main Office								
Offices					972.42		0.09	**972.42**
Fallow Area (1st Floor)	955.4						0.091	**955.4**
Toilets						13.2	0.001	**13.2**
Corridors/Circulation				143.84			0.014	**143.84**
Cleaners						6.62	0.001	**6.62**
Risers/Lifts	27.6						0.003	**27.6**
Plant Deck	961.87						0.092	**961.87**
Warehouse	1043316						99.551	**1043316**
Distribution Office 1								
Offices					469.33		0.045	**469.33**
Toilets						4.05	0.0004	**4.05**
Corridors/Circulation				81.66			0.0078	**81.66**
Cleaners						4.03	0.0004	**4.03**
Risers	4.95						0.0005	**4.95**
Plant Deck	241.18						0.0230	**241.18**
Distribution Office 2								
Offices					469.33		0.0448	**469.33**
Toilets						4.05	0.0004	**4.05**
Corridors/Circulation				81.66			0.0078	**81.66**

Cleaners						4.03	0.0004	**4.03**
Risers	4.95						0.0005	**4.95**
Plant Deck	241.18						0.0230	**241.18**
Welfare Office								
Offices					13.55		0.0013	**13.55**
Total (%)	99.78			0.029	0.184	0.003	**100.00**	
Total area (m^2)	**1045753.13**			**307.16**	**1924.63**	**35.98**		**1048020.9**

