2.2.7 Building Log Book

Project Number – P23025

Panattoni – Horton Road, Poyle

Building Logbook | September 2024

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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			

1. Purpose and Responsibilities

Purpose of a building log book

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

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

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

This building logbook was prepared by:

Winvic Construction Ltd
Brampton House
Moulton Park
Northampton
NN3 6PZ

Dated: July 2024

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	Scope of Works of the O & M Manual
Health and Safety	Data Sheets of the O & M Manual
Schedule of Hazards Associated with Materials Used	Data Sheets of the O & M Manual
Record Drawings	Guidance Notes
Equipment Logbooks (e.g., Boiler log book)	With Equipment
Testing & commissioning certificates & reports	Certificates/Warranties/Guarantees of the O & M Manual
Plant & Equipment data	Data Sheets of the O & M Manual

3. Main Contacts

Emergency Contact Name 1	Tenant to confirm
Emergency Contact Name 2	Tenant to confirm
Electricity Emergency Contact	Harlaxton – 08000556288 (HARL000862) SSE – 08009803290
Gas Emergency Contact	National Grid – 0800111999
Water Emergency Contact	Thames Water – 08003169800
Lead Designer Contact Name	Lewis King UMC Architects Sheppard Lockton House Cafferata Way Newark Nottinghamshire NG24 2TN 01636554854
Building Services Design Contact Name	Lee Sutton W M Building Services (Leicester) Ltd 657 Melton Road Thurmaston Leicester LE4 8EB 01163112477 Michael Harrison Walter Miles Electrical Engineers Ltd Marshall House West Street Glenfield Leicester LE3 8DT 01162872400
Principle Contractor	Winvic Construction Ltd Brampton House 19 Tenter Road Moulton Park Northampton NN3 6PZ 01604678960
Mechanical Services Installer	W M Building Services (Leicester) Ltd 657 Melton Road Thurmaston Leicester LE4 8EB 01163112477
Commissioning Managers Name	David Hopgood Winvic Construction Ltd Brampton House 19 Tenter Road Moulton Park

	Northampton NN3 6PZ 01604678960
Electrical Services Installer	Walter Miles Electrical Engineers Ltd Marshall House West Street Glenfield Leicester LE3 8DT 01162872400
Planning Supervisor Name	Taylor Cherrett Turley The Pinnacle 20 Tudor Road Reading RG1 1NH 01189022830
O&M and Logbook Author Name	Tina Tooley Winvic Construction Ltd Brampton House 19 Tenter Road Moulton Park Northampton NN3 6PZ 01604678960
Mechanical & Electrical Consultant	N/A
Facilities Management Contractor Name	Tenant to confirm
Maintenance Contractor Name	Tenant to confirm

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 **12.08.24 to 13.09.24** **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	✓	✓	✓	N/A
External Services Pipework Test Sheet	✓	✓	✓	N/A
Hot & Cold Water Pipework Test Certificates	✓	✓	✓	N/A
AGD Pipework Test Certificates	✓	✓	✓	N/A
TMV Test & Hot Water Balancing Reports	✓	✓	✓	N/A
ASHP Commissioning	✓	✓	✓	N/A
Ventilation Air Balance Reports	✓	✓	✓	N/A
LTHW Water Balancing	✓	✓	✓	N/A
Primary Ventilation Balancing	✓	✓	✓	N/A
WC Extract Air Balance	✓	✓	✓	N/A
BMS & Controls Commissioning	✓	✓	✓	N/A
VRF Heating & Cooling Test & Commissioning Certificates	✓	✓	✓	N/A
Fire Damper Certificates	✓	✓	✓	N/A

Air infiltration

A building air pressure test was carried out on the 16/08/2024 and showed a measured air permeability of 1.30m³ which was within the specified target refer to building manuals for full rest report.

Handover

Handover took place on:	16/09/2024
End of defects liability period:	16/09/2025
The handover procedure was managed by:	Spencer Jackson (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 gas distribution pipework & gas entry location to the warehouse.
- External site wide mains cold water distribution pipework & entry location to the riser.
- External protectaline hydrant main from dedicated branch from incoming fire main with 2No fire hydrants within the site boundary.
- LTHW Heating and associated pipework and fittings, pumps served from dedicated air source heat pump for hot water and heating.
- Main offices VRF heating & cooling system with concealed ducted indoor units, external condensers located externally & all condensate disposal systems.
- Central primary supply and extract ventilation with heat recovery air handling unit within the plantroom, ductwork distribution incorporating attenuators, fire dampers, volume control dampers and room air terminals.
- Toilet extract ventilation to main offices including, twin toilet extract fan to plantroom, ductwork distribution incorporating attenuators, fire dampers, volume control dampers and room air terminals.
- Domestic mains cold water services system to serve all cold outlets within the building, incorporating pipework, valves, controls, and thermal insulation.
- Central hot water to main offices with hot water cylinder within plantroom served from ASHP and solar thermal system with back up immersion including pipework, valves, controls, and thermal insulation.
- An automatic controls system and BMS to monitor and control the complete building services package.
- An above ground drainage system to remove wastewater from all sanitaryware appliances throughout the building to drain.
- Thermal insulation to all domestic hot and cold water, heating, and ventilation services as necessary.
- The chlorination of all domestic hot and cold water systems serving all new installations.
- Flushing and cleaning of LTHW heating system
- 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°Cdb / -3.6°Cwb
Summer	28.1°Cdb / 19.2°Cwb for thermal loads

