KAIZEN

Consulting Engineers

Manchester One

MEP Strategy Report – February 2026







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Introduction and Preambles

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Client Vision

Manchester One (formerly Portland Tower) is a landmark 21 storey office block in the heart of Manchester City Centre. Originally constructed in 1963, and has already been significantly improved over recent years and Bruntwood SciTech have aspirations to further improve and extend the building.

The existing building is to be extended off the front and side elevation, providing a new and fresh arrival experience, flexible retail outlet, new WCs and entrance lobby, with serviced and extended office facilities on the upper levels. Completing the extension will be a fourth floor roof garden and outdoor amenity.

Alongside the extension we have been asked to review the long term M&E strategies for the building including the tower, which will be refurbished on a floor by floor basis over time following the completion of the new extension.

The design and fit out of the floor plates in the existing tower (other than those linked with the extension project) are not included in the scheme, although the project team must ensure that the strategies and systems are aligned and future proofed.

This report identifies the design criteria and other briefing information on which the design of the mechanical, electrical and public health engineering systems will be based for the Manchester One extension, along with advising on future strategy for the existing tower. The objective of the report is to demonstrate the proposed nature of the building engineering systems design.

Scope of Works

The proposals have been developed based on the building layouts and construction information provided by Bridge Architects with services loadings based on the functionality, occupancy profiling, fabric specifications and casual gains anticipated for each area. Whilst the designs are specific to support the Building as a standalone development, they pay cognisance to the existing and future development of the Clients estate.

The new Mechanical & Electrical services installations shall be designed to be energy efficient, incorporate energy saving components and utilise renewable and/or low carbon technologies to minimise energy consumption and carbon emissions and to comply with the relevant sections of the Building Regulations, Net Zero Operational Carbon in operation form part of the project brief for the extension along with targeted improvements and longer term infrastructure investment and planning for the existing tower structure.

The services shall be designed with ease of installation and maintenance regimes in mind and consideration given to removing "whole" items of plant without the need to dismantle into component parts, whilst maintaining flexibility for future fit-out and tenant occupation level by level.

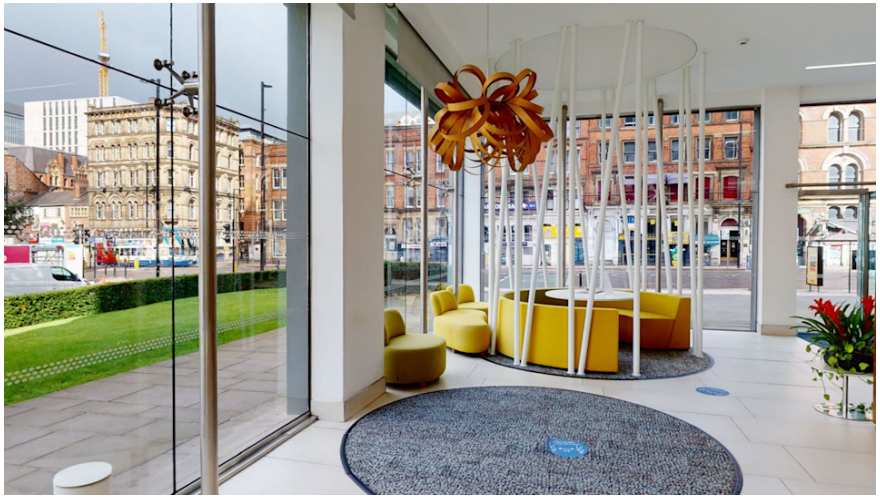
The services shall be designed with ease of installation and maintenance regimes in mind and consideration given to removing "whole" items of plant without the need to dismantle into component parts, whilst maintaining flexibility for future fit-out and tenant occupation level by level.

All plant, controls and equipment shall be selected to deliver the highest seasonal operating efficiencies, which minimises carbon emissions and energy consumption.

By adopting and initial focus being a fabric first approach and incorporating low to zero carbon technologies, the extension to the building could be shown to be in line with Part L2 of the Building Regulations along with the Client Teams plan to support the use renewable and low carbon energy sources. The operational energy density of the towers is expected to stay as is, with gradual phased improvements over time as systems and levels are improved.

The potential of an all-electric building has been kept in mind adopted to help the building move towards zero-carbon in use as the carbon content of grid electricity continues to fall in line with the predictions illustrated in the report, please refer to the electrical section of this report which includes a high level load assessment and plans to reinforce LV capacity.

Environmental control systems shall be developed so they can be operated easily by end users. Systems shall be designed to reduce maintenance requirements, minimise running costs and maximise flexibility and value.



Introduction and Preambles



All equipment, materials and workmanship will meet the requirements of, but not be limited to the following documents and standards unless otherwise indicated in this report:

a) Client brief and Specifications

b) Other Standards: -

- Guides to Good Practice as published by the Chartered Institution of Building Services Engineers.
- The Building Regulations.
- Latest edition of British Standard Specifications and British Standard Codes of Practice (current at date of tender), and European Norms.
- Statutory Undertakings Regulations.
- The Local Authority Environmental Health Officer's requirements.
- Building Control Officer Requirements.
- Planning Requirements.
- The Local Fire Officer's requirements and fire engineers requirements
- Structural Engineers input in terms of existing building structure.
- The Health and Safety at Work Inspectorate's requirements.
- BS 7671: Requirements for Electrical Installations.
- CIBSE Commissioning Codes and BSRIA Commissioning Guides
- Building and Engineering Services Association (Formerly HVCA) Ductwork Specification Standards DW 144, 145 and 172
- BSEN 12056 Parts 1-5 Gravity Drainage Systems Inside Building.
- BS 8000 – Part 13: Code of Practice for Above Ground Drainage and Sanitary Appliances.
- Construction (Design and Management) Regulations
- Clean Air Act.
- Equality Act.

Scope of Works

Scope of Works

Scope of Works

- Provide energy efficient Mechanical & Electrical Services systems that provide a Building Regulations compliant building, assists with the Clients aspirations of a highly efficient building.

- Provide a future ready, energy efficient, low carbon emission and sustainable building incorporating best practice design principles to achieve the above.



The proposed Mechanical Services systems for the project include:

- Extension to be fully sealed, mechanically ventilated and conditioned.
- Natural ventilation to the tower via openable windows, as existing although glazing replaced and upgraded.
- Heat Pump heating and cooling.
- Domestic hot and cold water via heat pumps, subject to tower phasing i.e. “de-gas”
- Boosted cold water supplies.
- Above ground foul drainage.
- Fire-fighting wet riser to remain (by specialist)
- Mechanical controls & BEMS.

The proposed Electrical Services systems for the project include:

- Incoming power connection – new larger capacity LV sub-station.
- Infrastructure for incoming communications cabling.
- Electrical distribution.
- Internal & external lighting.
- Security/CCTV/access control.
- Fire detection and alarm systems.
- Specialist systems (disabled toilet alarm, nurse call, induction loops and the like).
- Mechanical Services wiring.
- Lightning protection.
- Passenger lifts.

Scope of Works

Internal Environmental Design

The building's environmental conditions, further detailed later in this report and denoted on the accompanying design information, are generally in line with the Employers Requirements and the requirements of the Building Regulations and will allow for optimum occupant comfort and energy efficiency.

Energy Targets, Strategies and Benchmarks

The proposed building extension will realign Manchester One with future expectations and the evolving streetscape, support occupant wellbeing and champion Bruntwood's ambition to achieve net zero carbon across the estate.

Passive design principles have been applied to create attractive spaces, with excellent access to natural resources and to minimise energy demand. Building services will be highly efficient, maintain optimal internal conditions and support detailed post occupancy evaluation through an appropriate sub-metering strategy.

Dynamic thermal modelling has been used to assess indoor environmental factors, predicted energy demand and annual CO2 emissions. Results are set out within the body and the appendix of this report. The extension and the tower window replacement have been addressed independently.

Site Analysis and Existing Services

The existing site is populated with several utility connections which shall be diverted and/or made redundant. Estimated peak and annual loads for water and electricity have been established to allow initial communications with the utility providers to be held, to ascertain the availability of these services to supply the new development.

Sustainability and Renewable Technologies

A range of sustainable and renewable energy efficiency measures have been used to develop the scheme and the design across all disciplines with a move to electrification of heat way from fossil fuels being the key driver.

Strategy

Sustainability considerations listed below have been used to develop the scheme and the design across all disciplines.

- Fabric first approach
- Energy use and CO_2 emissions – dynamic thermal simulation has been conducted.
- Water use.
- Adapting buildings for climate change.
- Sustainable drainage.
- Minimise pollution.
- Minimise waste.
- Local environment and community.