Tenancies

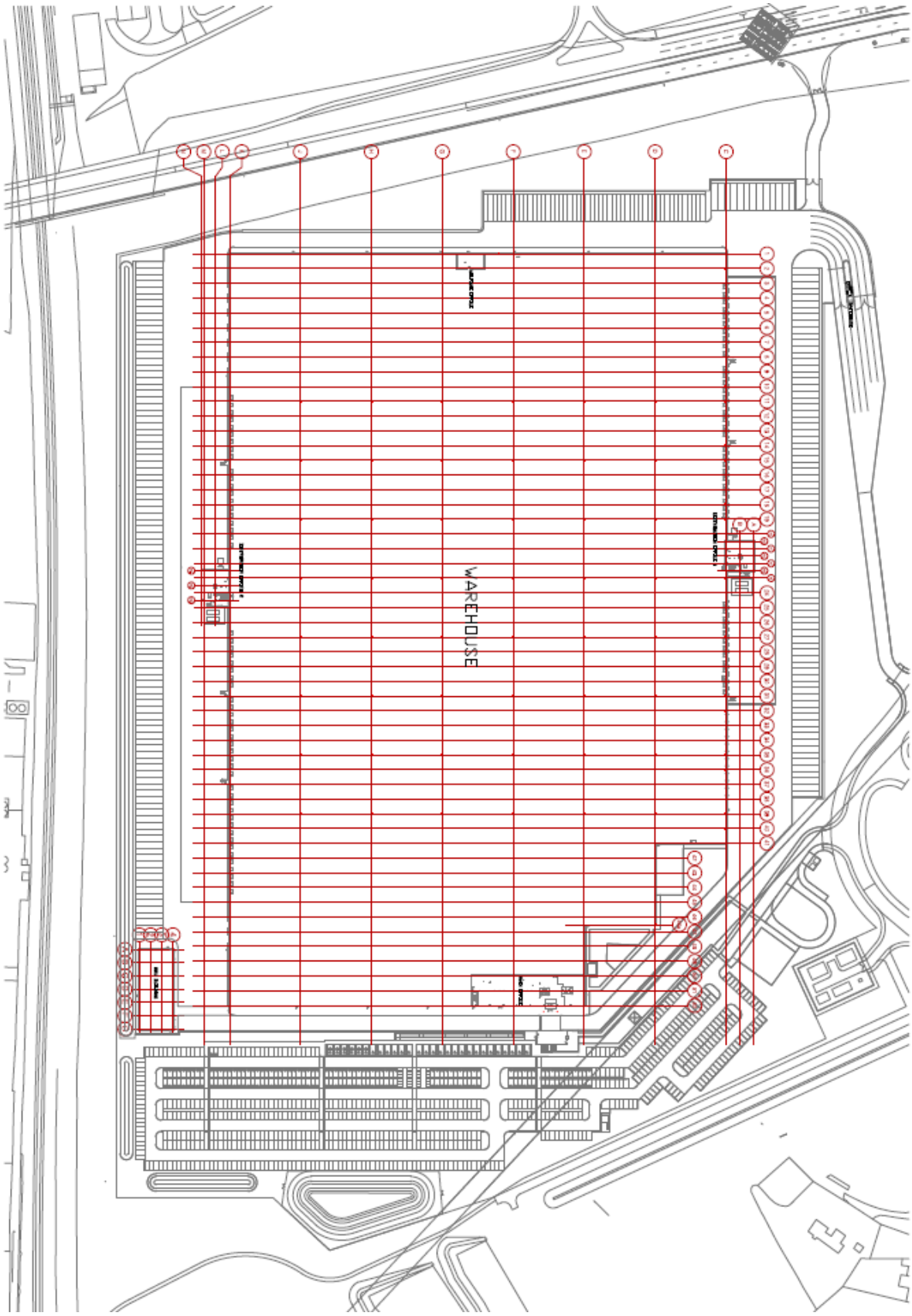
Not applicable

Separately managed and special areas

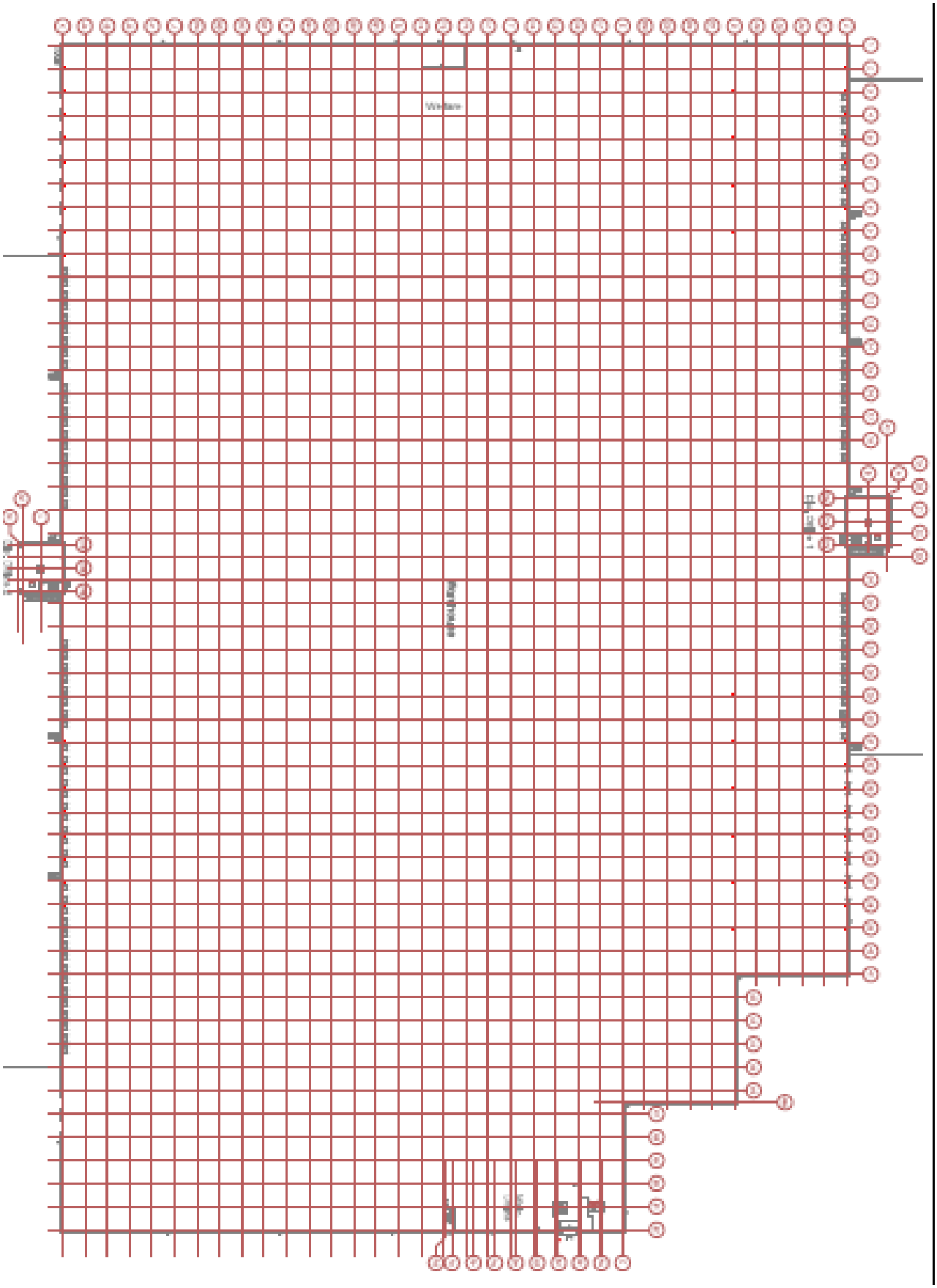
Not applicable

Floor plans

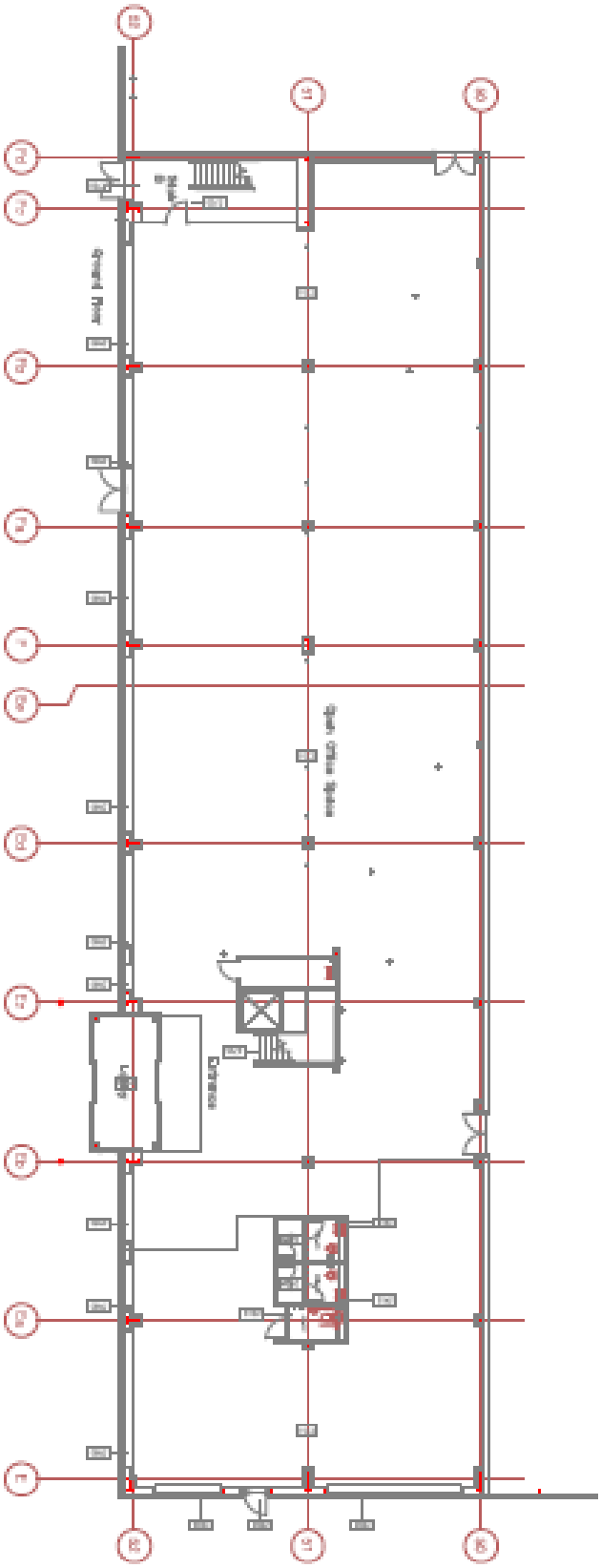
SITE



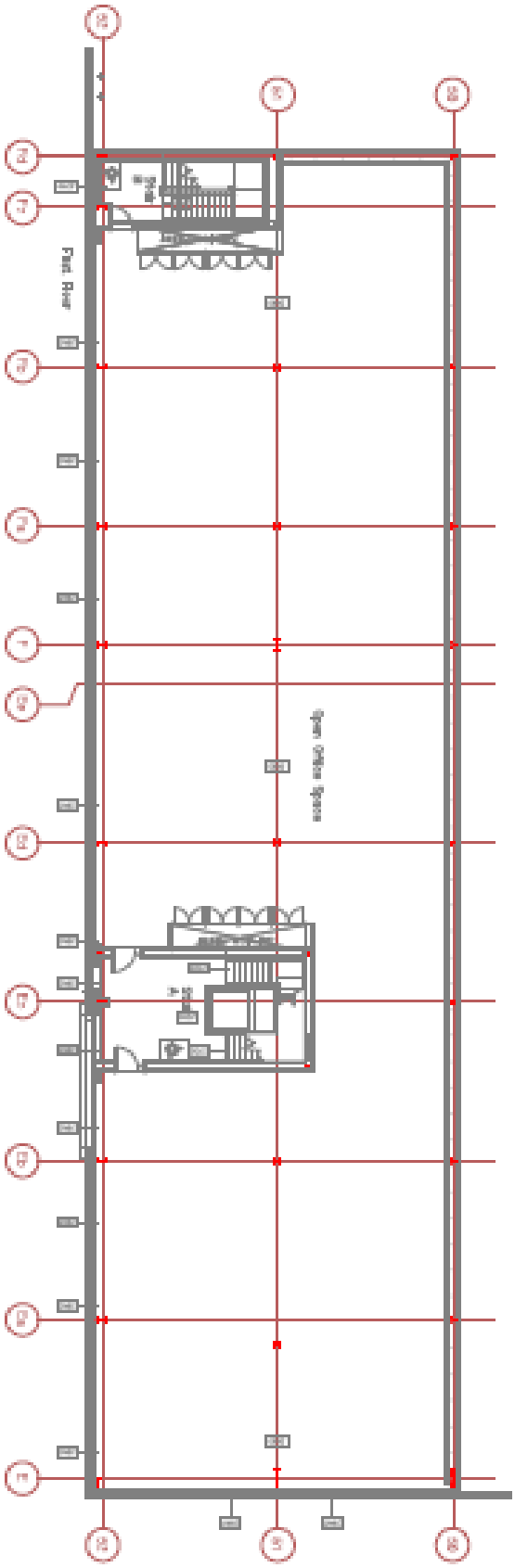
WAREHOUSE



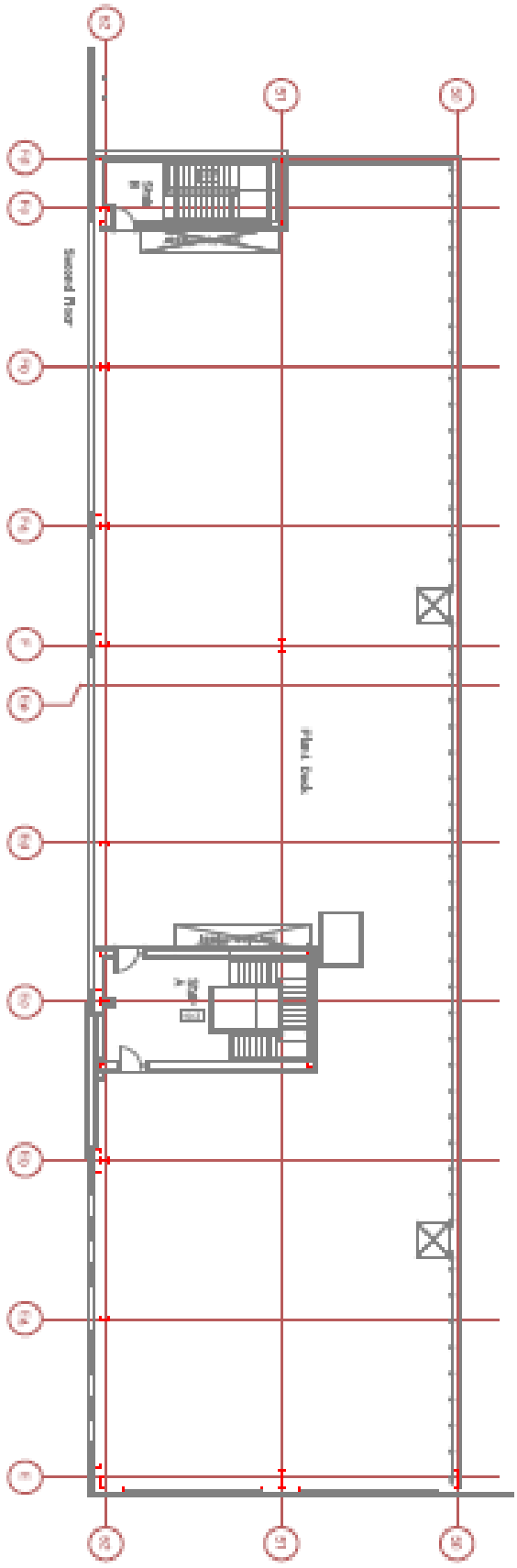