Internal				
Area	**Temperature**		**Infiltration**	**Mechanical**
	Winter	***Summer***		
Offices	21°C	23°C	1.0	12l/s/p
Reception	21°C	28°C	1.0	N/A
Toilets	19°C	N/A		10 ach
Cleaners	N/A	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 7.5 m²
Fresh air temperatures	
Winter	21°C db
Summer	Uncontrolled
Air filtration	
Office fresh air supply	G4/F7
Noise Criteria	
Office Areas	< NR 35
Tea Room	< NR 40
Toilets	< NR 40
Circulation Areas	< NR 40
Cleaners	< NR 40
Plantroom	< NR 50
External	NR65 @ 1MTR from Building
Hot & Cold-Water Services	
Max Velocity	1.15m/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: 5m/s Branch ducts: 4.0m/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 tails from utility ring main unit at boundary to HV side of private transformer.
- LV tails from LV side of transformer to main LV panel.
- LV Main Panel Board, Sub Split Metered Power & Lighting Distribution Boards for the office, external services distribution board and Mechanical Distribution Board.
- Primary cable tray systems within ceiling voids.
- Under floor power track system and floor boxes within the office areas to provide a flexible power solution, Hand dryer power supplies for future use.
- Power supplies to mechanical equipment.
- Internal lighting with PIR control, dimming facility within office areas. Emergency Lighting throughout the office and core areas, with exit signage above doors.
- External lighting consisting of building and column mounted LED fittings.
- Fire Alarm to office, core areas and warehouse.
- Accessible WC Alarm and Disabled Refuge System.
- Electric vehicle chargers within car park.
- Testing & Commissioning of all services.

Electrical Design Criteria

Design Criteria – Panattoni Poyle

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

Internal Lighting

Area	Lux	Uniformity
Bathrooms, toilets	200	0.4
Corridors	100	0.4
Reception Lobby	300	0.4
Stairs	150	0.4
Plant rooms, riser	200	0.6
Cleaners Store	200	0.6
Open plan office	500	0.6

External Lighting

Area	Lux	Uniformity
Building Perimeter	30	0.40
Pedestrian Only Walkways	10	0.25
Parking Areas	05	0.25
Service Yard	30	0.40
Loading Bays	50	0.40
Building Entrances	50	0.40

Emergency Lighting

Designed to comply with BS5266

Fire Alarm System

P1/M 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 unit, zoning of R32 VRF heating and cooling to open plan offices, DX heating & cooling coil to AHU, ASHP for LTHW & Hot water production and solar thermal 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.

CO2 monitors are located in the spaces between 150 & 800 m3 in volume, these should be green at all times, should amber or red be illuminated please check design occupancy levels are not being regularly exceeded and ventilation plant is fully operational.

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 all office fittings.

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. CO2 monitors are located in the spaces between 150 & 800 m3 in volume, these should be green at all times, should amber or red be illuminated please check design occupancy levels are not being regularly exceeded and ventilation plant is fully operational.

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 LTHW radiators c/w localised TRV for temperature trimming.

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 VRF heating and cooling, heat recovery filter checks 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 7314.52m^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					574		7.85	**574**
Reception					47.3		0.65	**47.3**
Landing				39.75			0.54	**39.75**
Toilets						50.01	0.68	**50.01**
Tea Room						11.2	0.15	**11.2**
Corridors/Circulation				216.19			2.96	**216.19**
Cleaners						3.64	0.05	**3.64**
Risers/Lifts/undercroft	677.57						9.26	**677.57**
Plant Deck	75.86						1.04	**75.86**
Warehouse	5619						76.82	**5619**
Total (%)	87.12			3.50	8.49	0.89	100.00	
Total area (m^2)	**6372.43**			**255.94**	**621.3**	**64.85**		**7314.52**