Passive Design Consideration within the strategy has been given to reduce the building demand as far as practicable.

Mixed mode ventilation incorporating opening windows has been included where possible, expanding on the existing strategy for the tower, whilst providing fully sealed mechanical ventilation to the extension via high efficiency heat recovery air handling units.

Daylighting has been maximised in all areas to promote health and wellbeing, while at the same time controlled to minimise heat gains and losses.

Energy Reduction Strategies

The following list summarises sustainability measures that have been employed for the development.

- Automatic daylight dimming lighting controls.
- Energy efficient LED luminaires.
- PIR movement/absence detectors to control lighting.
- Air Source Heat Pumps with high SCOPs
- Efficient fan and pump motors.
- Utilise variable speed inverter driven pump and fan technology.
- Mechanical ventilation plant incorporating heat recovery where practicable.
- Automatic controls and interfaces with Smart Building Technology
- Major water leak detection system with alarms.
- Energy meters and remote monitoring of energy usage.

Renewable/Low Carbon Technologies

The following renewable/low carbon technologies have been incorporated into the building's Mechanical & Electrical design:

- Air to air and water source heat pumps.

Utilities

Utilities

Existing Infrastructure

The existing site location and the City Centre is well serviced by existing utilities in the adjacent footways and highways as such the existing incoming utilities shall remain & be maintained as part of the ongoing design. There are some minor diversions to consider as part of the early works prior to groundworks commencing;

- Relocation of signage totem and associated services.
- Diversion of Gas (potentially, subject to drainage and foundation design)
- Diversion/alteration to BT and comms routes, which will need to remain serviceable I,e, parallel services may be required.

The intention is for this to eventually become an all-electric building, other than a retained gas supply to serve the speculative ground floor flexible retail unit kitchen, with a goal to decarbonise the property and remove any and all gas-based heating systems.

The existing incoming cold water supply and cold water storage tank located within the basement mechanical plant room, the intention would be to expand upon the existing system to serve the proposed 4-storey extension along with the existing system. There are secondary and tertiary tanks throughout the building, and the extent of existing services need to be further considered in areas as part of the longer term refurbishment strategy.

Above Ground Drainage

The existing above ground drainage soil stacks shall remain within the existing tower risers and continue to be maintained and replaced in-line with normal replacement strategies as and when they begin to fail.

The proposed extension: WC, changing area, Kitchen area and bathroom facilities shall require new below ground drainage infrastructure as part of the civil design and shall be extended by KCE above ground during the developing design.

Mains Cold Water Services

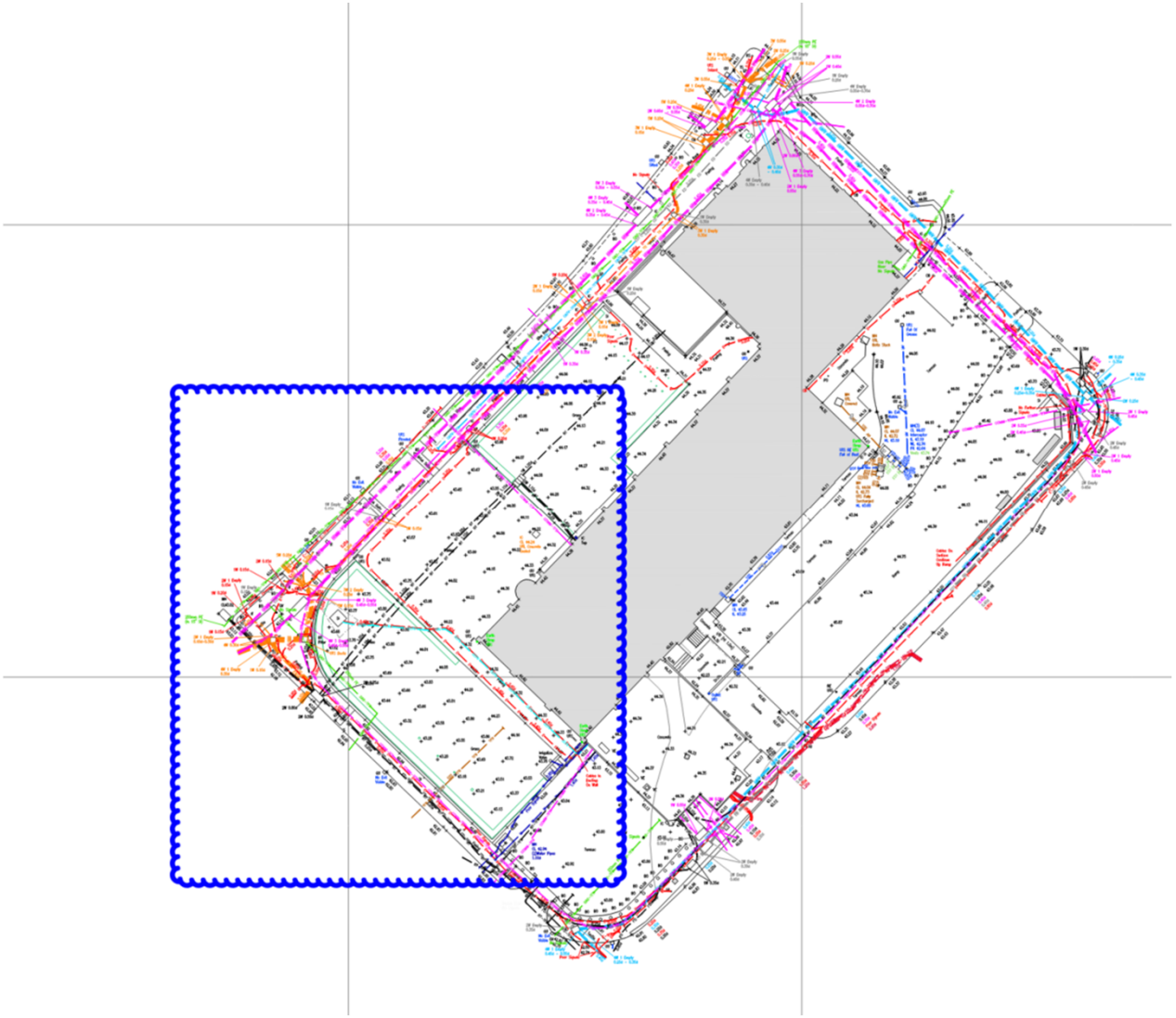
It is proposed that existing mains cold water service will be refurbished and repurposed for the future use of Manchester One within the basement plant room.

The existing incoming mains currently serve two (potentially three) tanks, one located in the basement plant room servicing the potable cold water service needs of the building and a water tank on the roof. The intention going forward is to retain the basement water storage tank and allow for a new pump booster set to allow for the additional load of the proposed extension as new WC, changing areas and flexible retail provision. The tanks at roof level shall remain until further investigation is conducted to understand the extent of the services and phased refurbishment strategy.

In an ideal scenario a meter would be provided to each tenant demise, however this is not currently feasible within the tower without significant disruption and as such sensible metering and tenant sub metering shall be provided for all new parts of the extension. The meter will be linked to the site Building Energy Management System (BEMS) and will detect and monitor the quantity of water delivered from the mains connection. A secondary water meter, installed at the point of building entry, will also be linked to the site BEMS, and will monitor the water consumption for out-of-range values to aid the Landlord in the early identification and detection of a leak occurring on the water services network.

The temperature of the incoming mains cold water will also be monitored via the BEMS and any out-of-range values will trigger an alarm.

Utilities

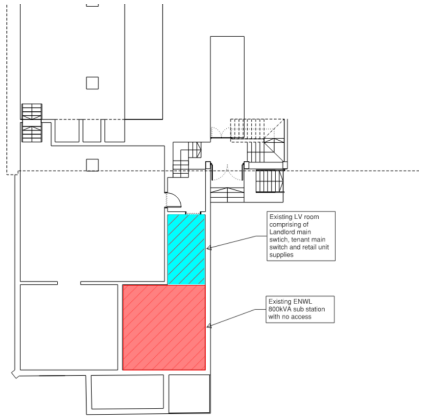


Utilities

Electricity

The Manchester One building is serviced by an ENWL 800kVA 6.6kv/400V transformer sub station located within the LG basement areas, beneath the public car park ramp.

This DNO supply serves the Manchester One building, along with other "off site" LV supplies.