MAIN OFFICE GROUND



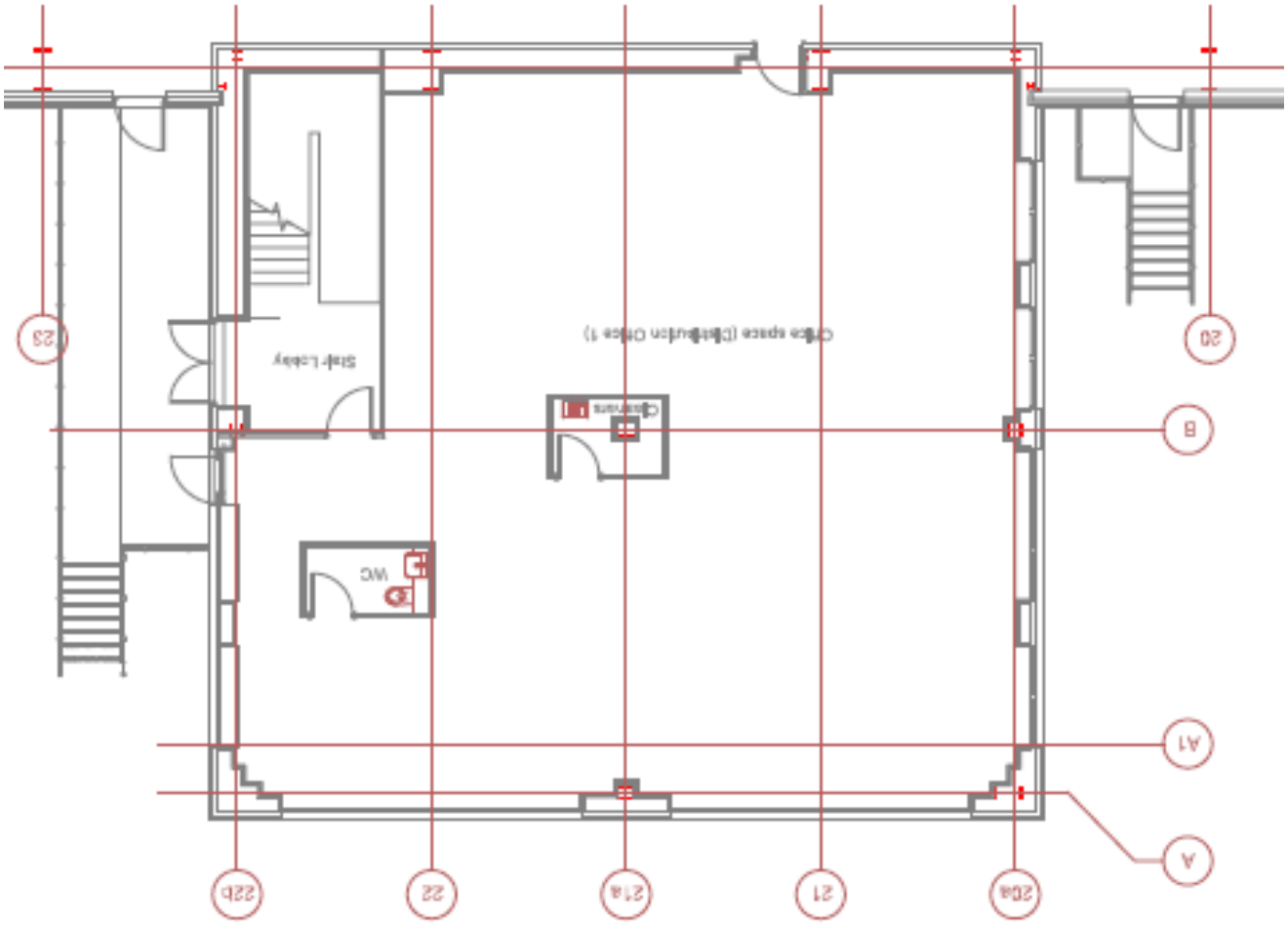
MAIN OFFICE FIRST



MAIN OFFICE PLANT DECK



DISTRIBUTION OFFICE No. 1 GROUND



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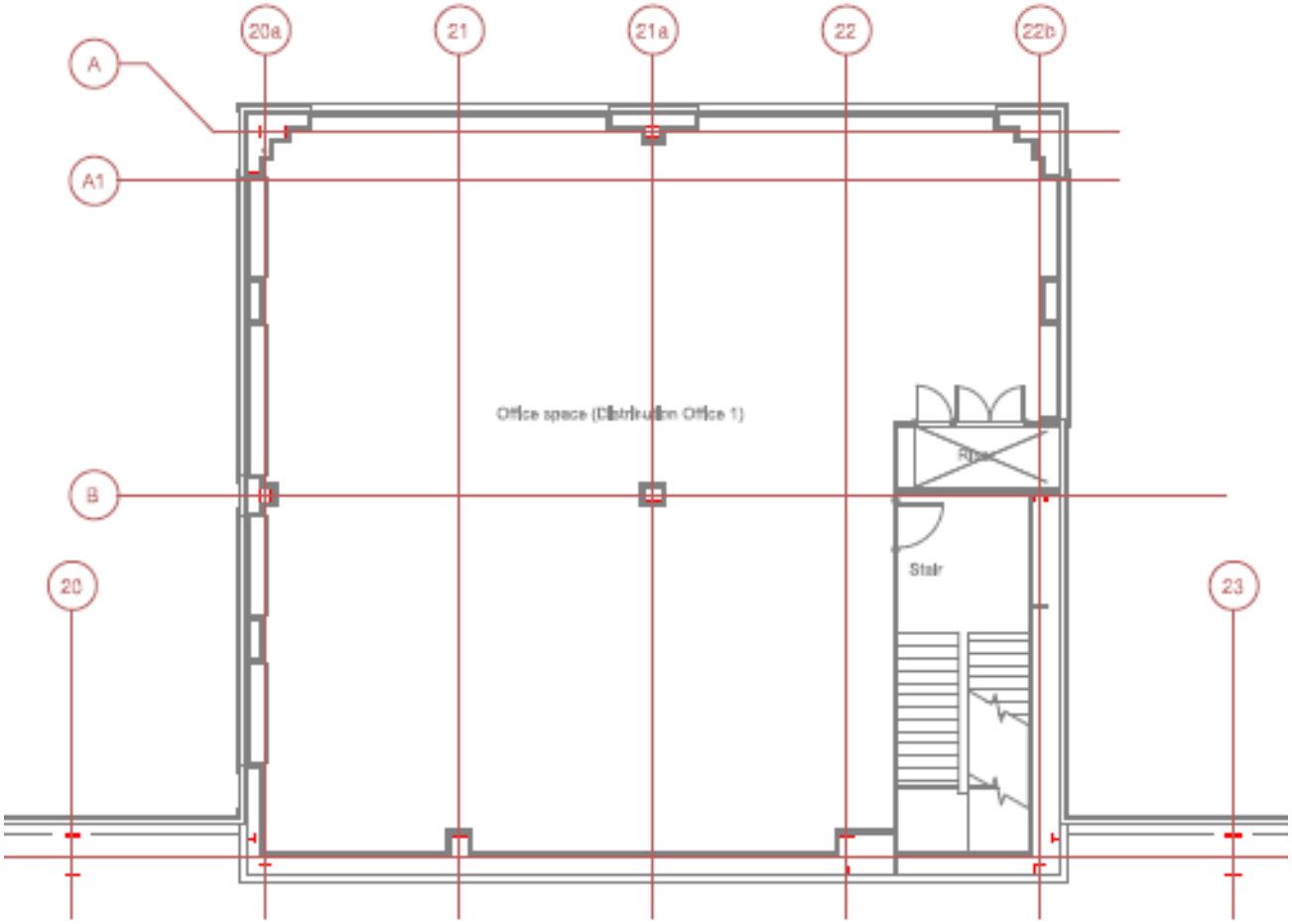
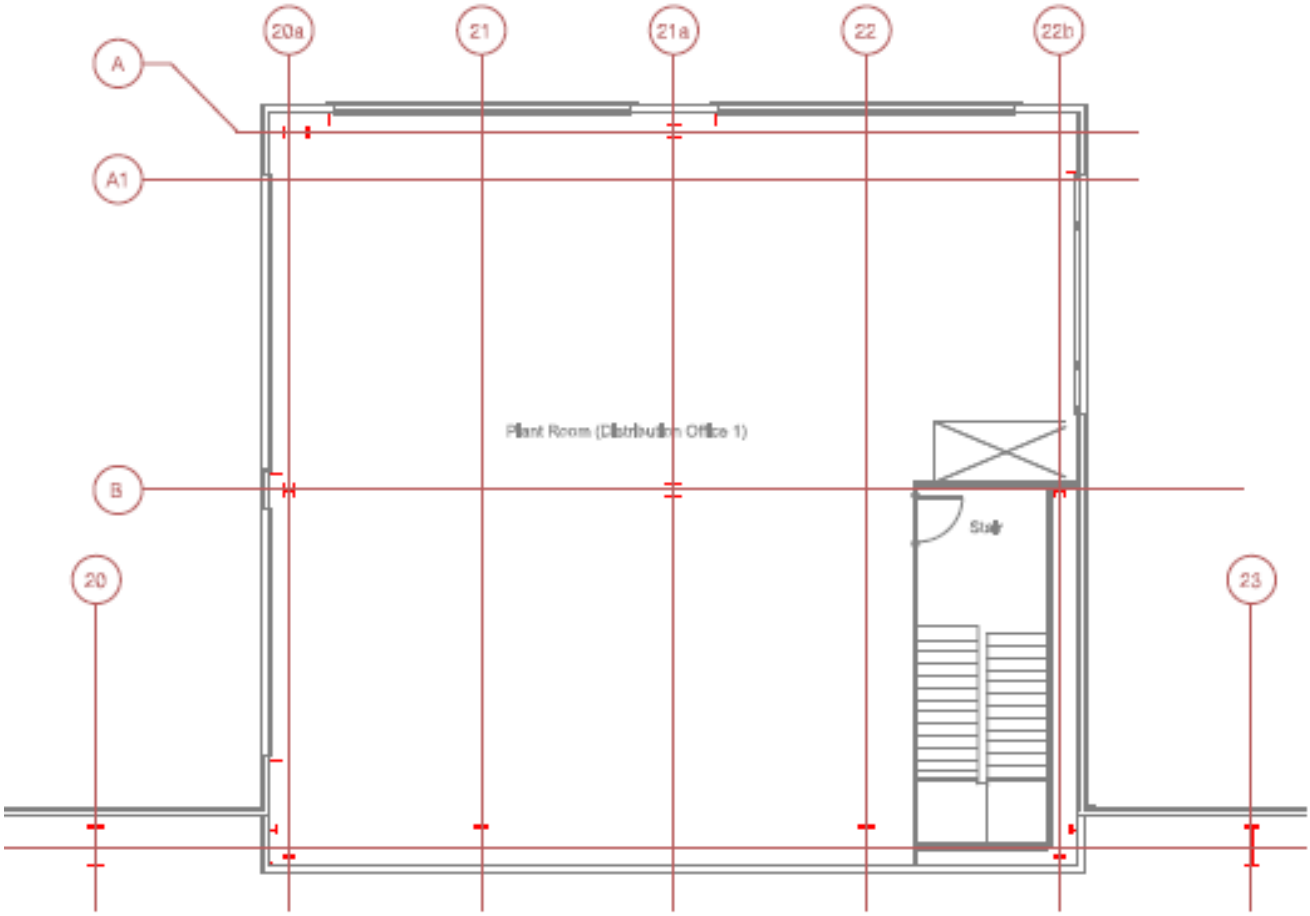
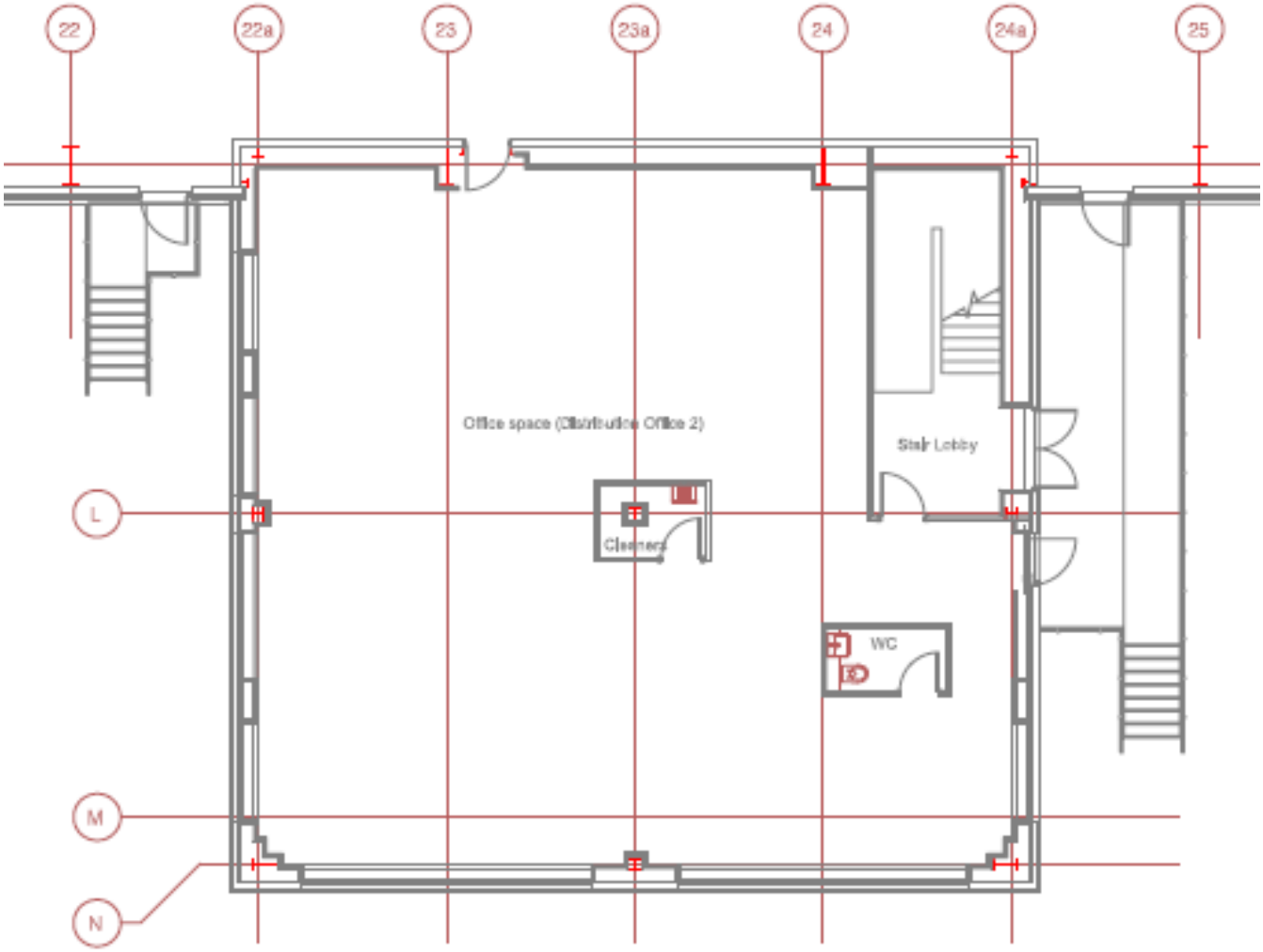