Tenancies

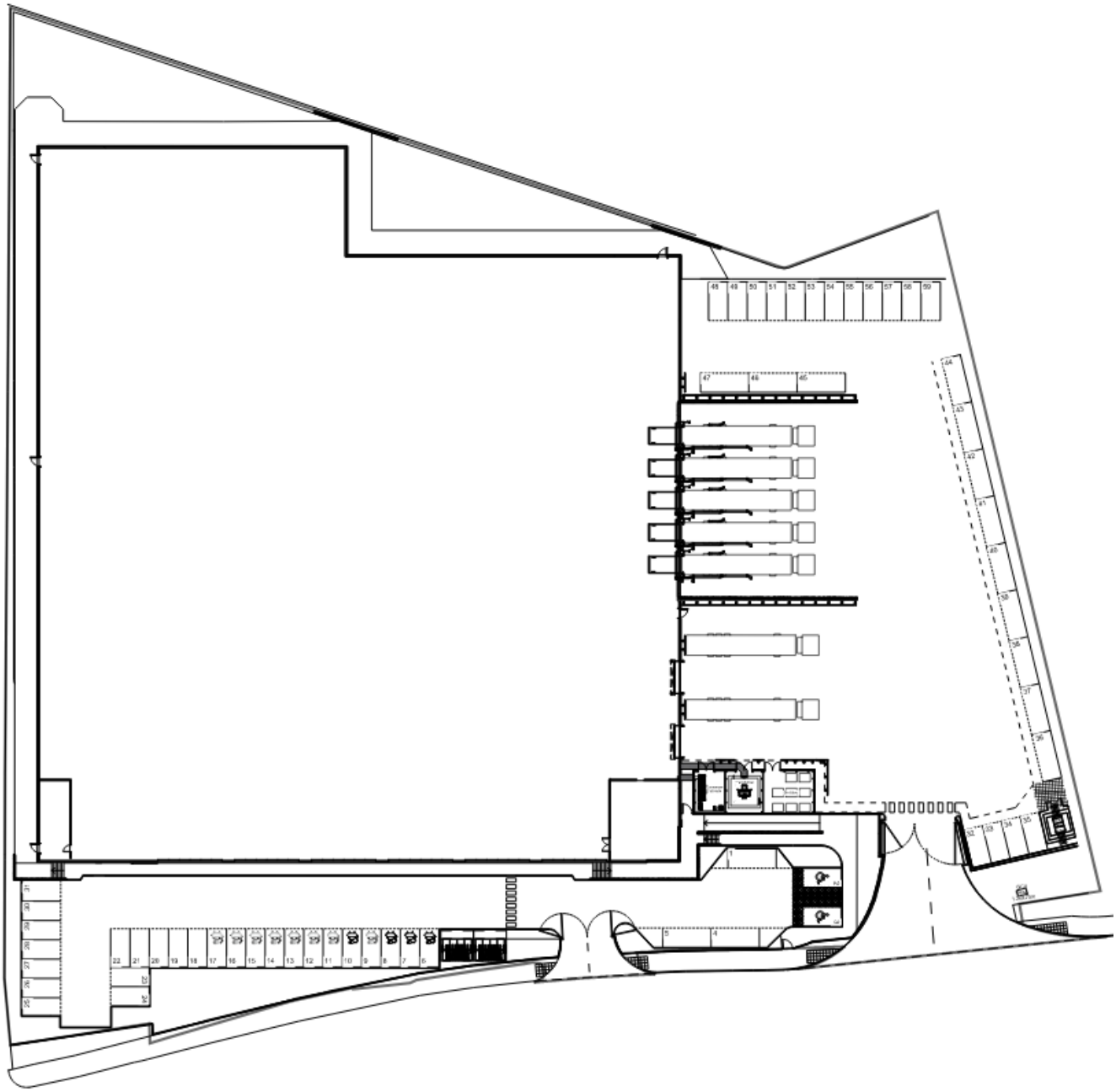
Not applicable

Separately managed and special areas

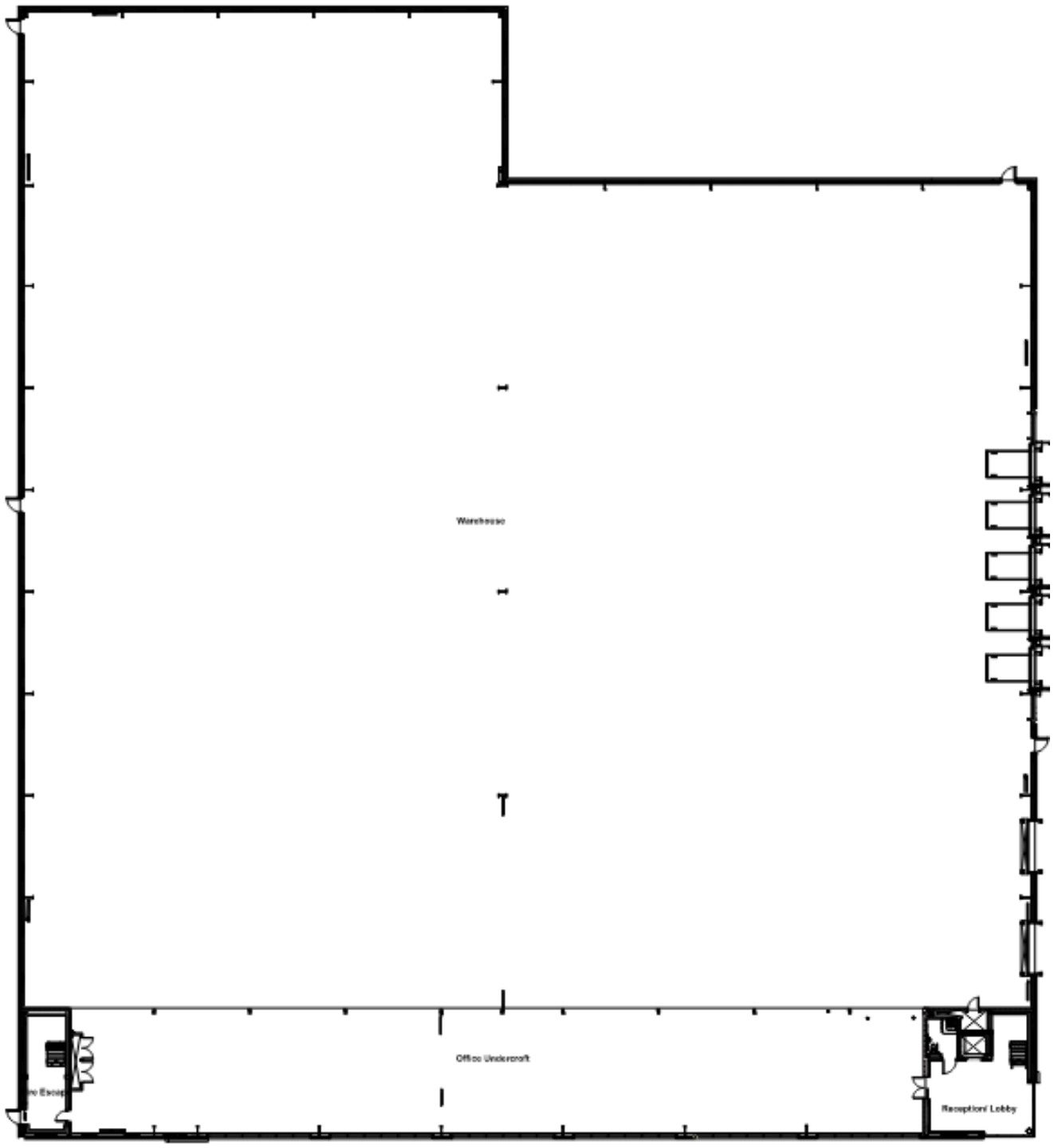
Not applicable

Floor plans

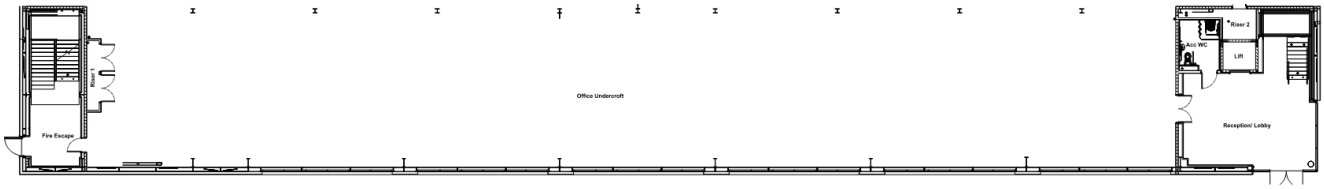
SITE



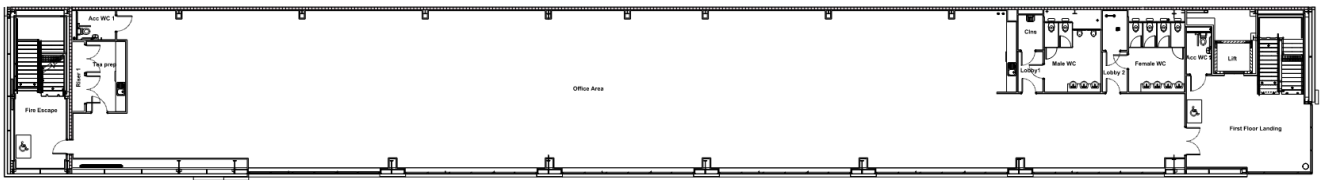
WAREHOUSE



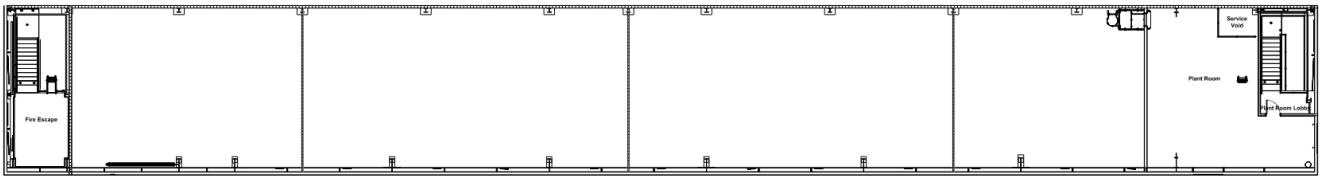
MAIN OFFICE GROUND



MAIN OFFICE FIRST



MAIN OFFICE SECOND



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	External Condensing Compound	40.28	130.9
Heat Recovery Unit	Plantroom	5.00	
Toilet Extract Fans	Plantroom	0.48	
ASHP	External Condensing compound	4.81	14.0
Electric Water Immersion	Plantroom	3	
Pumps	Plantroom	0.69	
EV Chargers	Car Park	7.4	

SYSTEMS:

Mechanical Services

Description	Drg No:
Schematic Services	P23025-WMB-DR-M-0100 Series
LTHW Heating Services Layout	P23025-WMB-DR-M-0200 Series
Domestic Water Services Layout	P23025-WMB-DR-M-0300 Series
DX Heat Pump/VRF Services Layout	P23025-WMB-DR-M-0400 Series
Public Health Services Layout	P23025-WMB-DR-M-0500 Series
Ventilation Services Layout	P23025-WMB-DR-M-0600 Series
External Services	P23025-WMB-DR-M-0800 Series
Mechanical Wiring Layout	P23025-WMB-DR-M-0900 Series

MAIN OFFICES

HEATING

The offices are provided with heating and hot water from a monobloc style air source heat pump system, the refrigerant compressor circuit is all contained in the condensing unit located in the compound externally and generates hot water up to 58°C flow temperature with a differential of 5°C.

The heat pump is fitted with safety valve and all associated controls with flexibles connections to the flow and return pipework, connection set includes isolating valves and bypass flushing loop.

Copper pipework adapts at low level to pre-insulated flexible twin pipework is installed on refrigeration tray and rises vertically to the second-floor plantroom.

A single head wall mounted inline electronic heating pump is fitted on the heating flow to serve the following circuits:

- Constant temperature circuit serving hot water upper coil.
- Radiator single zone circuit.

Each pump will be mounted on wall supports. The pump suction pipe will be fitted with isolating valve, test points, pressure gauge, and flexible connection with the discharge pipe incorporating flexible connection, pressure gauge, test point and isolating valve.

The heating flow is fitted with diverting control valve with priority control to the hot water system to divert full heat to the hot water coil to ensure quick recovery.

The hot water upper coil connection is controlled from the ASHP interface control board and BMS, a standard valve arrangement consisting of isolating valve, commissioning valve on return & draincock to lowest connection.

The constant temperature radiator circuit is optimised to ensure the occupied space is at the correct temperature at the set time period. This pump set is electronic and will reduce speed to accommodate the closing of thermostatic radiator valves. Automatic bypass valves are fitted to ensure the minimum pump volume is always available and system extremities are always circulating.

A quick fill loop with isolating valves and double check valve is fitted on the heating return to allow the system to be filled and topped up, the loop will be disconnected on commissioning, and it should be noted that the system contains 20% by volume glycol to protect against freezing and any system top up should therefore also include the checking and top up of glycol.

A 6-litre chemical dosing pot will be installed and linked across the heating flow and return and 25mm flushing valves installed to the main headers to enable circuit flushing and cleaning prior to commissioning.
The office and core area toilets, stairs, and circulation spaces to the first floor are served from the ASHP heating circuit, commercial quality steel flat panel style radiators with top and side grilles are fitted to all areas, disabled toilets are provided with low surface temperature type.