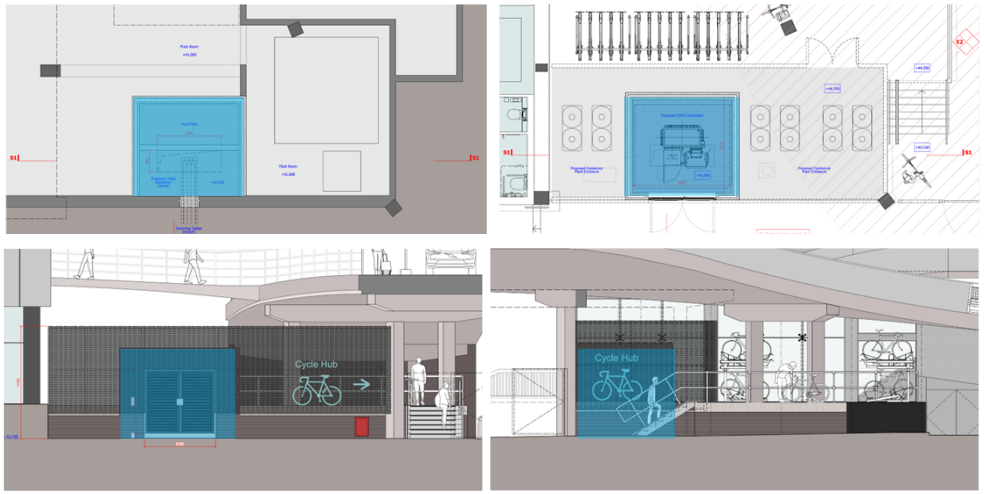
Unusually, the internal cabling and tenant busbar systems has the Fiscal supplier meters located "on floor", therefore theoretically the internal LV infra structure from the transformer to the tenant metering position on the tenant busbar would belong to ENWL. We are seeking to address this as part of the scheme, and long-term strategy.

Electrification and Low Carbon Heat

Transitioning away from fossil fuel combustion requires significant upgrades to the electrical infrastructure. The new 4-storey (plus rooftop) extension, replacement of gas-fired heating in the tower core will increase the peak electricity demand.

Presently, the building is served by a dated ENWL 800kVA unit located within the basement plant room. Through initial design calculations it is proposed that the substation capacity be increased to 1500kVA, requiring additional space to locate the new equipment.

A dedicated substation building will be constructed above the existing plantroom deck, on the external perimeter of the new condenser compound. Located at the rear of the building, the area is not visually prominent though will be architecturally screened partly forming a passageway to the new cycle storage and welfare facilities.



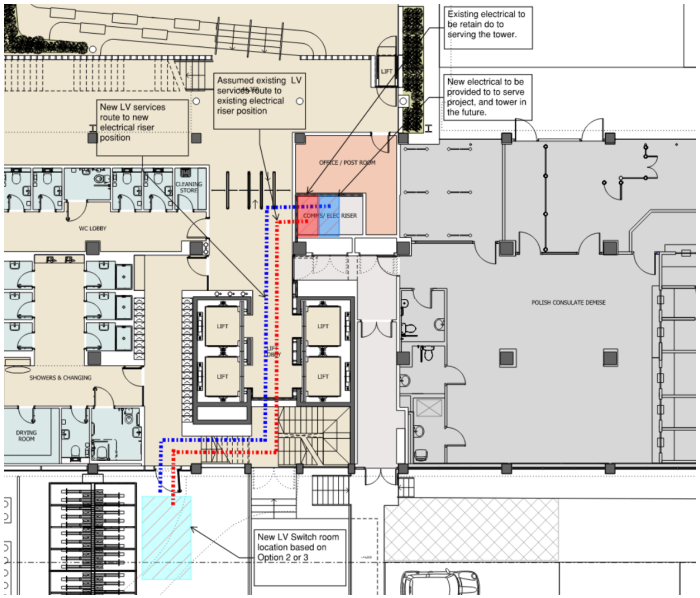
Proposed substation containment above plant room

Utilities

ENWL LV Distribution

The existing LV distribution from the existing LV room to the bottom of the electrical riser within the tower appears to be routed to the front of the lift access. This route would need to be protected throughout to ensure that the tenant upper floor supplies have limited interruptions. The new LV supplies for the project works, along with the "future proofed" new LV riser up the tower can be provided to allow installation and extension of the new busbar system at a future date for the tower "on floor" fitout(s).

As the new and existing electrical riser is "back to back" the existing on floor tenant refurbished DBs and fit out works can readily be transferred to the new riser busbar behind the existing.



Energy and Sustainable Design

Energy and Sustainable Design

Sustainability Objectives

We recognise and support the Sustainability Strategy of the Client and the objectives put forward by Bridge and the team as part of the design:

- The use of Low to Zero Carbon (LZC) technologies as part of the strategy.
- Adoption of a fabric first approach in support of the recognised LEANER – CLEANER – GREENER approach



Approach to Energy Strategy

One of the key criteria which has informed the design approach from the very earliest stages is to provide comfortable, stable environmental conditions that enhance and promote user comfort. This is achieved using engineering solutions that are intrinsically sustainable and energy efficient. The LEANER-CLEANER-GREENER strategic energy approach delivers an appropriate blend of technologies which can be tailored to suit the building and the Clients aspirations. Whilst Building Control compliance is mandatory the aim is to optimise both the predicted EPC rating, but more importantly the actual energy use, within the realms of affordability and practically. The three-step approach is as follows:

Step 1 – (Be LEANER)

Reduce building energy use by optimising the building envelope.

- Enhanced fabric with more thermally efficient construction elements to reduce heat gains/losses.
- Well-constructed building targeting a low air leakage rate.
- Providing good levels on daylight in deep spaces to enable artificial lighting to be reduced during the daytime.
- Optimised size of windows and ratio to the façade and suitable reveal depths to provide appropriate shading to limit overheating risk.

Step 2 (Be CLEANER)

Design and operate building service systems efficiently.

- Low energy ventilation strategy high efficiency heat recovery.
- High efficiency heating and cooling sources.
- Variable speed pumping and on/off zone controls strategies for the heating systems.

Step 3 (Be GREENER)

- Provide LZC Technology energy sources to offset the remaining carbon emissions.

Energy and Sustainable Design

Early Thermal Modelling

Dynamic modelling has been undertaken for the proposed extension to predict the annual energy consumption and attributable CO2e emissions for both regulated and unregulated uses.

Approved Document Part L2

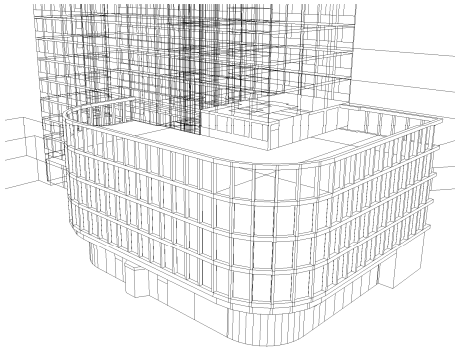
As a building extension, it is expected that the new-building energy and CO2 requirements of Approved Document Part L are not applicable. A similar assessment approach is undertaken to derive the preliminary Energy Performance Certificate (EPC).

BREEAM Ene01 Excellent

Although BREEAM is not required for this scheme, planning policy does denote that where viable, a BREEAM Ene01 score of Excellent should be achieved. Due to site constraints and the incorporation of existing building elements within the scheme, attainment of this standard is considered unviable. However, the fundamental objectives of this BREEAM credit issue have been followed through reducing the demand for energy, employing efficiency measures and minimising CO2 emissions.

Energy Use Intensity (EUI)

Predicted regulated and unregulated energy has been calculated for both a benchmark scheme utilising the existing available heating services and for the proposed, low-carbon strategy.



Component	Parameter	Input
Weather	Simulation file	2016 Manchester TRY
Fabric	U-values	Refer to Table 2
Internal lighting	Luminaire efficacy	> 100 lm/c.W. Office power density ≤5W/m^2
	Control	Presence detection and daylight dimming
External lighting	Load	Excluded from assessment.
Heating & cooling	Internal conditions	From Part L NCM profile: 22°C – 23°C (office-type spaces)
	Office VRF SCoP/SEER	3.51 / 6.06 (electric panel heaters to core)
Ventilation	Mechanical supply	12l/s.person
	SFP	1.83 – 1.89 W/l/s
	Heat recovery	75 – 78%
	Control	Speed control linked to indoor CO_2 levels
Domestic hot water	Demand	From Part L NCM profiles: c.5m^3/weekday
	Generator and efficiency	Air to water heatpumps, SCoP > 2.87
	Storage	1000litres, standing losses 0.0047 kWh/l.day
	Secondary circulation	200m, loss 6.0 W/m, pump 0.2 kW.
Occupancy	No. people	From Part L NCM profile: Maximum occupancy c.410 people Weekdays ≈ 8am – 6pm
Equipment	Office ICT	15 W/m^2

Table. Model input data

Energy and Sustainable Design

Summary of Findings

Mechanical building services have been represented using IES-VE ApacheHVAC. An initial simulation has been undertaken to establish baseline performance utilising the current heating infrastructure, assuming 4-pipe fancoils and a dedicated air-cooled chiller. Domestic hot water is provided by the current in-line heaters. The proposed scheme has been simulated for full occupancy and maximum ICT loads, and also for 75% diversity with office and meeting areas and more energy efficient ICT equipment (at 8 W/m2).