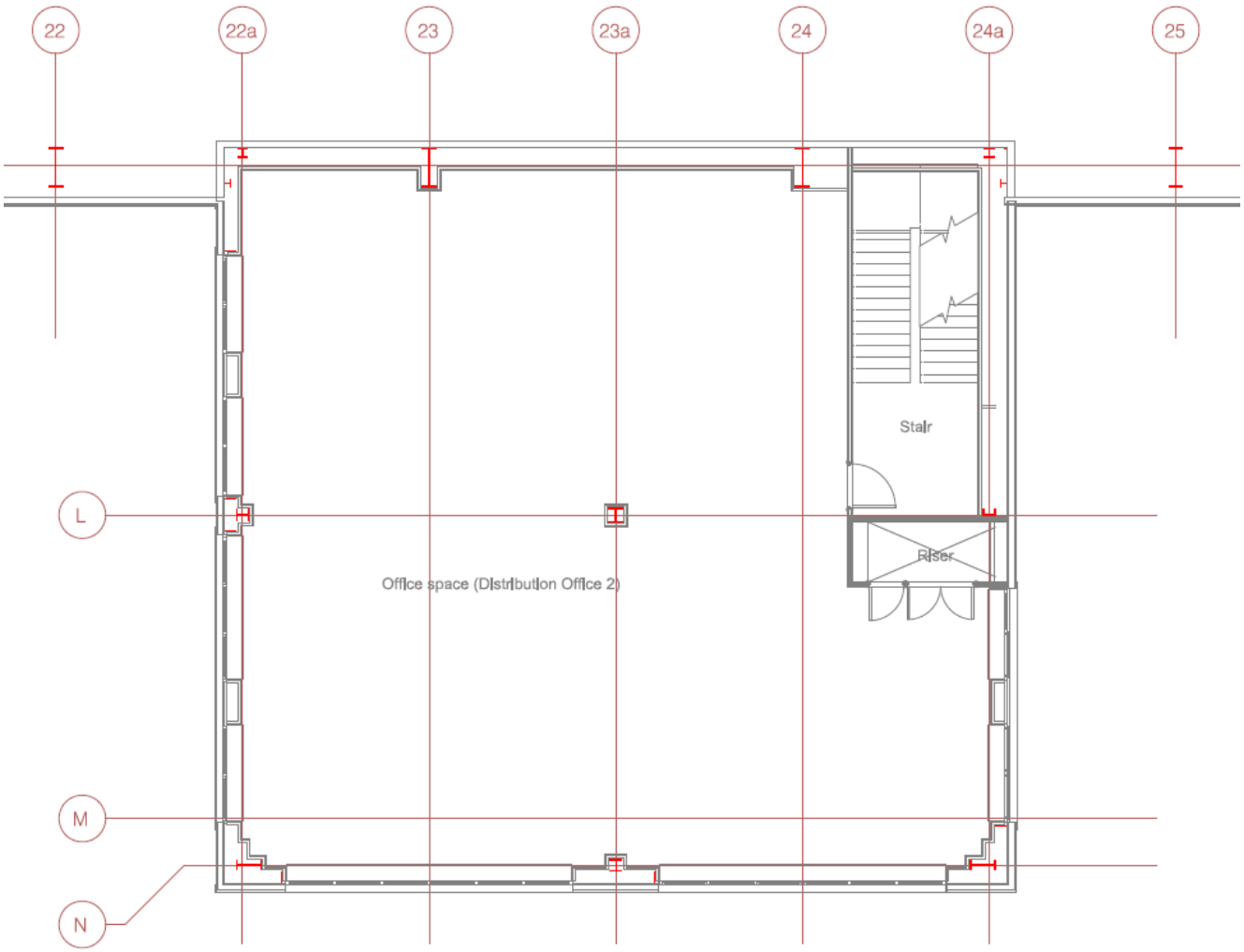
DISTRIBUTION OFFICE No. 1 PLANT DECK



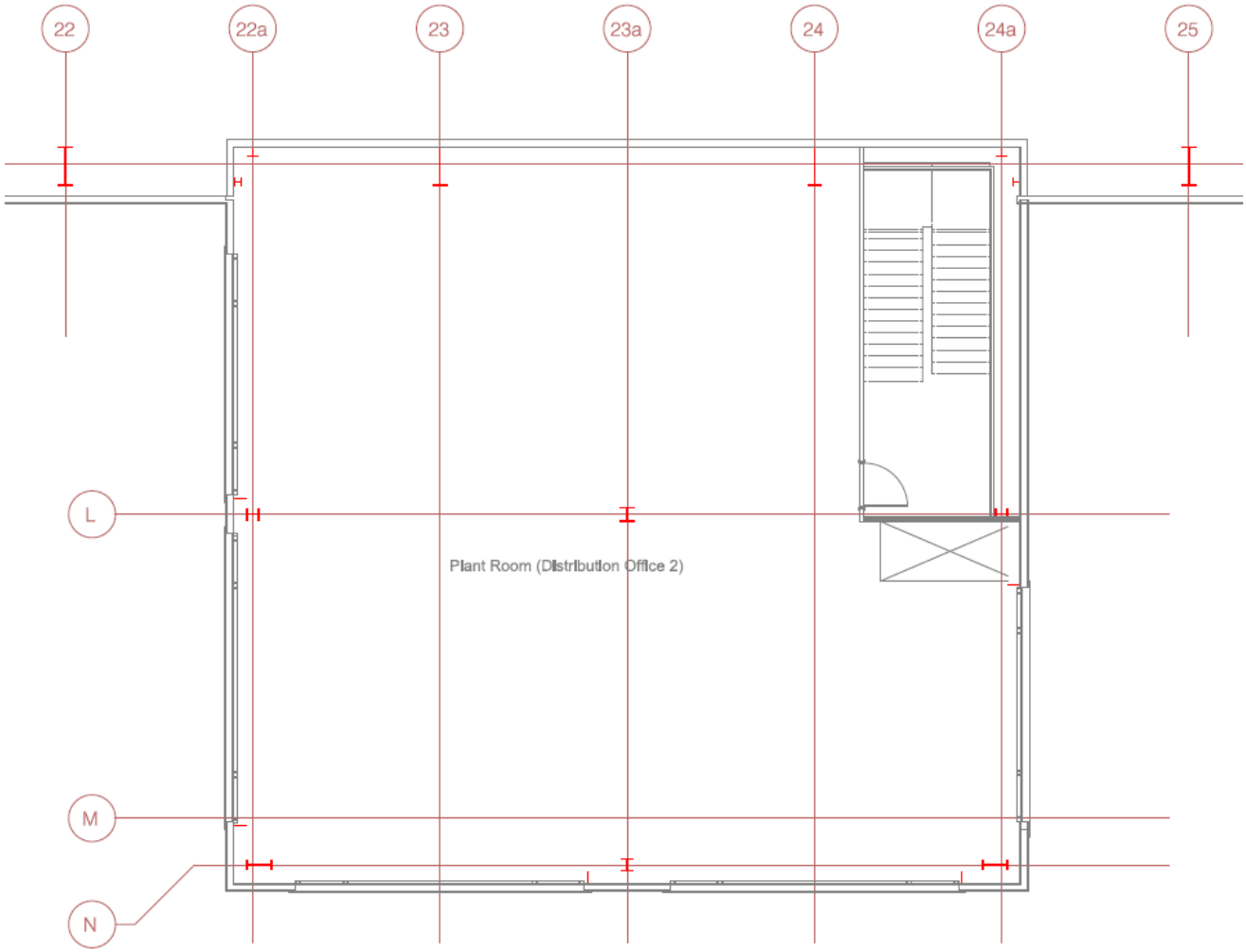
DISTRIBUTION OFFICE No. 2 GROUND



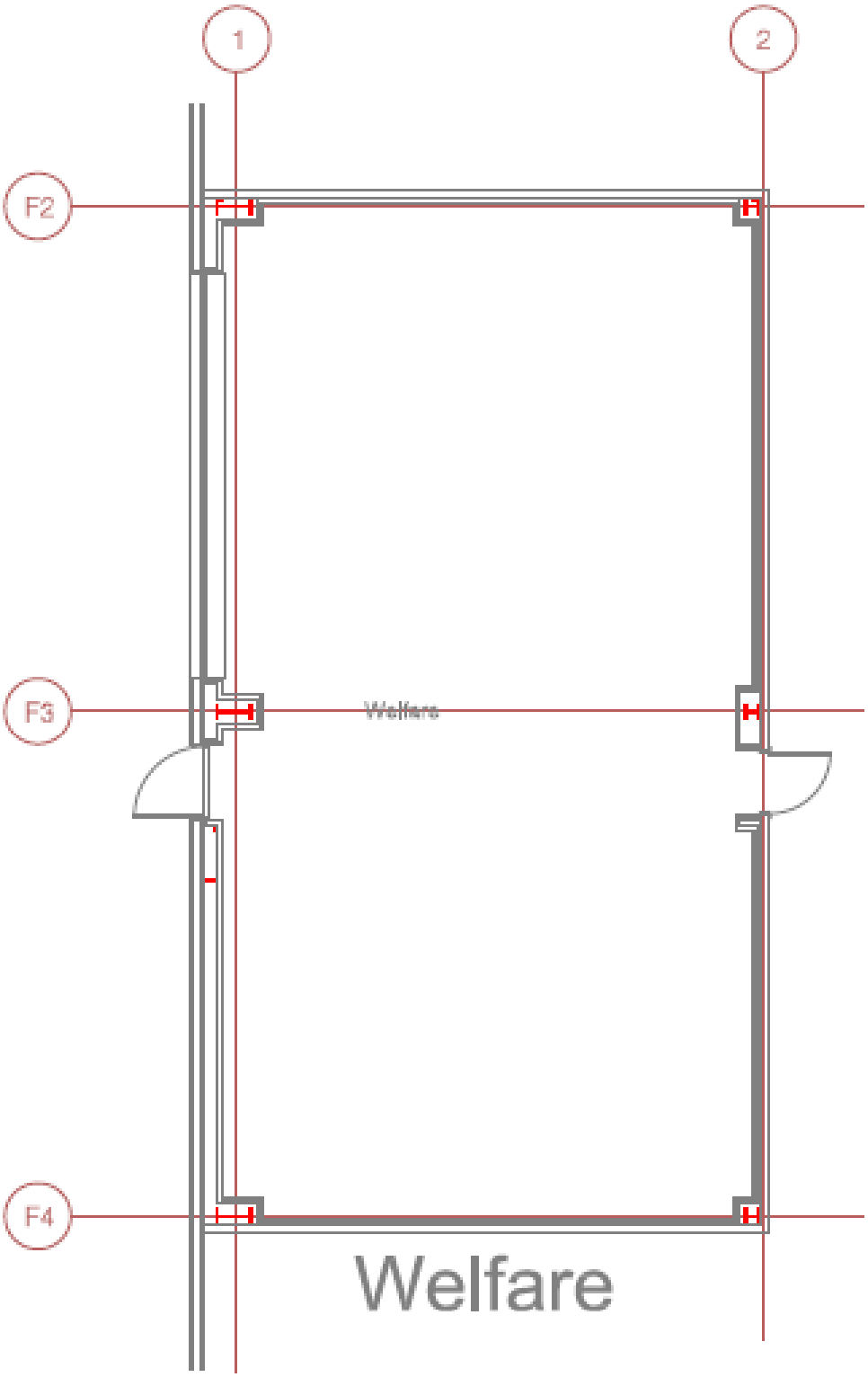
DISTRIBUTION OFFICE No. 2 FIRST



DISTRIBUTION OFFICE No. 2 PLANT DECK



WELFARE OFFICE



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
VRF Condenser	Main Office Plant Deck	32.00	112.00
Distribution Office VRF Condensers	Distribution Office 1 & 2 Plant Deck	36.00	126.00
Welfare Office DX Condensers	External	4.57	16.00
Electric Overdoor Heater	Main Office Reception	15.0	15.0
Heat Recovery Units	Main Office Plant Deck	14.0	9 EHB
Heat Recovery Units	Distribution Office Plant Deck	21.0	9 EHB
Toilet Extract Fans	Main Office & Distribution Office Plant Deck	1.48	
Electric Panel Heaters	All Areas	10	10
Local Heat Recovery Units	Welfare Office Ceiling Void	0.165	
Electric Water Heater	Hub Office Plant Deck	14	

SYSTEMS:

Mechanical Services

Description	Drg No:
Schematic Services	P22036-WMB-MO-ZZ-DR-M-0100 Series
Electric Heating Services Layout	P22036-WMB-MO-ZZ-DR-M-0200 Series
Domestic Water Services Layout	P22036-WMB-MO-ZZ-DR-M-0300 Series
DX Heat Pump/VRF Services Layout	P22036-WMB-MO-ZZ-DR-M-0400 Series
Public Health Services Layout	P22036-WMB-MO-ZZ-DR-M-0500 Series
Ventilation Services Layout	P22036-WMB-MO-ZZ-DR-M-0600 Series
Mechanical Wiring Layout	P22036-WMB-MO-ZZ-DR-M-0900 Series
External Services	P22036-WMB-MO-ZZ-DR-M-0800 Series

MAIN OFFICES

HEATING

The toilets, corridor and stairs and where not heated by VRF heat pump system and heat loss is in excess 100 watts heating are to be provided with standalone electric panel heater with integral time and temperature control. LST style electric heaters are provided to disabled toilets.

Over the main entrance doors to the reception a 15 kW recessed electric over door curtain has been provided with facility for link to BMS and local wall mounted controller.

MAINS COLD WATER SERVICES

A new MDPE protectaline cold water main enters the building within the warehouse and is routed to high level in the warehouse and across the main office plant deck level where it serves the rainwater harvesting system and drops in riser to ground floor.

Mains cold water services pipework distributes within office ceiling voids and risers to serve the following equipment/systems:

- Main Office toilet areas
- Main Office Hot water heater unvented kits
- Rainwater harvesting make up

To assist in BREEAM credit collection toilet PIR detection is fitted to each space and linked to two port control valves, on detection the valves will open to allow water to fill cisterns and basins, during periods without occupation the valves will remain closed.

An electromagnetic water conditioner is fitted within the plant deck to reduce the effect of limescale, the system uses a zinc sacrificial anode with unique electronic controls.

Mains cold water pipework is installed to all outlets with service valves within 300mm of the appliance.