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

Thermostatic radiator valves are fitted to all radiators to allow localised temperature trimming.

MAINS COLD WATER SERVICES

A new MDPE protectaline cold water main enters the building within the riser to the main offices and terminates with isolating valve, double check valve, drain cock and leak detection check meter. From this incoming location the mains cold water adapts to copper.

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

- General Plantroom equipment including pressurisation units.
- Office toilet areas
- Hot water cylinder inlet
- Rainwater harvesting make up.

The hot water heater serving the offices is provided with metered mains cold water to the cold-water inlet of the cylinder, the connection is fitted with manufacturer's proprietary unvented kit consisting of expansion vessel, pressure relief valve, isolating valve, check valve and pressure reducing valve.

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.

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

All pipework where concealed, within voids, plantrooms or risers is fitted with Phenolic foam 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

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 main office riser, from this point the MDPE converts to copper tube with isolating valve and rises to second floor plant room.

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 225 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 single 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 phenolic foam thermal insulation with identification applied in accordance with the specification.

HOT WATER SERVICE

Located in the second-floor plant room is the domestic hot water system, this system serves the following areas/systems:

- Offices general domestic hot water service

The offices are provided with a single vertical indirect hot water cylinders with two coils connected to the solar thermal acting as pre-heat/buffer section of the cylinder and the other to the ASHP heating system via three port control valves to maintain hot water flow temperatures with priority to hot water recovery. Additionally, a 3-kW electric immersion is fitted in the cylinder to lift the temperature to 62°C and controlled from the ASHP interface board and BMS.

The hot water cylinder is provided with lower solar heating coil and upper high gain air source heat pump coil with larger surface area for lower operating temperatures, control sensors, thermometer, isolating valves on flow, return and cold-water inlet, drain valve, temperature and pressure relief valve, manufacturers unvented kit including pressure relief valve, pressure reducing valve, non-return valve and expansion vessel sized to accommodate hot water expansion during heat up, insulating jacket and casing. A cylinder circulating pump will be provided and linked to the flow from the hot water cylinder to ensure the complete volume of the cylinder is raised to high temperature one a week to reduce risk of legionella infection.

The hot water cylinder is designed to maintain 60°C flow conditions with a single head bronze secondary hot water circulator fitted on the common cylinder return pipework to maintain a return water temperature of 55°C. 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 blending valve installation. Thermal balancing valves shall be incorporated at return connections to balance the system to ensure temperature differential is maintained.

The hot water pump will be provided with isolating valves on suction and discharge, non-return valve and 100mm diameter pressure gauges and gauge cock.

An external solar array consisting of 2No flat panel collectors are located externally on the warehouse roof and linked to the plantroom with pre-insulated aluminium flexible pipework and extended to the lower coil of the indirect hot water cylinders. An ultrasonic heat meter is fitted on the solar thermal pipework connections to report back to the automatic control system.

The solar system is fitted with pumping station consisting of single head pump, expansion vessel, safety valve and appropriate controller and sensors. The solar system is intended to be the primary source of hot water generation with the ASHP system used to ensure the water is raised to operating conditions when leaving the cylinder.

The copper pipework to the offices runs at high level within the plantroom to the first-floor office ceiling void and distributes to all outlets as required. Thermostatic blending taps are incorporated on hot water outlets to disabled and standard wash basins. Cleaner's sinks, tearoom sinks shall be supplied with unregulated hot water, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed, within voids, plantrooms or risers is fitted with phenolic 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 into the building. Ventilated stacks and branch pipes shall be installed throughout the floors and shall discharge to atmosphere with bird cage or be fitted with air admittance valve within the void.

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 reception first floor offices are serviced with the installation of a Daikin variable refrigeration volume air conditioning system with heat recovery. Three systems are installed in total as below:

- System 1 – Ground floor & first floor offices (Part)
- System 2 – First Floor Open Plan Office (Part)

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 externally to the main offices in the condenser compound and are charged with R32 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 ducted fan coil units concealed within the ceiling void or wall mounted unit to the reception. This equipment contains the evaporator coil, filter, and fan. The fan coil fresh air is supplied to the rear of the fan coil or to grilles within the space via galvanised sheet metal ductwork.

From the fan coil discharge plenum secondary air insulated galvanised ductwork & flexible ductwork is extended to swirl diffusers where ceilings are installed with swirl size selected to ensure correct throws and terminal velocities.

Open swirl diffusers are to be used for extracting vitiated air into the ceiling plenum and then to the filtered rear of the fan coil unit.

The diffusers are fitted with galvanised plenum boxes with side entry spigots and connected to galvanised ductwork with flexible insulated ductwork a maximum of 500mm long. All plenum boxes on conditioned supply air are provided with acoustic and thermal lining internally.

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 filter section of the fan coil; room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

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

DX Cooling & Heating

The main offices for the purposes of supply air tempering will be provided with DX heating/cooling coil within the AHU.

The condensers are sited externally to the main offices in the condenser compound and are charged with R32 refrigerant gas which when activated pumps the refrigerant around the system to the DX coil in pipework insulated with class O Armaflex on galvanised metal tray.

The condensers operation is via the BMS to enable and modulate its operation according to off coil and internal conditions using expansion valve and interface fitted to the coil.

Copper condensate pipework is installed from the DX coil in copper pipework and discharges over floor gully.

OFFICES SUPPLY & EXTRACT VENTILATION

The office is provided with supply and extract ventilation by a heat recovery air handling unit mounted internally on the main plantroom.