CO2e emissions have been derived using the UK Government GHG Conversion Factors for Company Reporting (2025):

Grid-supplied electricity: 0.17700 kg.CO2e/kWh

Natural gas (GCV): 0.18259 kg.CO2e/kWh

The conditioned GIA is taken from the model to be 3,025 m2.

Iteration	Gas (MWh/yr)	Elec (MWh/yr)		EUI	CO_{2e} (tonnes./yr)	
	Reg.	Unreg.	Reg.	(kWh/m².yr)	Unreg.	Reg
Baseline	287.9	152.2	152.4	195*	26.9	79.5
Proposed	0	152.2	159.0	102	26.9	28.1
Diversified	0	86.1	145.0	76	15.2	25.7

Table. Predicted operational energy consumption and CO_2 emissions (Extension)

* Incudes fossil fuel combustion.

Summary of Findings

Results highlight the reduction in both energy and CO2 emissions achieved through the efficiency and low-carbon servicing strategy. Small power (office equipment) accounts for almost 50% of the predicted energy consumption, highlighting the need to consider in achieving Net Zero Carbon. Where a level of operational diversity is included, the predicted EUI is below the Office 2026 target of 83 kWh/m2GIA.yr.

Iteration	Gas (MWh/yr)	Elec (MWh/yr)		,EUI (kWh/m².yr)	CO_{2e} (tonnes./yr)	
	Reg.	Unreg.	Reg.		Unreg.	Reg
Baseline	441.4	653.4	1,157.0	166.	115.6	285.4
Proposed	375.1	653.4	1,124.1	158	115.6	267.5
Future	0	653.4	1,028.1	124	115.6	182.0
Diversified	0	285.8	1,005.4	95	50.6	178.0

Table. Predicted operational energy consumption and CO_2 emissions (Tower)

Mechanical Design

Mechanical Design

Performance Requirements

External Design Conditions

The following external ambient design conditions shall be used to size and select the mechanical services plant and equipment,

Summer: 28.7°C db / 18.50°C wb

Winter: -4°C db / 100% sat

Sizing for cooling equipment shall be performed against CIBSE DSY weather files for Manchester, as the closest site, to ensure comfort conditions are met.

Plant Design External Conditions

The plant and equipment shall be selected to ensure they can operate within the following extremes of temperature:

Summer Maximum: 35°C db / 22°C wb

Winter Minimum: -10°C db / 100% sat

Internal Design Conditions

The internal comfort conditions shall generally be as follows, any rooms specifically not detailed shall be as per the recommendations within CIBSE Guide A (2006) Table 1.5.

	Winter (Heating) °C	Summer (Cooling) °C
Offices/Conference Rooms	19 - 23	24 - 26
Communal corridors	19 – 21	n/a
Computer rooms	19 – 21	21- 23
Server rooms	19 – 21	21 - 23
Patch Rooms/Dedicated IT	19 – 21	21 - 23
Café	19 – 23	22 - 25
Kitchens (Commercial)	15 – 18	18 - 21
Toilets	19 – 21	n/a
Stores	Untreated	-
Plant Rooms	Frost Protection	-

Humidity

Relative Humidity will be uncontrolled unless confirmed as a requirement to the Server/Comms room when 50% ± 10 may be specified.

Internal Noise Conditions

As Defined within the Acoustic Engineers Report.

Specific Fan Powers

To meet Building Regulations requirements.

Ventilation Rates

Mechanical Vent Occupancy	12 l/s/Person
IT Rooms	12 l/s/Person
Mechanical Vent Admin/Staff Rooms	12 l/s/Person
Toilets	6 Air Changes/Hour
Changing Rooms	10 Air Changes/Hour

Mechanical Design

Kitchens	In accordance with DW172 to suit cooking equipment and prep areas.
Plant Room	In accordance with BS6644 as required.

Ductwork Design Velocities (max)

Main Ducts (roof and main risers)	6 m/s
Primary Horizontal Ducts	4.5 m/s
Branch Ducts to Outlets	3.0 m/s
Grille/diffuser terminals	0.25 m/s at the occupied zone

In addition, a maximum limiting pressure drop per unit length of 1.0 Pa/m shall be applied.

Heating Loads

The heating loads shall be calculated as the summation of the fabric losses and infiltration losses. The final total heating loads shall incorporate a design margin to be agreed in light of the desire not to oversize plant, but to design closely to match performance.

Cooling Loads

The cooling loads shall be calculated as the summation of the fabric load, solar load, infiltration load, equipment gains, ventilation gains to also be considered. The final total cooling loads shall incorporate a design margin to be agreed in light of the desire not to oversize plant, but to design closely to match performance.

Domestic Hot Water

A notional provision of 5 l/Person of hot water storage has been allowed, demand profiling has been considered as part of our energy modelling.

Demand units will be in line with the flow rates within the Performance Requirements.

Flow Water Temperature	60°C
Return Water Temperature	50°C

All wash hand basin and sink outlets shall be blended to 41°C and shower outlets blended to 38°C. Cleaners sink and catering kitchen wash up sink outlets shall not be blended.

Pump Sizing

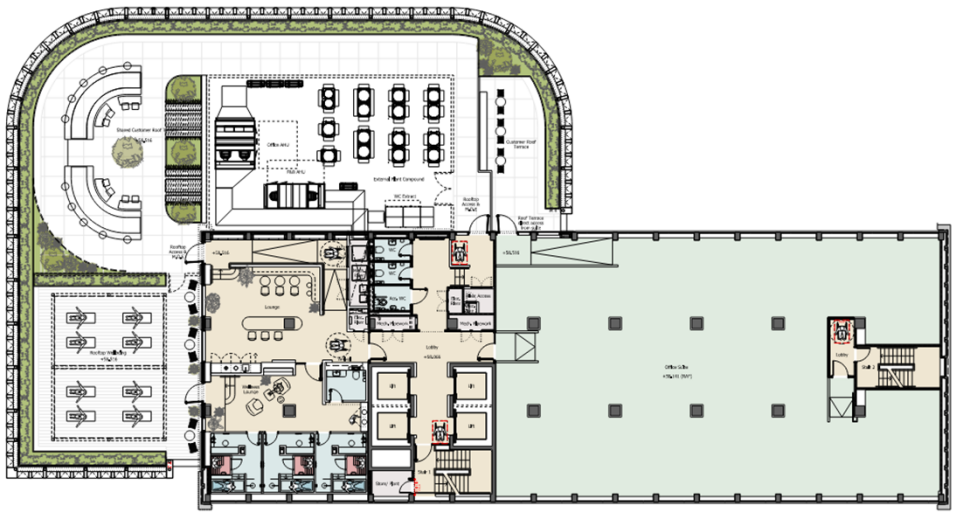
All fans and pumps shall be sized and selected with a 10% margin on flow rate and 21% margin on pressure drop incorporated.