All pipework where concealed, within voids, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

RAINWATER HARVESTING SYSTEM

A rainwater harvesting scheme is to be provided to the following areas:

- Main Offices sanitary appliances
- External watering point

The general principle is that rainwater is collected at office roof level and connected via the gravity downpipes to the inlet of a 5000-litre underground rainwater storage tank provided with leaf filter to remove larger heavier particles within the rainwater disposal system.

The filtered water discharges from the filter into the storage area of the tank through an inlet calmer. Any rainwater discharged into the tank whilst full will be diverted to drain from a tank connection.

The pump chamber of the tank is fitted with a 600mm diameter access turret and the filter with a 600mm diameter access turret and standard duty cover for on-going maintenance and inspection. The storage chamber access manway provides access to twin pump set, level sensors and the connection of MDPE pipework to the pump. The pump is provided with check valve and floating suction filter.

The main storage chamber is fitted with an overflow to discharge excess water to drain and encourage the removal of floating particles within the tank.

The pump discharge water via Black/green striped MDPE to the office entry location within the warehouse, from this point the MDPE converts to copper tube with isolating valve and rises to second floor plant deck.

The system is complete with automatic controls system to monitor and control the entire rainwater system, all floats, pumps, micro switches and solenoid valves are wired back to this combination unit in the plantroom, rainwater and make up water check meters linked to the BMS are fitted at this location.

The system is a pressurised system which incorporates a one piece 400 litre header tank for the internal storage of rainwater within the processing unit. The below ground inlet pipework is piped to an open connection on the header tank which discharges recovered rainwater into the tank a float valve is incorporated which under control of a solenoid valve will allow mains water make up under the dictates of the micro switch within the header tank, a twin pump booster set is contained within the combination unit for pressurised discharge.

From the pumped discharge connection isolating valve copper pipework distributes to the offices ceiling voids to serve all sanitary appliances on all floors with service valves within 300mm of the appliance.

Proximity PIR detection is fitted to each space and linked to two port control valves, on detection the valves will open to allow water to fill cisterns, during periods without occupation the valves will remain closed.

All pipework conveying recovered rainwater will be insulated and identified clearly as rainwater and not for drinking, all cisterns with be fitted with labels to identify the water serving them is from a non-drinking water supply.

All pipework where concealed, within voids, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

HOT WATER SERVICE

The domestic hot water to the main office toilets and cleaners rooms are provided from local unvented electric hot water heaters.

The hot water is generated locally from a Hyco multi-point unvented electric water heater located at low level in the toilet vanity units, IPS or high level.

The unvented water heaters are fitted with expansion kits consisting of isolating valve, check valve, pressure reducing valve, expansion vessel and pressure relief valve. The pressure relief valve discharges to Hepworth dry traps connected to the foul waste pipework.

To ensure hot water is provided to the draw off without delay lengths of uncirculated pipework will be kept to a maximum of 3m for unblended water and 2m after any blending valve installation.

Thermostatic blending taps are incorporated on hot water outlets to disabled wash basins. General basins shall be supplied with TMV3 blending valve, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed and within vanity units/IPS are fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

PUBLIC HEALTH SERVICES

The public health installation is installed throughout the building to collect the soil and waste from each sanitary appliance. The installation shall also prevent the transmission of foul air in to the building. Ventilated stacks and branch pipes shall be installed throughout the floors and shall discharge to atmosphere with vent cowl.

All appliances discharge foul water into stacks installed to concealed locations within IPS or voids etc, each stack is fitted with an inspection cover at 1.0m a.f.f.l. on each floor. Fire collars are fitted where the p.v.c. 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.

VRF HEAT PUMP

The ground floor open plan offices are heated and cooled with the installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery. Two systems are installed in total as below:

- System 1 – Ground floor north
- System 2 – Ground floor south

The VRF air conditioning systems have the flexibility to provide heating and cooling simultaneously to all units, which means that two adjacent spaces can be operated differently at any one time due to the incorporation of solenoid valve kits to the system.

Condensers are sited internally on the main office second floor plant area and are charged with R410A refrigerant gas which when activated pumps the refrigerant around the systems to a series of solenoid valve kits via refrigerant grade pipework insulated with class O armaflex on galvanised metal tray. The solenoid valves are energised in the correct sequence to give heating or cooling within the dedicated space.

The indoor evaporator elements of the system are all four way standard cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan and discharge louvres.

All the indoor units are connected via a two-wire control cable to a central controller mounted on the plant room BMS panel facia, this allows each individual unit to be addressed and controlled independently. All indoor units are fitted with return air sensors mounted within the cassette, room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

uPVC condense pipework is installed within the ceiling void and connects to all indoor units the unit drains are pumped from an integral pump. The condense drain terminate with 32mm Hepworth HepVo dry traps to local soil stacks.

GENERAL OFFICES SUPPLY & EXTRACT VENTILATION

The ground floor office space ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second floor plant deck.

The air handling units incorporates the following equipment:

Supply Side	-	Motorised air inlet damper
	-	G4 Pleated panel filter
	-	F7 Rigid bag filter
	-	Access section
	-	Plate Heat Exchanger
	-	Supply fan
	-	Access section
	-	Electric Heating Coil
	-	Discharge spigot
Extract Side	-	Motorised exhaust air damper
	-	G4 Pleated panel filter
	-	Access section
	-	Extract fan

- Plate Heat Exchange c/w face & bypass damper
- Access section
- Discharge spigot

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the main office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments will be fitted with standard fusible link fire dampers and access doors, any through protected route walls will be fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units will be achieved via the onboard control system which under the dictates of a temperature sensor located in the supply air duct will modulate in sequence the face and bypass damper and electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through swirl diffusers, the extract from the space uses identical swirl diffusers.

All primary grilles and diffusers will be fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible insulated ductwork a maximum of 500mm long. Where required the supply diffusers will be provided with blanking plates or reduced neck boxes to ensure the correct throw and distribution of air within the space.

All plantroom and ceiling void fresh air, supply and extract ductwork is fitted with mineral wool thermal insulation with identification applied to insulated and un-insulated ducts in accordance with the specification.

TOILET EXTRACT SYSTEM

The main office toilets and cleaners' room is provided with extract ventilation from a dedicated twin extract fan mounted located internally on the main office second floor plant area.

The toilet extract system consists of a series of circular extract valves to the core area toilets on all floors connected via galvanised extract ductwork distribution system. A twin direct drive fan set with auto-changeover controls, back draught shutter and BMS interface is fitted internally and supported with internal anti-vibration mountings and flexible connections.

The exhaust air ductwork is extended around the plant deck from the fan to connect to external louvre

The toilet extract ductwork from the unit connection drops into the main riser to the ground floor ceiling void, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments will be fitted with standard fusible link fire dampers and access doors, any through protected route walls will be fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

The fan is fitted with an integral auto-changeover panel which indicates the fan running and activates the automatic changeover with fault indication to the building management system.

All main branches are to be fitted with opposed blade volume control dampers for regulation, branches to terminals are fitted with single blade dampers where necessary and to be used for minor local trimming only.

Make up air for the toilet extract system is via undercut doors.

DISTRIBUTION OFFICES No. 1

HEATING

The toilets, corridor and stairs and where not heated by VRF heat pump system and heat loss is in excess 100 watts heating are to be provided with standalone electric panel heater with integral time and temperature control. LST style electric heaters are provided to disabled toilets.

Over the main entrance doors to the reception a 15 kW recessed electric over door curtain has been provided with facility for link to BMS and local wall mounted controller.

MAINS COLD WATER SERVICES

A new MDPE protectaline cold water main enters the building within the warehouse and is routed to high level in the warehouse and across the distribution office plant deck level where it drops into the riser to ground floor.

Mains cold water services pipework distributes within office ceiling voids and risers to serve the following equipment/systems:

- Main Office toilet areas
- Main Office Hot water heater unvented kits

To assist in BREEAM credit collection toilet PIR detection is fitted to each space and linked to two port control valves, on detection the valves will open to allow water to fill cisterns and basins, during periods without occupation the valves will remain closed.

An electromagnetic water conditioner is fitted within the plant deck to reduce the effect of limescale, the system uses a zinc sacrificial anode with unique electronic controls.

Mains cold water pipework is installed to all outlets with service valves within 300mm of the appliance.

All pipework where concealed, within voids, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

HOT WATER SERVICE

The domestic hot water to the distribution office toilet and cleaners rooms are provided from local unvented electric hot water heaters.

The hot water is generated locally from a Hyco multi-point unvented electric water heater located at low level in the toilet vanity units or ceiling void.

The unvented water heaters are fitted with expansion kits consisting of isolating valve, check valve, pressure reducing valve, expansion vessel and pressure relief valve. The pressure relief valve discharges to Hepworth dry traps connected to the foul waste pipework.

To ensure hot water is provided to the draw off without delay lengths of uncirculated pipework will be kept to a maximum of 3m for unblended water and 2m after any blending valve installation.

Thermostatic blending taps are incorporated on hot water outlets to disabled wash basins. General basins shall be supplied with TMV3 blending valve, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed and within vanity units/IPS are fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

PUBLIC HEALTH SERVICES

The public health installation is installed throughout the building to collect the soil and waste from each sanitary appliance. The installation shall also prevent the transmission of foul air in to the building. Ventilated stacks and branch pipes shall be installed throughout the floors and shall discharge to atmosphere with vent cowl.

All appliances discharge foul water into stacks installed to concealed locations within IPS or voids etc, each stack is fitted with an inspection cover at 1.0m a.f.f.l. on each floor. Fire collars are fitted where the p.v.c. 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.

VRF HEAT PUMP

The ground and first floor floor open plan offices are heated and cooled with the installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery. Two systems are installed in total as below:

- System 1 – Ground & first floor

The VRF air conditioning systems have the flexibility to provide heating and cooling simultaneously to all units, which means that two adjacent spaces can be operated differently at any one time due to the incorporation of solenoid valve kits to the system.

Condensers are sited internally on the distribution office second floor plant area and are charged with R410A refrigerant gas which when activated pumps the refrigerant around the systems to a series of solenoid valve kits via refrigerant grade pipework insulated with class O armaflex on galvanised metal tray. The solenoid valves are energised in the correct sequence to give heating or cooling within the dedicated space.

The indoor evaporator elements of the system are all four way standard cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan and discharge louvres.

All the indoor units are connected via a two-wire control cable to a central controller mounted on the plant room BMS panel facia, this allows each individual unit to be addressed and controlled independently. All indoor units are fitted with return air sensors mounted within the cassette, room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

uPVC condense pipework is installed within the ceiling void and connects to all indoor units the unit drains are pumped from an integral pump. The condense drain terminate with 32mm Hepworth HepVo dry traps to local soil stacks.

GENERAL OFFICES SUPPLY & EXTRACT VENTILATION

The ground & first floor office space ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second floor plant deck.

The air handling units incorporates the following equipment:

Supply Side
- Motorised air inlet damper
- G4 Pleated panel filter
- F7 Rigid bag filter
- Access section
- Plate Heat Exchanger
- Supply fan
- Access section
- Electric Heating Coil
- Discharge spigot

Extract Side
- Motorised exhaust air damper
- G4 Pleated panel filter
- Access section
- Extract fan
- Plate Heat Exchange c/w face & bypass damper
- Access section
- Discharge spigot

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the distribution office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments will be fitted with standard fusible link fire dampers and access doors, any through protected route walls will be fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units will be achieved via the onboard control system which under the dictates of a temperature sensor located in the supply air duct will modulate in sequence the face and bypass damper and electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through swirl diffusers, the extract from the space uses identical swirl diffusers.

All primary grilles and diffusers will be fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible insulated ductwork a maximum of 500mm long. Where required the supply diffusers will be provided with blanking plates or reduced neck boxes to ensure the correct throw and distribution of air within the space.