The air handling units incorporates the following equipment:

Supply Side	-	Motorised air inlet damper.
	-	G4 Pleated panel filter c/w access
	-	F7 Rigid Bag Filter c/w access
	-	Plate Heat Exchanger
	-	Supply fan c/w access.
	-	DX Cooling/Heating Coil
	-	Discharge spigot.
Extract Side	-	G4 Pleated panel filter c/w access.
	-	Extract fan.
	-	Plate Heat Exchanger c/w Bypass Damper
	-	Motorised air exhaust damper

The air handling units will be provided complete with electrical wiring to isolators with construction from double skinned insulated panels on a channel frame, access panels shall be fitted to all locations requiring regular access.

Exhaust air ductwork extends from the unit to connect to external louvre on Southwest elevation with fresh air inlet to a louvre on the Southeast Elevation.

The supply and extract ductwork from the unit connections runs at high level in the plantroom to enter the first-floor ceiling void through white wall with branch to ground floor through riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices fire compartments will be fitted with standard fusible link fire dampers and access door to damper dependant.

The units are provided with comprehensive control and monitoring facility to the unit, all control items are fitted and wired on the unit and the complete system is interfaced with the building management system.

Temperature control of the air handling units will be achieved via the building management 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 DX cooling/heating coil to maintain the required temperature conditions supplied to the space.

All main branches are to be fitted with opposed blade volume control dampers for regulation, branches to terminals are fitted with single blade volume control dampers where necessary.

The supply air is discharged into the spaces through the ceiling void with tempered air then discharged into the space through the rear of the fan coil units.

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 un-insulated and un-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.

The return air to the air handling unit is from the void above the occupied space, ductwork fitted with multiple low velocity bell mouth terminations open in the void again using the plenum as a return air path draw air into the ductwork distribution system and back to the plantroom.

To affect the free passage of air from the space into the void swirl diffusers will be used with sufficient free area to ensure an unrestricted path into the void.

All plantroom, riser, and ceiling void supply, return air and fresh air ductwork is fitted with 25mm mineral wool thermal insulation with identification applied to insulated and un-insulated ducts in accordance with the specification.

TOILET EXTRACT VENTILATION

The office core area toilets and cleaner's room are provided with supply air from the primary ventilation plant and extract ventilation from a dedicated twin extract fan mounted within the second-floor plant deck.

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 on anti-vibration mountings.

The exhaust air ductwork is extended to connect onto the exhaust air common louvre in the Southwest elevation.

The toilet extract ductwork from the unit connections runs at high level in the plantroom to enter the first-floor ceiling void through white wall with branch to ground floor through riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

Penetrations through the offices fire compartments will be fitted with standard fusible link fire dampers and access door to damper.

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.

SITE WIDE

- **NATURAL GAS INSTALLATION**

Within the base build works a new low pressure gas supply has been extended to within the site boundary. From this point the gas supply connects to a new gas meter & governor externally.

From the outlet of the meter steel pipework is extended through the gas meter kiosk floor slab and into the ground where it adapts to MDPE. A low-pressure site wide MDPE main is installed to the building, MDPE pipework is extended to the building entry locations where it adapts to steel below ground rises above ground into the building.

At the Incoming entry the point into the building the gas incoming locations has been fitted with purge valve, additional emergency control valve and de-commissioning valve.

WAREHOUSE

At the entry point to the main office's entry point on gridline B1/3 the gas will be fitted with 40mm purge valve, 80mm additional emergency control valve & 40mm purge de-commissioning valve.

The 80mm gas is blanked and valved at low level for future fit out extension.

DOMESTIC MAINS COLD WATER SERVICES

A new blue protectaline 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 protectaline 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 and draincock will be fitted, a leak detection meter linked to the leak detection panel 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:

- Main Office Riser – Leak detection meter & alarm fitted.

SYSTEMS:

Electrical Services

Drawings

Description	Drg No:
LV Schematic	P23025-WME-XX-XX-DR-E-0001
HV Schematic	P23025-WME-XX-XX-DR-E-0002
Disabled Refuge Schematic	P23025-WME-XX-XX-DR-E-0003
DB1 LV Panel Layout	P23025-WME-XX-XX-DR-E-0010
Office Lighting Layout	P23025-WME-BR-ZZ-DR-E-0100
Warehouse Lighting Layout	P23025-WME-BR-XX-DR-E-0101
Office Small Power Layout	P23025-WME-BR-ZZ-DR-E-0200
Warehouse Small Power Layout	P23025-WME-BR-XX-DR-E-0201
Office Fire Alarm Layout	P23025-WME-BR-ZZ-DR-E-0300
Warehouse Fire Alarm Layout	P23025-WME-BR-XX-DR-E-0301
Office Containment Layout	P23025-WME-BR-ZZ-DR-E-0400
Warehouse Containment Layout	P23025-WME-BR-XX-DR-E-0401
External Lighting Layout	P23025-WME-EX-XX-DR-E-0500
External Lighting Lux Plot	P23025-WME-EX-XX-DR-E-0501
External Duct Layout	P23025-WME-EX-XX-DR-E-0502
External Lighting Layout	P23025-WME-EX-XX-DR-E-0503
Transformer Plinth Detail	P23025-WME-XX-XX-DR-E-0504
LV Tails Duct Detail	P23025-WME-EX-XX-DR-E-0505
External Power Layout	P23025-WME-EX-XX-DR-E-0506
Lightning Protection Layout	P23025-WME-EX-XX-DR-E-0700
External Coordination	P23025-WME-EX-XX-DR-E-0800

General

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

1. HV tails from utility ring main unit at boundary to HV side of private transformer
2. LV tails from LV side of transformer to main LV panel
3. Installation of local DB's to the offices
4. Installation of small power and lighting to the offices
5. Installation of dock door busbar and isolators
6. Installation of P1/M fire alarm system to the offices
7. Installation of Disabled refuge system
8. External lighting
9. Installation of power and fire alarm containment to the offices
10. Mechanical supplies in the offices
11. Installation of EVC points to car park
12. Ducts for future CCTV use and future barriers

HV Supply

The source for the HV supply is an 11kV ring main unit located at the site boundary with 185mm triplex cables routed through ducts to the HV side of the transformer.