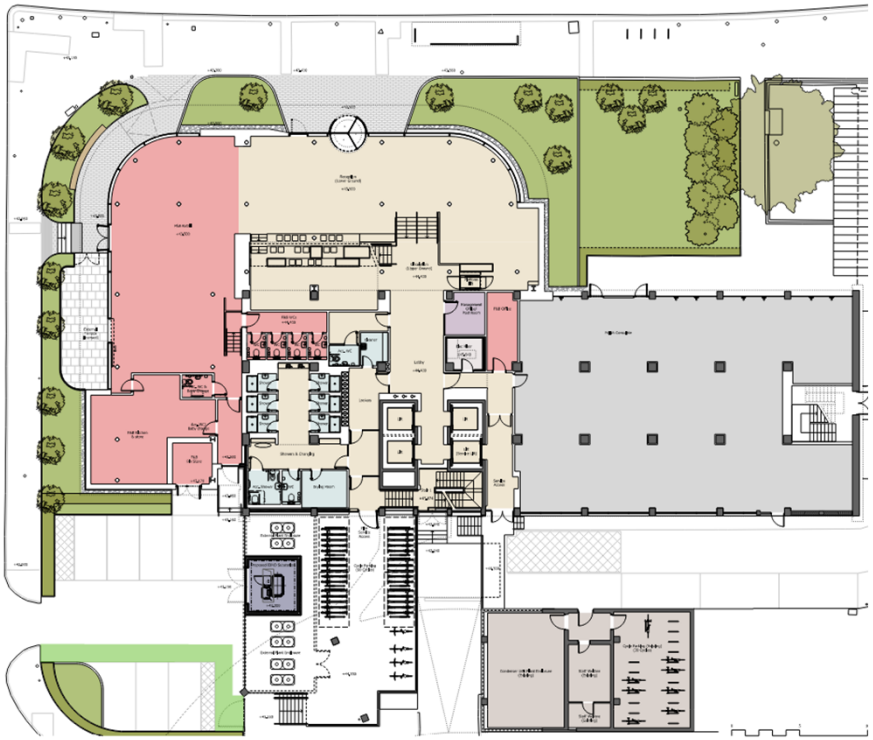
Mechanical Design

Plant Areas & Services Distribution

New ventilation and air source heat pump plant to serve the extension will be located at fourth floor roof level and contained within a plant compound. A new riser shall be formed adjacent the existing core area to carry new services from fourth floor down to ground.

Additionally , located at ground floor level externally above the existing basement plant room, a new plant compound is provided to accommodate the expansion of plant requirement. This shall be adjacent the new substation, flanking it on both sides with provision for air source heat pumps and hot water storage. The area shall also be screened and secure, please refer to the architects information for further detail. This plant space is critical to facilitate the future plans do decarbonise the building, being adjacent and above the existing boiler room which allows integration and changeover to and from existing systems.





Mechanical Design

Heating and Cooling Systems – VRF System

It is proposed to provide heating and cooling provision to the new extension via a high efficiency VRF system serving fan coil units to achieve simultaneous heating & cooling control with heat recovery throughout the extension. Air to Air source heat pumps located at roof level shall serve the branch selectors units on each floor of the extension to feeding into ducted coil units providing conditioned air into the space.

Dedicated new VRF plant shall be installed at roof level of the extension, with existing tower VRF replaced in a phased manner, suitably sized based on revised loading, in one of four locations subject to chosen options – namely;

1. Extension roof
2. New plant deck on lid of existing boiler room
3. Existing plant well
4. Tower Roof

Due to the extension adopting a dedicated mechanical ventilation system, ASHPs shall serve the AHU heating and cooling coils to temper the air entering the building, reducing vent load on internal systems.

The overall control of the buildings heating and cooling system will be via the BEMS, which shall provide adjustment to set points and timed operation of individual plant items and zones, with an out of hours set back. Separate zoning for out of hours use will be reviewed and separate zoning control provided as required.

Heating & Cooling Terminal Units

Fan Coil Units - FCUs

Fan Coil units are intended to be installed as part of the fit-out of office space on each level of the extension as well as ground front of house entrance in addition to the flexible retail provision.

New FCUs shall incorporate ultra low energy, low profile chassis type units. All services are currently expected to be exposed so careful consideration to secondary ductwork setting out and service branches should be given.

Mechanical Design

Extension Ventilation Systems

The ventilation requirements for the new building extension will be provided by mechanical ventilation plant located within the external plant areas roof level 4. The building ventilation systems shall be designed to be highly efficient to reduce the buildings energy consumption.

Two separate AHU's shall be installed as each AHU shall be serving landlord & tenant areas independently.

In general, all mechanical ventilation systems will incorporate the following features where applicable:

- Variable speed operation, at the dictates of internal temperature and/or CO_2 sensors.
- High efficiency heat recovery.
- High efficiency AHU specific fan powers (SFP).
- Low plant noise and incorporate acoustic attenuation to suit the applicable room noise ratings, selected to operate below the applicable room noise rating.
- reverse cycle heating/cooling coils (where applicable).
- Fresh air inlet and exhaust air dampers.
- Panel (G4) and bag (F7) filters

In the event of a fire or emergency event scenario, the building ventilation systems will be designed to automatically switch off.

The air handling units will be controlled to maximise the free cooling benefit of the supply air at the dictates of internal and external temperature sensors and using enthalpy sensors installed on the AHU air inlet.

Fresh air supply and stale extract air will be based on specified occupancy levels to maintain indoor air quality levels of CO2, to meet the minimum requirements of the Building Regulations and in line with CIBSE guidelines and desired fresh air ventilation rates.

Existing Tower Ventilation Systems

Currently each floor plate of the existing tower ventilation is provided by manual window openings. This strategy is to be maintained with the fabric improved including full window replacement and thermal insulation improvements.

Fabric improvement to the existing tower building will reduce thermal loss, limit solar gain in summertime and improve system controllability. Continued transition from on-site gas combustion to electrification will prevent Scope 1 emissions and benefit from the ongoing decarbonisation of the national grid.

Works aim to align with current and emerging policy and achieve targeted EUI (Energy Use Intensity) and operational carbon emissions.

Excessive solar gain can lead to occupant discomfort and a greater reliance on mechanical cooling during the summer months. Approved Document Part L introduces a compliance metric for new buildings, which compares total solar gain from April to September against a benchmark based on a notional façade specification. Meeting this benchmark demonstrates that the building provides an adequate level of solar control.

The floor plate has been divided about the centreline to form northwest and southeast zones for both the large (1) and small (2) office suites.

Part L: 2021 Criterion 3: Limiting Solar Gain (% of recommended limit)								
	Original Windows				Proposed Windows			
Level/s	1.NW	1.SE	2.NW	2.SE	1.NW	1.SE	2.NW	2.SE
01	117	166	-	-	56	80	-	-
02	128	177	-	-	61	85	-	-
03	135	186	-	-	65	90	-	-
04	193	154	-	-	75	93	-	-
05	155	195	107	136	74	93	50	63
06 - 20	154	194	103	132	75	94	52	65

Results show a notable reduction in solar control indicating lesser risk of overheating. It is however expected that comfort cooling will be required during summer months.

Mechanical Design

Extension and Tower Toilet Extract Systems

Toilet extract shall be provided by dedicated central twin extract fans located in the fourth roof top plant areas for the extension The system will be ducted via service risers to each space. This system will extract stale air from the WC accommodation and cleaner's stores. The fan units shall be connected back to the BEMS and shall operate under the dictates of a scheduled timeclock channel.

Make-up air to WC's will be provided either by a combined dedicated supply and extract AHU or form adjacent spaces and shall transfer between them via open doorways or suitably sized air transfer grilles which shall be located either in the doors themselves, or via transfer grilles mounted at high level in the walls. All transfer grilles shall be non-vision types. All of the above shall be reviewed inline with the developing fire strategy.

Currently the tower core and WC vent strategy is not consistent throughout the building. We would recommend that this is addressed on a level by level basis, with ducted inline fans ducted to a window replacement decorative panel – please refer to the architects' drawings for further information.

Changing Room and Cycle Hub Systems

The changing rooms will be provided by a supply and extract Air Handling Unit (AHU) located in the fourth floor roof top plant areas. The system will be ducted via service risers to each space. This system will extract stale air from the changing areas with make-up air provided by a supply section of the AHU.

Any air transfer will be via suitably sized air transfer grilles which shall be located either in the doors themselves, or via transfer grilles mounted at high level in the walls. All transfer grilles shall be non-vision types.

The AHU's will comprise filters, heat recovery section, supply and extract fans, heating and cooling coils, dampers and will be provided with fully integrated self-contained controllers, which shall be initiated and monitored via the BEMS installation.

The AHUs will be connected back to the BEMS and shall operate under the dictates of a scheduled timeclock channel.

Smoke Ventilation Systems

Please refer to the fire engineers report for requirements. It is envisaged that AOVs will be provided at the head of existing stair cores within the tower.

Ductwork Ancillaries

Air will be distributed in to and out of the rooms through suitably sized and selected grilles and diffusers to meet the requirements of each space.

Attenuators will be provided on all air systems to meet the internal and external noise criteria. Cross talk attenuators will be in ductwork systems where required to prevent noise transfer between noise sensitive rooms.

Terminal variable air volume devices will be installed to modulate the air supply and extract to suit the ventilation requirements of each space, as required.

Volume control dampers will be installed in all ductwork systems to enable each system to be proportionally balanced.

Mechanical Design

Fire dampers and smoke dampers will be installed throughout the ductwork systems to meet the compartment ratings detailed in the fire engineers report and on the architect's drawings.

Fire rated ductwork will be installed on all kitchen extract ductwork outside of the kitchen fire compartment in accordance with DW 172.