All plantroom and ceiling void fresh air, supply and extract ductwork is fitted with mineral wool thermal insulation with identification applied to insulated and un-insulated ducts in accordance with the specification.

TOILET EXTRACT SYSTEM

The distribution office toilets and cleaners' room is provided with extract ventilation from a dedicated twin extract fan mounted located internally on the distribution office second floor plant area.

The toilet extract system consists of a series of circular extract valves to the core area toilets on all floors connected via galvanised extract ductwork distribution system. A twin direct drive fan set with auto-changeover controls, back draught shutter and BMS interface is fitted internally and supported with internal anti-vibration mountings and flexible connections.

The exhaust air ductwork is extended around the plant deck from the fan to connect to external louvre

The toilet extract ductwork from the unit connection drops into the main riser to the ground floor ceiling void, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments will be fitted with standard fusible link fire dampers and access doors, any through protected route walls will be fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

The fan is fitted with an integral auto-changeover panel which indicates the fan running and activates the automatic changeover with fault indication to the building management system.

All main branches are to be fitted with opposed blade volume control dampers for regulation, branches to terminals are fitted with single blade dampers where necessary and to be used for minor local trimming only.

Make up air for the toilet extract system is via undercut doors.

DISTRIBUTION OFFICES No. 2

HEATING

The toilets, corridor and stairs and where not heated by VRF heat pump system and heat loss is in excess 100 watts heating are to be provided with standalone electric panel heater with integral time and temperature control. LST style electric heaters are provided to disabled toilets.

Over the main entrance doors to the reception a 15 kW recessed electric over door curtain has been provided with facility for link to BMS and local wall mounted controller.

MAINS COLD WATER SERVICES

A new MDPE protectaline cold water main enters the building within the warehouse and is routed to high level in the warehouse and across the distribution office plant deck level where it drops into the riser to ground floor.

Mains cold water services pipework distributes within office ceiling voids and risers to serve the following equipment/systems:

- Main Office toilet areas
- Main Office Hot water heater unvented kits

To assist in BREEAM credit collection toilet PIR detection is fitted to each space and linked to two port control valves, on detection the valves will open to allow water to fill cisterns and basins, during periods without occupation the valves will remain closed.

An electromagnetic water conditioner is fitted within the plant deck to reduce the effect of limescale, the system uses a zinc sacrificial anode with unique electronic controls.

Mains cold water pipework is installed to all outlets with service valves within 300mm of the appliance.

All pipework where concealed, within voids, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

HOT WATER SERVICE

The domestic hot water to the distribution office toilet and cleaners rooms are provided from local unvented electric hot water heaters.

The hot water is generated locally from a Hyco multi-point unvented electric water heater located at low level in the toilet vanity units or ceiling void.

The unvented water heaters are fitted with expansion kits consisting of isolating valve, check valve, pressure reducing valve, expansion vessel and pressure relief valve. The pressure relief valve discharges to Hepworth dry traps connected to the foul waste pipework.

To ensure hot water is provided to the draw off without delay lengths of uncirculated pipework will be kept to a maximum of 3m for unblended water and 2m after any blending valve installation.

Thermostatic blending taps are incorporated on hot water outlets to disabled wash basins. General basins shall be supplied with TMV3 blending valve, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed and within vanity units/IPS are fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

PUBLIC HEALTH SERVICES

The public health installation is installed throughout the building to collect the soil and waste from each sanitary appliance. The installation shall also prevent the transmission of foul air in to the building. Ventilated stacks and branch pipes shall be installed throughout the floors and shall discharge to atmosphere with vent cowl.

All appliances discharge foul water into stacks installed to concealed locations within IPS or voids etc, each stack is fitted with an inspection cover at 1.0m a.f.f.l. on each floor. Fire collars are fitted where the p.v.c. 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.

VRF HEAT PUMP

The ground and first floor floor open plan offices are heated and cooled with the installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery. Two systems are installed in total as below:

- System 1 – Ground & first floor

The VRF air conditioning systems have the flexibility to provide heating and cooling simultaneously to all units, which means that two adjacent spaces can be operated differently at any one time due to the incorporation of solenoid valve kits to the system.

Condensers are sited internally on the distribution office second floor plant area and are charged with R410A refrigerant gas which when activated pumps the refrigerant around the systems to a series of solenoid valve kits via refrigerant grade pipework insulated with class O armaflex on galvanised metal tray. The solenoid valves are energised in the correct sequence to give heating or cooling within the dedicated space.

The indoor evaporator elements of the system are all four way standard cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan and discharge louvres.

All the indoor units are connected via a two-wire control cable to a central controller mounted on the plant room BMS panel facia, this allows each individual unit to be addressed and controlled independently. All indoor units are fitted with return air sensors mounted within the cassette, room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

uPVC condense pipework is installed within the ceiling void and connects to all indoor units the unit drains are pumped from an integral pump. The condense drain terminate with 32mm Hepworth HepVo dry traps to local soil stacks.

GENERAL OFFICES SUPPLY & EXTRACT VENTILATION

The ground & first floor office space ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second floor plant deck.

The air handling units incorporates the following equipment:

Supply Side
- Motorised air inlet damper
- G4 Pleated panel filter
- F7 Rigid bag filter

- Access section
- Plate Heat Exchanger
- Supply fan
- Access section
- Electric Heating Coil
- Discharge spigot

Extract Side
- Motorised exhaust air damper
- G4 Pleated panel filter
- Access section
- Extract fan
- Plate Heat Exchange c/w face & bypass damper
- Access section
- Discharge spigot

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the distribution office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments will be fitted with standard fusible link fire dampers and access doors, any through protected route walls will be fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units will be achieved via the onboard control system which under the dictates of a temperature sensor located in the supply air duct will modulate in sequence the face and bypass damper and electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through swirl diffusers, the extract from the space uses identical swirl diffusers.

All primary grilles and diffusers will be fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible insulated ductwork a maximum of 500mm long. Where required the supply diffusers will be provided with blanking plates or reduced neck boxes to ensure the correct throw and distribution of air within the space.

All plantroom and ceiling void fresh air, supply and extract ductwork is fitted with mineral wool thermal insulation with identification applied to insulated and un-insulated ducts in accordance with the specification.

TOILET EXTRACT SYSTEM

The distribution office toilets and cleaners' room is provided with extract ventilation from a dedicated twin extract fan mounted located internally on the distribution office second floor plant area.

The toilet extract system consists of a series of circular extract valves to the core area toilets on all floors connected via galvanised extract ductwork distribution system. A twin direct drive fan set with auto-changeover controls, back draught shutter and BMS interface is fitted internally and supported with internal anti-vibration mountings and flexible connections.

The exhaust air ductwork is extended around the plant deck from the fan to connect to external louvre

The toilet extract ductwork from the unit connection drops into the main riser to the ground floor ceiling void, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments will be fitted with standard fusible link fire dampers and access doors, any through protected route walls will be fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

The fan is fitted with an integral auto-changeover panel which indicates the fan running and activates the automatic changeover with fault indication to the building management system.

All main branches are to be fitted with opposed blade volume control dampers for regulation, branches to terminals are fitted with single blade dampers where necessary and to be used for minor local trimming only.

Make up air for the toilet extract system is via undercut doors.

WELFARE OFFICE

MAINS COLD WATER SERVICES

A new MDPE protectaline cold water main enters the building within the warehouse for future extension in the fit out and to serve CAT 5 booster.

Mains cold water services pipework distributes to serve the following equipment/systems:

- CAT 5 Booster

Mains cold water pipework is installed to all outlets with service valves within 300mm of the appliance.

All pipework where concealed, within voids, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

DX HEAT PUMP

The welfare office is heated and cooled with the installation of two Mitsubishi DX heating and cooling R32 split systems.

Condensers are sited internally to the warehouse on the lid of the welfare office and are charged with R32 refrigerant gas which when activated pumps the refrigerant around the system via refrigerant grade pipework insulated with class O armaflex on galvanised metal tray. The reversing valve within the indoor unit is energised in the correct sequence to give heating or cooling within the dedicated space.

The indoor evaporator elements of the system are all four way standard cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan and discharge louvres.

All indoor units are fitted with return air sensors mounted within the cassette, room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

uPVC condense pipework is installed within the ceiling void and connects to all indoor units the unit drains are pumped from an integral pump. The condense drain terminate with 32mm Hepworth HepVo dry traps to local soil stacks.

GENERAL OFFICES SUPPLY & EXTRACT VENTILATION

The welfare office ventilation requirements are satisfied with supply and extract ventilation using an packaged heat recovery air handling unit mounted internally within the ceiling void.

The air handling units incorporates the following equipment:

Supply Side - G4 Filter

- Access section
- Paper Core Heat Exchange
- Supply fan
- Access section
- Discharge spigot

Extract Side
- G4 panel filter
- Access section
- Extract fan
- Plate Heat Exchange c/w face & bypass damper
- Discharge spigot

The air handling units are provided with integrated Mitsubishi controls system all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended internally within the ceiling void to external louvres.

The supply and extract ductwork from the unit connections distribute internally within the ceiling void, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through four-way diffusers.

All primary grilles and diffusers will be fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible insulated ductwork a maximum of 500mm long. Where required the supply diffusers will be provided with blanking plates or reduced neck boxes to ensure the correct throw and distribution of air within the space.

All ceiling void supply and return air ductwork is fitted with mineral wool thermal insulation with identification applied to insulated and un-insulated ducts in accordance with the specification.

SITE WIDE

DOMESTIC MAINS COLD WATER SERVICES

A new blue MDPE water main has been installed to the site from the main road to the site boundary. This main terminates with water meter and isolating valve provided by the water authority on the boundary.

From the outlet of the meter Blue MDPE pipework is installed to all the incoming locations around the building all pipework being laid below 750mm from the finished ground level and surrounded by sand for protection.

At each entry point of entry to the building a stopcock, double check valve, pressure reducing valve and draincock will be fitted, a leak detection meter linked to the BMS and pulsed output water meter linked to BMS will be provided to the areas detailed below:

The following locations will be served from the site wide domestic water main:

- Warehouse gridline F3/52 – Leak detection via BMS
- Warehouse gridline C/22b – Leak detection via BMS
- Warehouse gridline K/24a – Leak detection via BMS
- Warehouse gridline F4/1 – Leak detection via BMS
- Gatehouse – Leak detection via BMS

- RRU Building – Leak detection via BMS

SPRINKLER INFILL

A new blue MDPE water main has been branched from the incoming water main valve and check valve assembly at the boundary to serve the sprinkler infill, hydrant main and domestic water main.

The sprinkler infill main is fitted with isolating valve with 125mm blue MDPE pipework is installed around the building, all pipework being laid below 750mm from the finished ground level and surrounded by sand for protection.

At the location of the future sprinkler tanks the main has been terminated with hydrant main for flushing and chlorination of the main prior to final connection by water authority.

HYDRANT RING MAIN

A new blue MDPE water main has been branched from the incoming water main valve and check valve assembly at the boundary to serve the hydrant main, sprinkler infill and domestic water main.

The 180mm hydrant main is fitted with isolating valve with blue MDPE pipework is installed around the building, all pipework being laid below 750mm from the finished ground level and surrounded by sand for protection.

The hydrant main runs around the perimeter of the building and is fitted with 16No hydrants.