LV Supply

The source for the LV supply is a private transformer located between the bin store and condenser compound fitted with an MCCB set at 800Amp for a rated supply of 550kVA From the LV side of the transformer 2 x 1core 300mm AWA cables per phase and neutral plus 240mm CPC are routed through ducts to the main LV Panel.

There are 6x225mm ducts provided for the LV tails at base build. The LV tails utilise 4 of the ducts, leaving 2 spares.

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

Main Switchgear and sub-distribution

The main LV panel is located in the Warehouse at gridline 2/F. The panel is floor mounted and has a main switch to isolate the electrical supply to all the outgoings ways.

The main LV panel has been electrically rated to suit the load of the supply and has surge protection units fitted to prevent/reduce potential surge damage caused by lightning protection. The panel is floor mounted Form 4 type 3, 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 are taken from the panel and secured to cable tray to feed the sub-distribution boards around the office, dock door busbar, Fire alarm panel, Disabled refuge panel, and the lift.

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 are installed to the offices to provide small power to items such as socket outlets, hand dryers and fused spurs for small load mechanical equipment. Boards will be provided as detailed below.

Ground Floor Riser DB2, EVC and Ext1
First Floor Storeroom DB3
Plant Deck DB4

The office distribution boards are split metered for lighting and power circuits and are fed from the main panel, location as described above.

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

The first-floor kitchenette and tea prep area have general purpose outlets above the worksurface. Dedicated sockets for dishwasher/fridge are located at low level with isolation above the worksurface.

Underfloor bus bar.
To allow flexibility for future furniture layouts underfloor bus bars are 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 with 1 x floor box in the ground floor reception area supplied through recessed and underfloor conduits.

Plastic fused spurs.
White fused spur outlets are 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 are provided for the mechanical plant AC units. These supplies are 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 metal trunking is connected at high level. Supplies to the door bus bar is taken from the main panels.

External power

Within the service yard a power supply is provided for petrol interceptors to monitor the amount of oil passing through water system and which is fed from DB2.

Containment

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

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

Office and core areas

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

The system is fully rewireable, cable ducts have been installed to link the underfloor busbar system to point of supply.

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 conduits.

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

External
Ducts have been provided for future sitewide CCTV use, for future barriers at the site entrance and future expansion of the EV charging systems.

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.

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 are installed, controlled via ceiling mounted PIR control.

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 flexible cable and plug to an LCM socket which allows the fitting to be disconnected without effecting others on the circuit. Dependant on the type and quantity of fittings the dextra plug can be connected into a multi or single module, 6 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 1st and ground floors.

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

Office emergency lighting.

Emergency lighting to the office and core areas is 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 8 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 roadways and services yards with the fittings fixed through the external cladding using 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 internal perimeter of the warehouse and terminated 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 is 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 P1/M fire alarm system has been installed to the office areas with differing types of detection and indication used dependant on the location.

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 are 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. The Plant deck and ceiling void is provided with a HSSD aspirating smoke detection system, with a control panel located in the plant room. The HSSD pipework is routed to the ceiling void through the plant room. 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.

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 are provided to give a signal when the fire alarm is operated to shut down mechanical plant, automated office main entrance door fail open, and to lower the lift to the ground floor.

A mains rated output interface is provided to send fire alarm signal to the PV system.

Cabling.
The fire alarm has been wired in a 60-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 next 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 2c 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, 1 No reset button and 1 No over-door audible/visual warning unit are 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. The system is linked to the disabled refuge panel to provide remote indication of assistance required.

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

A number of Electric Vehicle Charge (EVC) stations have been provided in the main car park. The charge points are 6 x dual output 7.4kw bollards fed from a dedicated distribution board located within in the riser.

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 ducted fan coil units controlled from the Daikin central controller on the main office plant room control panel and local room controllers, the toilets, core areas and corridors are served via LTHW radiators from the air source heat pump system with localised TRV for room set point adjustment.

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 overcompensate 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 Daikin 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 overcompensate 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 plantroom heat recovery unit containing filters, fans, and heat recovery cube to pre-heat the incoming air & DX heating/cooling coil.

Main 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 radiator grilles 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: 506,000 kWh/yr. Other: Litres					
Energy			**Meters**		**Method**		**Meter location**	
Type of incoming energy	Main end-use	Estimated end-use consumption (kWh/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 (kWh/yr.)	List of meters	Location
Electric	Incoming		DB1	All Areas	Modbus Meter	506000	Main Meter	DB1
	DB2		DB2	Ltg & Power	Modbus Meter	12800	Sub Meter	DB2
	DB3		DB3	Ltg & Power	Modbus Meter	72000	Sub Meter	DB3
	DB4		DB4	Ltg & Power	Modbus Meter	178000	Sub Meter	DB1
	DB5		DB5	EVC	Modbus Meter	164000	Sub Meter	DB1
	EXT1		EXT1	Ltg	Modbus Meter	20000	Sub Meter	DB1
	DOOR BB		DOOR BB	Power	Modbus Meter	13000	Sub Meter	DB1
	LIFT		LIFT	Power	Modbus Meter	5110	Sub Meter	DB1

Building Performance Records

(Not more than three pages)