Where ductwork passes through a dedicated fire-fighting stair/protected lobby the supply and extract ductwork will be fire rated.

All supply air ductwork inside, and all supply and extract ductwork outside of the building shall be suitably insulated and protected. Generally, extract ductwork within the building shall be uninsulated.

Domestic Water Services

The cold water system will be designed to provide wholesome water at acceptable condition, flow, temperature and pressure to all draw offs. Additional key performance objectives shall be:

- Provide minimum risk of Legionella growth.
- Limit dead legs.
- A system design that minimises water consumption.
- Provision of adequate water metering linked into the site wide BEMS.
- Provision of major water leak detection between the site boundary connection and the incoming main into the building.
- Provision of sanitary solenoid shut off valves to toilet facilities to avoid water loss through faulty flushing cisterns.
- A legionella designer's risk assessment shall be carried out in accordance with HSE ACOP L8.

PIR linked water shut off devices will be installed on the cold water supply to each sanitary area which will operate according to demand and minimise leaks and wastage from sanitary fittings.

The design of the potable cold water services will be fully in accordance with BS EN 806, BS 8558 (2015) & IPE design guidelines.

The building will be served by a metered mains cold water service that will enter basement tank room. This will supply water to a sectional cold water storage tank to provide 8 hours of supply. The temperature of both the incoming supply and stored water will be monitored, and an alarm raised for any out of range values.

Boosted Cold Water Services

The tanked water will be boosted to the building outlets by a multistage booster set, operating in a duty/assist/standby configuration. The booster set shall be complete with auto-changeover panel that shall rotate the lead pump on a time run basis to reduce the wear on a single pump set. Each pump shall be provided complete with inverter drives to suitably match the varying load profile demand of the building. The packaged booster set shall also incorporate all service and non-return valves along with accumulator vessel.

The BCWS service will feed all cold water outlets throughout the existing & proposed building, domestic hot water generating plant, as well as any CAT 5 supplies with additional break tanks. Any irrigation and wash down facilities required will be fed from a CAT 5 water supply.

Water sub meters will monitor and record the water consumption at the BMS and will be installed on the DHWS feed and on branches to the main water consuming areas of the building, notionally the kitchen area of the flexible retail space. The cold water supplies feeding the toilet facilities will incorporate solenoid valves on the main branches that are linked to passive infra-red sensors to isolate the water supplies when not occupied.

Mechanical Design

Domestic Hot Water

Domestic hot water for the proposed extension is to be served via air to water and water to water heat pumps supplying hot water cylinders complete with electric immersion backup for a guaranteed hot water supply temperature. The as fitted domestic hot water gas system is to be phased out of the existing building as floor plates are refurbished with the plant being decommissioned and replaced.

The domestic hot water system will be a 2-pipe flow and return system. A secondary circulation pump shall be provided on the return loop to minimise dead legs and provide instant hot water at each outlet. Automatic thermal balancing valves will be provided on all return leg connections to enable efficient balancing of the return water system.

The domestic water services will incorporate a secondary return to ensure a minimum outlet temperature of 60°C and a minimum return temperature of 55°C. Lower temperatures and pasteurisation cycles will be considered if deemed required when final plant selections are made.

All hot water outlets, except kitchen and cleaners' outlets, will be blended to 41°C (showers to 38°C) to minimise the risk of scalding. All hot water installations shall be designed to comply with the requirements of HSE document L8 – The Control of Legionella Bacteria in Water Systems.

Domestic Hot & Cold Pipework

All domestic hot and cold pipework shall be installed in copper tube to BS EN 10576 with soldered joints and fittings and shall be fully insulated using mineral wool insulation and vapour sealed. The pipework shall be distributed via the corridors and service risers wherever possible.

All domestic hot and cold pipework, fittings and equipment shall be WRAS approved.

All pipework services which are proposed to be installed externally, shall be trace heated to protect against risk of damage from fluid contained within freezing. The trace heating system shall incorporate a local controller unit which shall be controlled and monitored by the BMS.

Wet Riser Installation

Following our surveys we have recommended that the client incumbent provider is approached for a condition and life-cycle plant and distribution strategy to ensure the system is fit for re-use and extension to include the new development.

Above Ground Drainage

All sanitary plumbing and foul above ground drainage systems will be designed, specified and installed in accordance with the Building Regulations, British Standards, Codes of Practice, Statutory and Local Regulations and other relevant technical guidelines.

The public health engineering systems will comprise the minimum pipework necessary to carry away the discharges from sanitary appliances and other dedicated discharge points, quietly and with freedom from nuisance or risk of injury to health.

All sanitary discharge pipework will be provided from the top floor level (roof/plant room) down to the ground/lower and basement level, where removal by below ground drainage will be designed by the civil and structural engineers. Therefore locations of discharge pipes, floor gullies etc. will be indicated down to slab level, where the connection to the underground drainage system will be provided by the civil engineer. A primary gravity soil and waste pipework will be installed to drain the toilets, wash hand basins, showers and sink units. The new above ground drainage system shall be the primary ventilated system type as described within BS EN 12056, and comply fully with Approved Document H, of the current Building Regulations.

Where possible each stack will ventilate to atmosphere at roof level, to prevent the requirement for installing automatic air admittance valves.

Mechanical Design

All condensate drains from plant and equipment will incorporate condensate lift pump and drain via gravity to the nearest foul water drainage pipework. All condensate pipework connections into the foul water drainage system shall incorporate a HepVO inline waterless trap.

All kitchen waste systems shall be treated locally by use of direct drainage dosing chemical injection which automatically breaks down grease build up (by kitchen specialists).

A floor gulleys shall be provided within all plant rooms and shall be connected to the foul drainage system.

Building Energy Management System (BEMS)

The building will be provided with a Building Energy Management System (BEMS) installed to monitor and control the operation of the mechanical and electrical services installations. In addition, the BEMS will monitor critical alarms and be capable of remote monitoring. The BEMS system will operate on an open protocol to allow compatibility and integration to a wider network in the future, or to link back to the Landlords central BEMS. It will provide a cost effective way of energy monitoring, management and saving.

Control panels will either be manufactured to a 'Form 4 - Type 2' standard, which will comprise a common power section for all plant and equipment, or alternatively where required for 'life-safety' applications a 'Form 4' standard, with individual power sections for each item of plant and equipment.

The BEMS will consist of networked intelligent controllers communicating over an Ethernet network. The BEMS shall operate on its own dedicated network with Ethernet switches serving the controllers and routers.

The system will comprise of configurable controllers and expansion modules located within dedicated control panels and a range of peripheral devices (sensors, inverters, dampers, valves, etc. The peripheral devices will be remotely mounted from the control panels and gather plant data and carry out commands issued from the controllers.

It is proposed to provide a number of motor control panels (MCCP) and outstations, installed locally to each of the mechanical plant rooms / areas. Wherever the plant rooms are located externally the MCCP and outstation shall be installed within a suitably rated enclosure.

Open protocol software will be used to allow users to monitor the operating conditions of the mechanical and electrical plant and associated devices and shall allow users to change operational conditions and set points within controllers. All operational conditions and set points will be stored within the controllers.

A graphical user interface will be installed for operation within the building with a dedicated desktop BEMS workstation PC provided for remote access and management of the BEMS system.
Each plant item will incorporate a factory fitted control panel that shall be fully compatible with the proposed controls system permitting local set point adjustment, time scheduling, remote monitoring and fault indication / interrogation.

The BEMS system will report the status of individual systems and shall provide alarms and warnings generated from remote sensing devices. All critical and non-critical alarms shall be displayed and stored on the BEMS workstation PC.

The BMS will provide the full digital and analogue control and monitoring needs of the building services to maintain the specified environmental and performance requirements of the systems.

The control system will optimise the operation of all the heating, cooling and ventilation systems in order to minimise energy use while maintaining the required internal comfort conditions thus improving the energy efficiency. Sensors and monitoring will include the simultaneous monitoring of the indoor/outdoor temperature, indoor CO2 level and status of all the plant. The system will use these parameters to optimise the internal conditions.

The BMS will provide self-learning optimum start and stop to minimise the operating hours of the Air to Water Source Heat Pumps while still achieving the required temperatures for occupied periods.

The BMS will provide weather compensation to the variable temperature heating circuit to reduce heating system output during the mid-season.

Mechanical Design

The BMS will also provide frost protection to the building and services during the winter as dictated by the ambient conditions.

The new heating and cooling system connections will be provided with 2 port motorised control valves to allow the BMS to control the operation of the heating and cooling to each circuit independently as and when required.

The BMS will integrate with the fire alarm installation and smoke ventilation.