SYSTEMS:

Electrical Services

Description	Drg No:
HV Schematic	P22036-WME-XX-XX-DR-E-0001
LV1 Schematic	P22036-WME-XX-XX-DR-E-0002
LV2 Schematic	P22036-WME-XX-XX-DR-E-0003
LV3 Schematic	P22036-WME-XX-XX-DR-E-0004
Fire Alarm Schematic	P22036-WME-XX-XX-DR-E-0005
Disabled Refuge Schematic	P22036-WME-XX-XX-DR-E-0006
LV1 Panel Layout	P22036-WME-ZZ-ZZ-DR E-0010
LV2 Panel Layout	P22036-WME-ZZ-ZZ-DR E-0011
LV3 Panel Layout	P22036-WME-ZZ-ZZ-DR E-0012
Internal Lighting Layout	P22036-WME-ZZ-ZZ-DR-E-0100 Series
Internal Small Power Layout	P22036-WME-ZZ-ZZ-DR-E-0200 Series
Internal Fire Alarm Layout	P22036-WME-ZZ-ZZ-DR-E-0300 Series
Internal Containment Layout	P22036-WME-ZZ-ZZ-DR-E-0400 Series
External Services Layout	P22036-WME-ZZ-ZZ-DR-E-0500 Series
Lightning Protection	P22036-WME-XX-ZZ-DR E-0700
Builders Work	P22036-WME-ZZ-ZZ-DR-E-0800 Series

General

The electrical installations completed as part of our scope of works includes the infrastructure, distribution and The electrical installations completed as part of our scope of works includes the infrastructure, distribution and services of the following.

1. HV Switchgear
2. HV cabling
3. HV/LV transformers
4. LV tails from transformer to main LV panel
5. Main LV panel boards
6. Installation of local DB’s
7. Installation of small power and lighting to the offices
8. Installation of warehouse exit door emergency exit lighting
9. Installation of dock door busbar and isolators
10. Installation of L1 fire alarm system to the offices
11. Installation of M1 (manual only) fire alarm to warehouse
12. Installation of Disabled refuge system
13. External lighting
14. Installation of power and fire alarm containment to the offices
15. Installation of containment to warehouse
16. Mechanical supplies in the offices
17. Installation of EVC points to car park

LV Supply

The source for the LV supply is a utility Ring Main Unit (RMU) located at the site boundary. The Regional Electricity Company has provided a 3000KVA metered HV supply. A client owned HV switchgear panel is located adjacent to the DNO HV switchgear. This comprises of an incoming SE6 switch and 3 No outgoing CET-T2 HV switches. A 185mm triplex HV cable is routed from each of the outgoing HV switches in radial circuits via ducts to the sitewide transformers located as below:

- TX1, 1.5MVA KNAN – located adjacent to Distribution Office 1
- TX2, 1.5MVA KNAN – located adjacent to Distribution Office 2
- TX3, 1.MVA KNAN – located in the north of the car park

LV tails are provided from each transformer to main LV panels. For LV 1 and LV2 5x1core 500mm per phase and neutral plus 300mm CPC are provided. Due to restrictions with foundation works these are routed above ground on cable ladder. For LV2 3x1core 500mm per phase and neutral plus 300mm CPC are provided, routed through cable trench/ducts.

ONLY PERSONS WITH THE NECESSARY COMPETANCE AND QUALIFICATIONS SHOULD CARRY OUT ANY SWITCHING OR WORKS ON THE SITEWIDE HV/LV SYSTEM.

AN EMERGENCY STOP HAS BEEN PROVIDED BY THE MAIN LV PANEL , WHICH IN THE EVENT OF AN EMERGENCY CAN BE OPERATED WHICH WILL ISOLATE THE SUPPLY TO THE LV PANEL

Main Switchgear and sub-distribution

There are 2 main LV panels located in the Warehouse and 1 in the car park.

LV1 is located near to Distribution Office 1 at gridline 20/C
LV2 is located near to Distribution Office 2 at gridline 21/K
LV3 is located externally in the car park within a GRP kiosk

Each panel is floor mounted and has a main switch to isolate the electrical supply to all the outgoings ways. The main LV panels have been electrically rated to suit the load of the transformer and have surge protection units fitted to prevent/reduce potential surge damage caused by lightning protection. The panels are Form 4 type 2, with outgoing MCCB ways to suit the anticipated electrical load and electric meters with both Pulsed and Mod bus outlets fitted to the larger electrical loads.

All outgoing ways are top exit and a 25% spare capacity has been provided for future use

XLPE/SWA/LSZH sub-main cables have been taken from the LV1 and LV2 panels and secured to cable tray or ladder to feed sub-distribution boards and the dock door busbar. Cables from LV3 are routed through ducts.

All outgoing ways have engraved labels to suit the designated circuit.

ONLY PERSONS WITH THE NECESSARY COMPETANCE SHOULD OPPERATE LV MCCB'S or MCB's. NEVER CLOSE A MCCB OR MCB ON LOAD.

LV Small power and distribution.

Office small power.

Dedicated distribution boards have been installed to the offices to provide small power to items such as socket outlet, hand dryers and fused spurs for small load mechanical equipment. Boards have been provided as detailed below.

Main Office Sub Panel Board – 2nd floor plant deck
Main Office Ground Floor Cleaners Room – Small Power DB
Main Office Ground Floor Cleaners Room – Lighting DB
Main Office Plant Deck
Distribution Office 1 First Floor riser
Distribution Office 2 First Floor riser
Warehouse Welfare Block
RRU Building
ECV DB's in car park "island" areas

Socket outlets.
Sockets have been provided throughout the office area on all levels for general purpose / cleaners use. These have been installed at 450mm AFFL and have generally been recessed in to the walls. All general purpose and cleaners sockets are protected by RCD devices and are on their own circuit.

As there is no raised access floor to the ground floor sockets in the ground floor main office open plan office area are within a surface dado trunking with risers to the ceiling void.

Underfloor bus bar.
To allow flexibility for future furniture layouts underfloor bus bars have been installed in the raised access floor areas of the office areas. These bus bars are fed from dedicated supplies from a local board in LSF/SWA cables on cable tray and terminated into the end of the bar, with a clean earth provided for high earth leakage items. 3-way floor boxes sit within cut outs in the floor tiles and contain 1 x 2 gang socket outlets, 1 x blank plate for telecoms and 1 x blank plate for data.

Plastic fused spurs.
White fused spur outlets have been provided within the W.C's for items such as hand dryers and disabled toilet alarms with the spurs mounted at high level.

Metal Clad fused spurs.
Within the ceiling voids of the office metal clad fused spurs have been provided for the mechanical plant AC units. These supplies have been wired in a ring formation back to the local distribution board

Mechanical services wiring
Mechanical services on the plant deck are fed from a dedicated distribution board on the plant deck. Local isolation is provided by either suitably rated isolators or metal clad fused spurs.

Warehouse

Each level access and service door has an electrical supply which is terminated into an isolator to allow the door manufacture to connect their control panel. From the isolator a flexible cable within galvanised conduit is connected at high level. Supplies to the door bus bars are taken from the main panels.

External power

Within the service yard a power supply has been provided for foul pumps which are fed from the local distribution boards.

Containment

Within the building there is a verity of containment used to allow cables to fixed around the office areas dependant on the type and size of cable required.

Warehouse
Cable tray and ladder has been installed around the perimeter of the warehouse for the XLPE/SWA/LSZH cable supplies to the door dock busbar and external lighting distribution boards.

Office and core areas

Cable tray.
Cable tray has been installed to the offices above the ceiling to support the LSOH twin and earth cables with vertical metal rigid or flexible conduits in the walls to protect the cables from penetrations.

Conduit.
Galvanised conduit has been used within the walls of the office to provide protection to the LSOH twin and earth cables and to also provide a pathway for future rewiring for small power and lighting circuits. Additional 25mm conduit have been used to contain the fire rated cables in the office when used for the fire alarm installation. Flexible conduit has been used in the stair core areas as there are no suitable routes for rigid conduit routes.

Conduit drops have been provided at doors into the office space for the future access control installation.

Lighting / Emergency Lighting

Office and core areas.

Office and core area luminaires utilise a mixture of recessed modular and circular LED fittings with surface linear fittings used in the riser and plant area.

Office
The office has various fittings installed in the gridded ceilings to provide the necessary lighting required. Open office areas and meeting rooms are provided with recessed dimmable 600x600 LED fittings. Control of these fittings is via recessed PIR's which allow the fittings to be dimmed down dependant on the amount of natural lighting entering the room. Meeting rooms are also provided with manual dimming switches.

W.C's.
The W.C's within the offices have gridded ceilings with recessed LED downlights provided and flush PIR detectors.

Main Office Reception area.
General lighting to the reception is provided by recessed LED downlights controlled via recessed PIR's.

Core areas and corridors.
In the core areas and corridors LED downlights lights have been installed, controlled via ceiling mounted PIR control.

1st Floor
Lighting to the first floor is provided by Tecton Trunking mounted linear LED fittings with integral PIR.

2nd floor Plant Deck.
Lighting to the first floor is provided by manually switched Tecton Trunking mounted linear LED fittings.

Riser and Distribution Office Plant Areas
The plant deck and escape stair are fitted with IP65 rated linear Led fittings with local manual switching.

Lighting installation.
All light fittings within the office and core areas are connected via a klik plug and flexible cable to a socket which allows the fitting to be disconnected without effecting others on the circuit. Dependant on the type and quantity of fittings the klik plug can be connected into a multi or single module, 3 or 4 pins. Cabling to the lighting circuits is provided in 3 core and earth LSOH cable on cable tray mounted above the ceiling back to the lighting DB's located on each floor in the riser cupboards.

FOR SAFETY THE RELEVANT CIRCUIT SHOULD BE ISOLATED BEFORE UNPLUGGING ANY FITTING.

Office emergency lighting.

Emergency lighting to the office and core areas has been installed to meet the requirements of BS5266-1 with emergency pack integral to the necessary fittings. Emergency fittings are indicated with a green LED indicator to show both power is present and that the batteries are charging.

All emergency lighting to the offices are integral to the fittings and are indicated with a green LED when charging and red when there is a faulty.

As the emergency lighting is not self test there is an emergency test key located at the local DB's.

DO NOT CONTINUEALLY CHARGE AND DISCHARGE THE EMERGENCY LIGHT FITTINGS AS THIS WILL SHORTERN AND POSSIBLY DAMAGE THE BATTERIES WITHIN.

External Lighting

The external lighting provides lighting to the Car park, access roads, site entrances, service yards and building perimeter.

The lighting scheme utilises LED lamps and control gear mounted in the light fittings which are either column or directly mounted to the building.

Column mounted lighting
A mixture of 10 metre and 6 metre columns have been installed to provide the necessary lighting to the services yards and site perimeter. Fittings are installed on top of the columns with flexible cables passing through the column to the base where they are terminated into fused cut out.

The electrical supply to the columns passes from the building and into underground ducts, under the roads and surface yard and into the base of the columns.

Build mount lighting.
Lighting has also been mounted to the building to provide lighting to the road ways and services yards with the fittings fixed through the external cladding with threaded rod, nuts and washers. Additionally, to prevent the internal cladding from being crushed by the tightening of the fixing brackets an external bracket supplied by the building cladder has been fitted. The electrical supply to

the fittings is installed on cable tray around the perimeter of the warehouse and terminate into fused spurs allowing a flexible cable to pass through the cladding and into the light fitting.

Lighting to the main office entrance is provided by 2 No bollard fittings with 3 hour emergency conversion.

External lighting control
A dedicated distribution board has been installed to provide power to the external lighting and small power items. This board has service enclosures mounted above with N/O contactors fitted which are operated by a photocell and programmer. The Photocell is mounted externally above the build mount lighting to prevent interference and both the photocell and programmer need to operate to allow the power to be passed onto the contactors.

Fire Alarm

A category L1 fire alarm system has been installed to the office areas with differing types of detection and indication used dependant on the location. The warehouse has a category M1 fire alarm system

The fire alarm is controlled and monitored by a panel located at the office main entrance with lockable doors to prevent unauthorised access.

Fire alarm to the office and core areas has been provided by point detection either mounted in the voids created by room segregation when greater than 800mm and/or on ceiling tiles or open ceilings as necessary to comply with the level of Category. To open office and corridor areas standard detectors or detectors with integral sounders have been fitted as necessary to comply with the level of Category and to provide the necessary sound indication in the event of a fire. Within cleaner's cupboards heat detectors have been used to try and reduce the possibility of false alarms generated by heat. Within W.C's ceiling mounted sounder/strobes have been provided to give both a visual and audible alarm in the event of a fire.