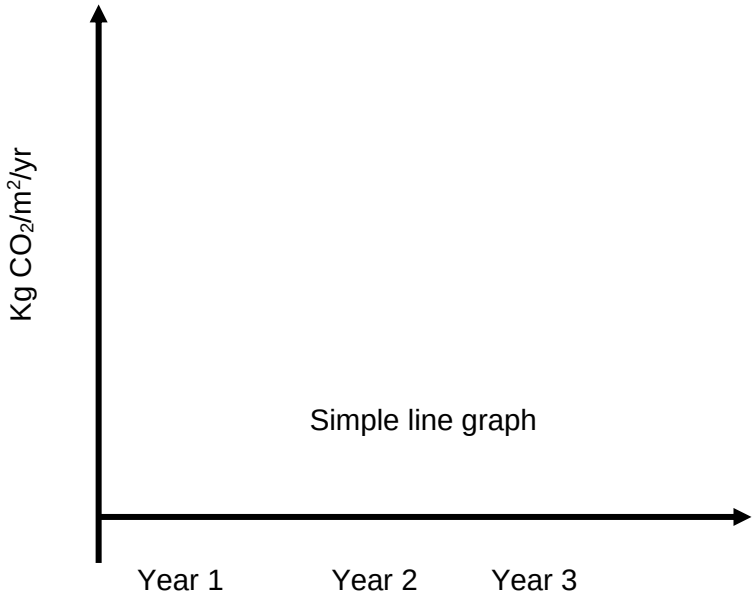
Overall annual energy performance

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 m^2**							
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			0.43			0.89	1.81
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

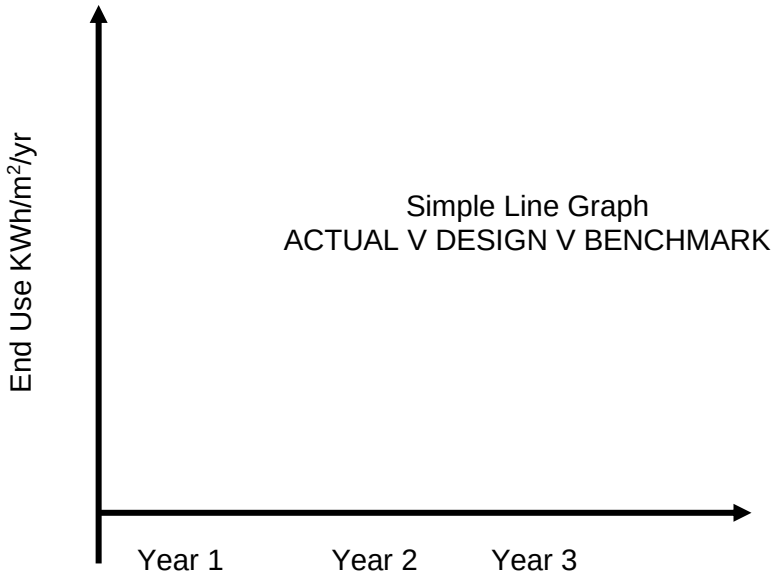
Annual summary of actual metered consumption per square metre and the design team's estimates versus benchmarks broken down by main end-uses. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building logbooks – a user's guide*. A copy is included on the CD-ROM associated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

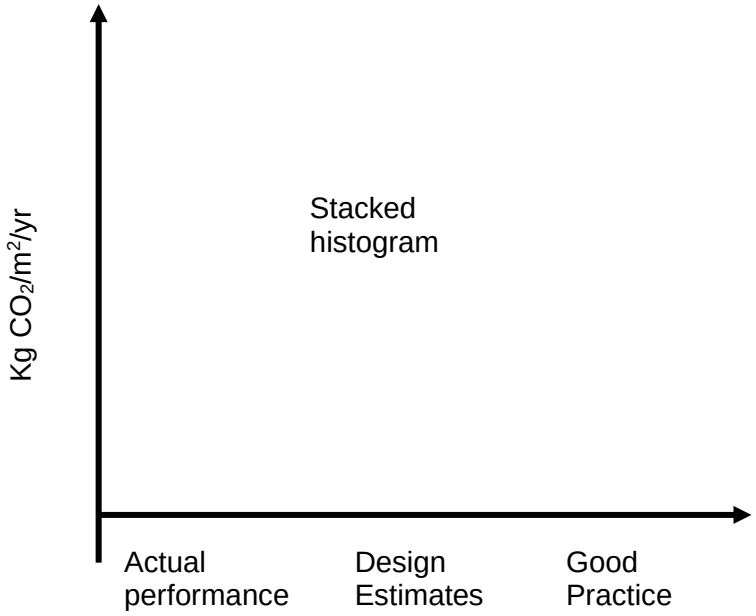
Building energy performance for period from *[date]* to *[date]* **Based on a treated floor area of *38015* m²**					
Fuel type	**Main end use**	**Actual** Metered incoming consumption ((Kw·h)/yr)	**Actual** Sub-metered main end use energy consumption ((Kw·h/m²)/yr)	**Design estimates** Main end use energy consumption (Kw·h/yr	**Good practice benchmark** Main end use energy consumption ((Kw·h/yr)
Electricity	Heating			0.84	1.02
	Cooling			1.35	0.9
	Auxiliary			0.72	0.54
	Lighting			5.8	8.69
	Hot Water			2.64	2.02
	Equipment *			44.89	44.89
	Total **			11.36	13.18

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

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				
ASHP				
External DX Condensers				
VRF Air Conditioning System				
Hot Water Cylinder				
Solar Thermal System				
Dampers (VCD's and Fire)				
Air Terminals & Louvres				
AHU & Filters				
Main Office Toilet Extract Fan				
Water Management				

Procedures				
TMV/Mixer Shower				
Hot Water Heaters				
BMS/Controls				
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.