Energy Monitoring

All electric and water meters, including sub meters, will be served via a Modbus network interfaced on to the Ethernet network and shall allow meter readings to be read via the BMS in order to facilitate trend analysis and warn of out of range values.

It is proposed to provide energy meters to the building in accordance with CIBSE TM39 recommendations for all mechanical services systems and major plant items, along with all kitchen and retail provisions.

Below is a list of the main proposed energy metering requirements for the building:

- Electricity supply to kitchens/retail.
- Incoming mains water.
- Boosted cold water main.
- Boosted cold water supply to HWS plant.
- Boosted cold water supplies to kitchens.
- CAT 5 boosted cold water supply (if required)
- Hot water supplies to kitchens (via heat meters) or tenants dedicated plant.
- Air to water source Heat Pump plant.
- Electricity to lighting (Landlord and Tenant)
- Electricity to power (Landlord and Tenant)
- Electricity to MCP's & HVAC plant items.

It is proposed to provide a number of motor control panels (MCCP) and outstations, installed locally to each of the mechanical plant rooms / areas. Wherever the plant rooms are located externally the MCCP and outstation shall be installed within a suitably rated enclosure.

Fire Suppression Systems

Fire suppression systems shall also be incorporated in the kitchen canopies and shall be provided by the canopy manufacturer/fitout contractor – all subject to fit-out requirements.

Electrical Design

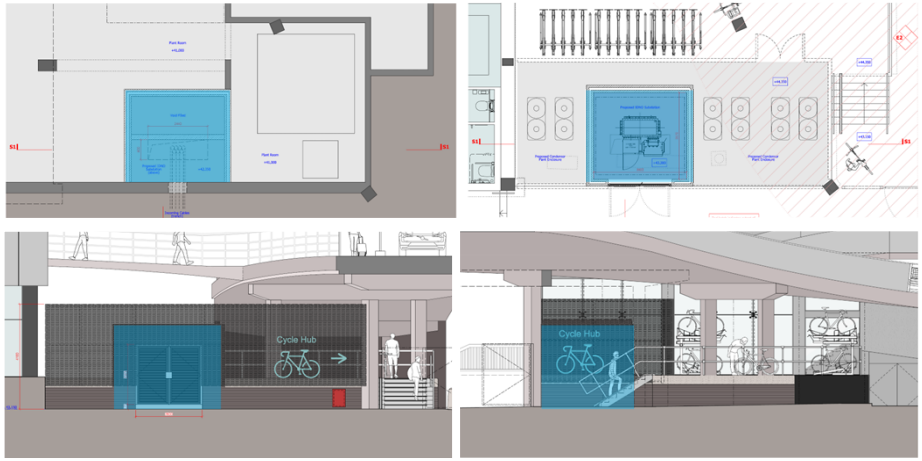
Electrical Design

Maximum Demand Summary

Total apparent power	1326 kW
Assumed power factor	0.98
Total real power	1353 kVA
Spare capacity	0.25
Maximum Demand	**1692 kVA**
Current (assuming balanced load)	2442 amps/ø

Electrical Infrastructure / LV Distribution

From the new 1500kVA transformer located within the new sub-station, a new LV switchboard shall be provided within the basement area to allow LV connection to all new LV supplies and distribution boards associated with the project, and to also allow reconnection / refeeding of the existing LV supply for the landlord, tenant, and retail supplies for areas that are within the existing tower.



The new switchboard shall need to accommodate the following existing supplies,

- Existing Tenant 800A TP&N main MCCB (set at 630A)
- Existing Retail tenant 200A TP&N fused switch
- Existing Landlords 800A TP&N amin MCCB.

The existing rising busbars (Tenant 1000A TP&N, Landlord 250A TP&N) shall remain in situ, and be reconnected to the new switch board (subject to confirmation of metering).

New rising busbar shall be installed and terminate at level four for future extension up to the tower roof level as part of the project. This will then future proof the tower and progress once the riser and on floor refurbishment works progress on a level by level basis, clearly subject to lease event and phasing and sequence of the on floor refurbishments.

Similarly, it is proposed that a new dedicated landlord and tenant rising busbar is provided from GF to level 4 of the new extension for all landlords lighting and power services, ands tenant / customer supplies feeding Local dedicated split metered lighting and power distribution boards shall be provided for each tenant space

All on floor distribution boards shall be metered and networked for measuring, monitoring, and collating billing information for tenant consumption.

Rising busbar shall be Schneider, or similar widely available product, with Schneider devices. Final distribution boards shall be ISOBAR P type and constructed to a high degree of separation

Rising busbar and distribution boards will provide electrical, and physical, spare capacity (25%) and incorporate energy sub-metering to assist future energy management, all linked to the BEMS.

The new low voltage section panel will incorporate BEMS monitored sub-metering equipment to allow remote monitoring of the site electricity usage in accordance with Part L of the Building Regulations.

Electrical Design

Distribution boards and fixed item locations will be strategically placed in riser cupboards and plant spaces away from tenant / general public access. Areas that will require designated power such as the server room and flexible retail unit will be provided with dedicated metered sub-main and distribution boards.

Distribution of electrical services within the building will generally be located, where practicable, within ceiling and roof voids with vertical distribution within designated service riser areas.

Service routes throughout the buildings will accommodate low voltage sub-main cables, data cabling and other extra low voltage (ELV) cables, fire alarm cables and low voltage small power and lighting cabling.

Due to the exposed nature of the soffit / ceiling construction and finishes, final circuit distribution will generally be LSF/LSF Flat Twin on galvanised steel cable tray / trunking / conduit at high level, with underfloor busbar for power distribution in tenant spaces.

The Mechanical & Electrical Engineering Building Services specification will indicate the requirement to provide high quality finishes to all mechanical and electrical engineering services provided, especially those located in exposed positions. Mechanical and electrical services which necessitate adjustment or control will be located appropriately to ensure tamperproof operation.

Electrical Design

General Power

Power outlets will be provided throughout the buildings as per the Clients requirements and FF&E layouts. Installation methods will vary depending upon the quantities required and the location. Where practicable cables will be recessed in partitions and walls where not, i.e. exposed soffit locations surface installations will be provided including galvanised steel tray / conduit and trunking and metal clad accessories.

Where a flush fixed installation can be provided, electrical accessories shall be recessed accessories fed via recessed conduit linked to containment within ceiling voids or service risers.

The general power requirements will include but not be limited to the supply and installation of the following:

- 230 volt cleaners socket outlets.
- 230 volt general sockets outlets.
- Three phase power supplies.
- General tenant power supplies to base build underfloor busbar systems, to allow flexibility for potential tenant fitout works, landlord FF&E equipment including equipment required in the Coffee FB, entrance, shower and changing rooms.
- General power to CCTV installation.
- General power to IT and data installations.
- Mechanical power supplies.

Socket outlets will be protected by a residual current device with a 30mA earth leakage. Socket outlets provided for specific equipment where RCD protection is not desirable e.g. freezers etc. which are suitably labelled should not be provided with RCD protection provided the requirements of BS7671 18th Edition regulation.

Surge Protection

Surge protection systems will be fitted to all incoming electrical supplies, main switchboards and final circuit distribution boards to limit damage to sensitive equipment in the event of a lightning strike.

Power Factor Correction

It's likely that due to the nature of the tenant fitout loads, that power factor correction will not be required.

Harmonic Filtering

There will be no harmonic filtering equipment although a point of connection will be provided for future provision. It is recommended the client makes an assessment of the effects of connected load harmonics when the site is fully operational.

Earthing and Bonding

The earthing and bonding will be installed as per the requirements of BS 7671. The IEE Wiring Regulations 18th Edition and the British Standard BS7430 Earthing.

The Earthing installation will consist of a main earth bar within the new low voltage switch room.

The earth bar will have the following items connected to it:

- Main electrical circuit protective conductor.
- Structural steel work system.
- Incoming water pipework.
- Ventilation ductwork.
- Heating circuit pipework.
- Cable containment.
- Lightning protection system.
- Clean earthing system to the main IT comms room,

Electrical Design

General Lighting and Emergency Lighting

The general lighting installation shall be led by the interior design concept for the spaces, comprising of feature lighting in circulation, common parts and in locations of fixed furniture. Within the suites, to supplement the feature lighting, a regular array of office / tenant lighting in future tenant spaces fit out areas is envisaged

As the lighting scheme will be interiors led, the contract of light and shade and the "feel" / "mood" of the lighting scheme and concept shall be of paramount importance to achieve the right look and feel of the space.

This being the case in certain circulation and common spaces, although the maintained averages illuminance will generally meet the requirement so CIBSE lighting code, the uniformity values may not be met in all instances.