The open warehouse has been provided with call points at each exit door and at locations to suit the requirements of BS5839. Sounders/beacons are provided throughout the open warehouse.

Call points.
Manual activation of the fire alarm is provided to call points at designated emergency exits from the office and also at change of levels.

Fire alarm interfaces.
Single channel interfaces have been provided to give a signal when the fire alarm is operated to shut down mechanical plant and lower the lift to the ground floor unless a fire is detected in the ground floor reception, in which case, the lift shall return to the first floor. An output interface is provided to send fire alarm signal to the PV system

Cabling.
The fire alarm has been wired in a 120-minute fire rated cable installed on dedicated tray with metal ties where the cable rises vertically.

Disabled Refuge Alarm

A disabled refuge system has been installed to the offices to cover staircases. The disabled refuge control panel is located at the main office reception adjacent to the fire alarm panel. At each landing designated as a disabled refuge a call station has been installed that will allow persons at these locations to contact the main reception via the main panel to ask for assistance if required. The cabling used to connect the main panel to the outstations is a 4c and earth enhanced fire rated cable.

Disabled Toilet Alarms

To the W.C's designated for Disabled use alarms comprising of 1 No emergency red pull cord, (2 No in showers) 1 No reset button (2 No in showers) and 1 No over-door audible/visual warning unit have been fitted. In the event of assistance being required within the W.C the pull cord can be pulled to operate the red indicator triangle and auditable sounder to summon help from outside. If required, the reset is located within the room with the power supply located at high level.

Lightning Protection

A Lightning Protection System has been installed to meet the requirements of the specification and BS EN 62305 to the warehouse and office building. Rods are positioned at no more than 16mtrs around the perimeter with tapes connected onto the main steels.

Electric Vehicle Charging

The Electric Vehicle Charge (EVC) are supplied from a dedicated transformer and LV panel in the north side of the car park. A number of Electric Vehicle Charge (EVC) stations have been provided in the main and disabled bay car park. The charge points are single phase dual output 7kw bollards and single phase single output 7kw bollards fed from dedicated distribution boards located within GRP kiosks in the car park. Cables from each distribution boards are routed through a buried duct system.

Testing and Commissioning

Electrical services test certification and commissioning has been carried in accordance with the NICEIC regulations.

Specialists installations and testing not covered by the Regulations for Electrical Installations has been tested to the relevant British Standards or Code of Practice.

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.

The building management system controls and monitors all heating, cooling and ventilation systems, however, local control is available to radiators and room set temperatures if required.

Heating:

Your working environment is heated with ceiling void mounted VRF cassettes controlled from the Mitsubishi central controller on the main office plant room control panel and local room controllers, the toilets, core areas and corridors are served via electric panel heaters.

Set the temperature you require and then leave it for a while to see how the temperature settles down. Make minor adjustments if necessary but don't alter them too much as the system may over compensate and you will get too hot/cold. Avoid overheating the space as this waste's energy and the resulting CO_2 emissions contribute to global warming.

Cooling:

Your working environment is conditioned with a Mitsubishi VRF heat pump system. The units are controlled for the space and once set up and maintaining conditions correctly this controls should not be changed without authorisation.

Set the temperature you require and then leave it for a while to see how the temperature settles down. Make minor adjustments if necessary but don't alter them too much as the system may over compensate and you will get too hot/cold. Avoid over cooling the space as this waste's energy and the resulting CO_2 emissions contribute to global warming.

Ventilation:

All the offices areas and occupied spaces are ventilated from central primary air plant containing filters, fans and heat recovery cube to pre-heat the incoming air a dedicated heat recovery ventilation unit on the plant deck.

Main office and distribution office toilet areas are fitted with twin toilet extract fans fitted with auto changeover panel to duty share and changeover if one fan fails.

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
Water	Incoming		WM1	All Areas	Direct		Main Meter	External
			WM2	Main Office	Direct		Internal Leak Meter	Warehouse
			WM3	Main Office RWH Make Up	Direct		Sub Meter	Office Plant Room
			WM4	Main Office RWH Consumption	Direct		Sub Meter	Office Plant Room
			WM5	Distribution Office No.1 MCWS	Direct		Internal Leak Meter	Warehouse
			WM6	Distribution Office No.2 MCWS	Direct		Internal Leak Meter	Warehouse
			WM7	Welfare Office MCWS	Direct		Internal Leak Meter	Warehouse
			WM8	RRU Building MCWS	Direct		Internal Leak Meter	RRU Building
			WM9	Gatehouse	Direct		Sub Meter	Gatehouse

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
Electric	Incoming		LV1	L&P	Direct	2830000	LV1	LV1
Electric			DB11	L&P	Direct	62000	DB11	DB11
Electric			DB13	L&P	Direct	112000	DB13	DB13
Electric			DB14	L&P	Direct	306000	DB14	DB14
Electric			DB15L	Ltg	Direct	24000	DB15L	DB15L
Electric			DB15P	Power	Direct	88000	DB15P	DB15P
Electric			DB16	L&P	Direct	180000	DB16	DB164
Electric			EXT1	Ltg	Direct	4015	EXT1	LV1
Electric			EXT2	Ltg	Direct	28000	EXT2	LV1
Electric			EXT3	Ltg	Direct	14000	EXT3	DB14
Electric			LIFT	Power	Direct	5110	LIFT	LV1
Electric			RSD BB1	Power	Direct	14600	RSD BB1	LV1
Electric			RSD BB2	Power	Direct	22630	RSD BB2	LV1
Electric	Incoming		LV2	L&P	Direct	2830000	LV2	LV2
Electric			DB20	L&P	Direct	530000	DB20	LV2
Electric			DB21	L&P	Direct	316000	DB21	LV2
Electric			DB22	L&P	Direct	110000	DB22	LV2
Electric			DB23	L&P	Direct	38000	DB23	LV2
Electric			DB24	L&P	Direct	104000	DB24	LV2
Electric			EXT4	Ltg	Direct	28000	EXT4	LV2
Electric			EXT5	Ltg	Direct	1825	EXT5	LV2
Electric			RSD BB3	Power	Direct	27010	RSD BB3	LV2
Electric			RSD BB4	Power	Direct	19710	RSD BB4	LV2
Electric	Incoming		LV3	EVC	Direct	1894000	LV3	LV3
Electric			FP1	EVC	Direct	644000	FP1	LV3
Electric			FP2	EVC	Direct	644000	FP2	LV3
Electric			FP3	EVC	Direct	674000	FP3	LV3
Electric			FP4	EVC	Direct	674000	FP4	LV3

Building Performance Records

(Not more than three pages)

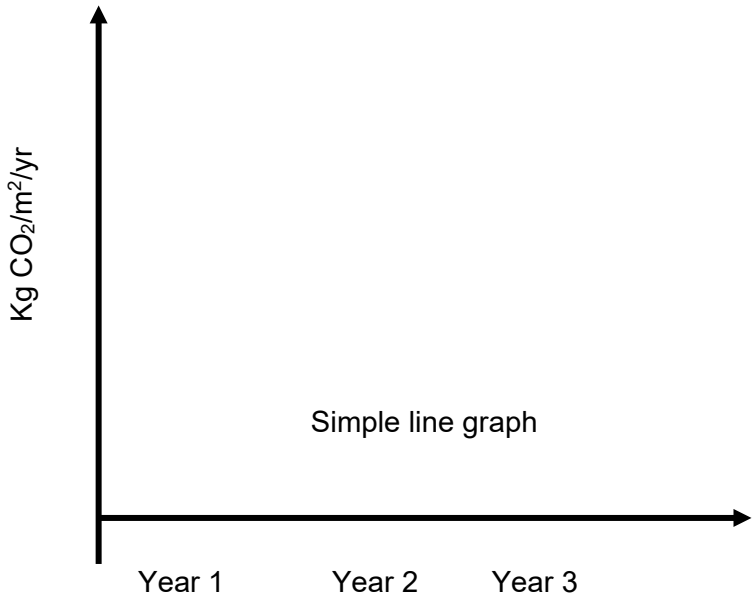
Overall annual energy performance

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*

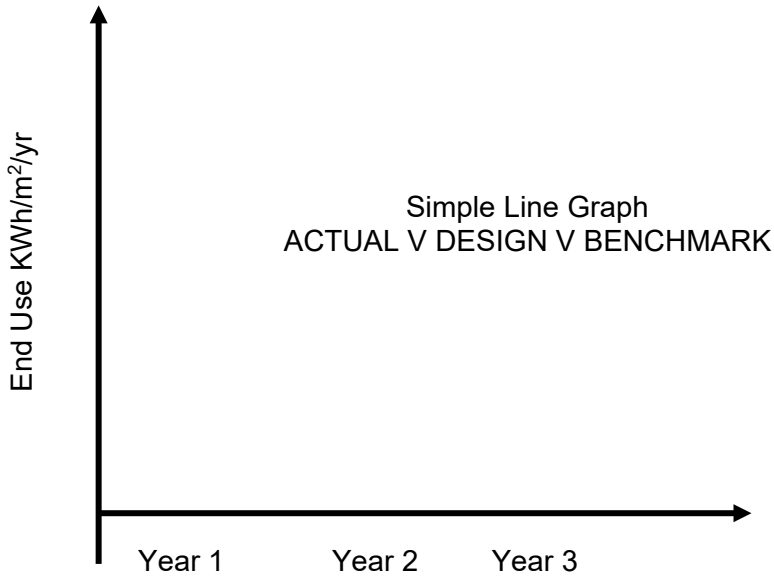
Energy end use comparison

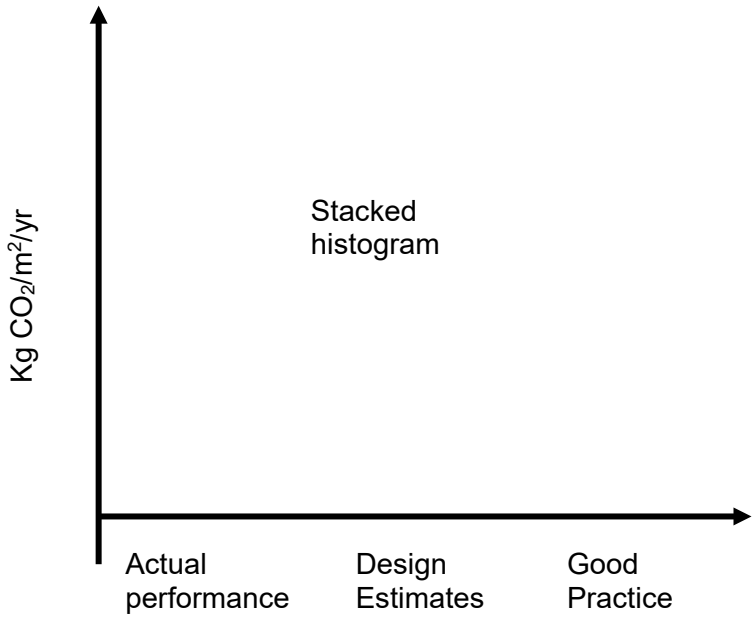
Annual summary of actual metered consumption per square metre and the design team's estimates versus benchmarks broken down by main end-uses. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building logbooks – a user's guide*. A copy is included on the CD-ROM associated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

10. 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				
External DX Condensers				
VRF Air Conditioning System				
Electric Hot Water Heaters				
Dampers (VCD's and Fire)				
Air Terminals & Louvres				
Main Office Toilet Extract Fan				
Water Management Procedures				
Rainwater				

Harvesting System				
Energy Monitoring Control System inc Water Leak Detection System				
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.

11. 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

12. 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.