The lighting layouts have been developed in conjunction with architect, the client, a feature lighting specialist and general lighting supplier to arrive at a co-ordinated lighting scheme.

Space	Recommended maintained illuminance	Recommended maintained illuminance for special situations
Meeting or break-out rooms	300 lx (for normal meetings)	500 lx (if more intense reading and writing is done)
Training rooms	300 lx (for normal meetings)	500 lx (if more intense reading and writing is done)
Conference rooms	300 lx (for normal meetings)	500 lx (if more intense reading and writing is done)
Board rooms	300 lx (for normal meetings)	500 lx (if more intense reading and writing is done)
Reprographics rooms	300 lx (vertical on reprographic equipment)	300 lx (on collating, binding and dispatch tables)
Libraries/information centres	300 lx (general)	200 lx (vertically on bookcases); 500 lx (on reading desks and counters)
Archives/document stores	300 lx (general)	200 lx (vertically on fronts of shelving)
Break rooms	200 lx (general)	300 lx (on serving and preparation areas)
Medical rooms	300 lx (general)	500 lx (on medical examination area)
Canteens/restaurants	200 lx (general)	300 lx (serveries); 500 lx (kitchens)
Entrance halls/reception	200 lx (general)	300 lx over reception desks and seating areas
Stairs/escalators	150 lx (on treads)	
Lift lobbies	200 lx (on floor)	
Corridors	100 lx (on floor)	
Security/control rooms	200 lx (general around CCTV monitors)	300 lx where there is use of written materials
Cleaner's cupboards	200 lx (general)	
Plant room	200 lx (general)	200 lx vertically on control panels, valve sets and instruments etc
Workshops	300 lx (general)	300 lx vertically on machines, 500 lx on workbenches
Lift motor rooms	200 lx (general)	200 lx vertically on sides of winding machine and front of control panel
Generator/UPS rooms	200 lx (general)	200 lx vertically on sides of generator, front of control panel and instruments etc
Storeroom for bulk items	200 lx (general)	
Storeroom for small items	300 lx (general)	200 lx vertically on front of shelving

Design Considerations

The lighting within the building will be designed to be efficient; suitable for the given task and to create visual interest using high efficiency luminaires with lamp sources selected to suit the particular requirements of each space.

To further enhance this and meet the challenge to provide buildings with the lowest possible energy consumption LED lighting will be used.

Typical floor plates shall include down lighting and feature mirror lighting to WC locations, suspended non-dimmable linear lighting to tenant office spaces, with feature lighting to proposed fixed seating and office / meeting room locations.

Electrical Design

Lighting Controls Strategies

The lighting control strategy is to be developed in line with Client requirements regarding the overall solution. The utilisation of intelligent lighting controls is key in delivering a lighting installation that is customised to suit the buildings application and tenant demise split requirements. It is fundamental in minimising energy consumption and managing the visual environment. Daylight dimming with presence and absence detection control will be used where practicable with scene setting control used in multifunction areas.

Localised DALI/ Casambi lighting control systems will be considered throughout the facility. The lighting control system will enable localised control and monitoring of the lighting installation.

The use of area controllers, automatic switching and manual pushbutton switches will be provided to allow local control and override.

Emergency Lighting

The emergency lighting shall be installed throughout, including final fire exit doors from the building, both internal and externally, based on the building fire strategy and Building Control requirements. The emergency lighting shall be provided to meet BS5266, with selected luminaires having integral changeover emergency lighting modules to switch over to emergency mode. Some of the existing tower systems appeared to require attention and this needs reviewing in more detail on a floor by floor basis.

Maintained illuminated final exit signs shall be provided to way mark escape routes and luminaires provided over each final exit door.

All emergency lighting luminaire shall be LED.

Exit signage and external bulkheads shall be LED, polycarbonate and IP65 rated

Emergency lighting shall be provided by means of a mixture 3NM emergency LED micro dot fittings with integral battery, or conversion of the general luminaire fittings with shall operate specific general lighting luminaire in the event of power failure.

External Lighting

An external lighting scheme in accordance with BS5489-1:2013 will be provided to facilitate safe and secure pedestrian and staff movement around the building and aid security.

In addition, a building façade lighting scheme will be provided to accentuate the Architecture and raise the buildings profile within the city scape. An external lighting specialist shall developed the external lighting concept through the early stages of the design that will be captured as part of the ongoing MEP proposals

To maximise energy saving the lighting levels and switching arrangement will be arranged with a view to reducing the lighting levels when the building is unoccupied to promote energy saving.

The scheme will be designed to complement the building and minimise the environmental impact of light pollution, in accordance with ILP guidance note for the reduction of obstructive light.

The scheme will include a combination of building mounted luminaires and feature façade lighting to the main entrance with column mounted luminaires provided to selected external walkways and accessible areas.

Induction Loops

Induction loop systems will be provided at the main reception area, and with building digital signage and AV gulley's facilities to assist the hearing impaired by transmitting amplified sound, music, speech, etc, to hearing aids fitted with a telecoil. Induction loop systems will comply with IEC 60118-4 2006 guidance.

Electrical Design

Fire Alarms

A new fire alarm system will be provided throughout the building extension. The fire alarm system will be designed and installed as a category L1 type system, all in compliance with the fire strategy.

The new fire alarm system shall have the facility and be linked back into the existing entire building fire alarm systems so as to retain a linked automatic fire alarm systems for proposed and existing demises. Some of the existing tower systems shall be replaced as required on a floor by floor basis.

The new fire alarm system shall be able to facilitate the introduction / upgrade of the existing alarm system on an ad hoc basis, as and when each upper floor plate is refurbished.

The fire alarm system will be controlled via a digital addressable fire alarm panel located at the entrance to the new building. Additional fully functional repeater panels will be located at designated firefighting entrances to the building. Fire alarm system wiring will consist of enhanced soft skin fire rated cable coloured red.

Fire alarm interfaces shall be provided to the following.

- Access control system (to release doors upon alarm).
- Mechanical control panels (to shut down ventilation on alarm).
- Fixed audio systems (to mute on alarm).
- Lifts are assumed to already connected to the existing fire alarm system.

The fire alarm system will operate a full evacuation on verification of an alarm condition. However, The cause and effects for the fire alarm system shall be incorporated into the site wide cause and effect matrix in consultation with the end user, fire officer, fire consultant, and other client team members

Security

The design of the security services shall be aimed to minimise, risks of theft, criminal damage, vandalism, personal attack and sabotage, during the life if the refurbishment. Temporary systems may be required to be provided by the contractor as part of the works, although these are not covered by this document and should be considered separately.

The systems considered as part of this strategy shall comprise of:

- CCTV
- Intruder Alarm System
- Access Control Systems

The fit out works scheme shall include the BWIC and infrastructure to allow for the further fit out by the incoming tenant.

The security systems shall be developed in consultation with the Clients in house security consultant to ensure that the security proposed for the Manchester One project is aligned with the clients own, estate wide strategy.

CCTV

The extended envelope of the building will be afforded CCTV coverage that will operate in conjunction with main access control systems.

The CCTV systems will be designed to monitor the following areas and will be agreed with the Clients Security Consultant:

- Entrances and main circulation areas.
- Cycles store.
- Building external elevations.
- Changing room lobby

The system shall be capable of producing images and record pictures (both still and video with time and date).

All CCTV locations will be provided with CAT6A network points, external cameras will have an un-switched fused spur suitably IP rated for outdoor use minimum IP65. Where possible all connections to be concealed in suspended ceiling and be tamper proof.

Electrical Design

Intruder Alarm System

The intruder detection and alarm system will be designed, as a minimum, to cover:

- Ground Floor Rooms With External Windows
- All Entrances / Fire Exits
- Emergency Exits
- Auto door locations

Zoning shall be provided.

All fire escape doors shall be continuously monitored during occupancy hours.

The security system will have the flexibility to enable the building to be zoned so that areas can be locked outside of normal hours whilst still allowing access to other areas.

The extended envelope of the building will be afforded CCTV coverage that will operate in conjunction with main access control systems.

Access Control System

The access control locations shall be developed on a 1st secure line and 2nd secure line basis. With the 1st line being at the building perimeter / primary point of entry into the building from ether ground floor main building entrance, or under croft entrance from the car park.

The 2nd secure line shall be provided beyond the public access / 1st secure line, in location that provide a point of entry to the internal floor plate, upper floor areas. In the basement this shall be the door / access into the cycle store and staircase access. At ground floor this shall be at access points to the staircases.

The staircase shall generally have secure access in either direction to control vertical travel up and down the staircase into the floor plates. Tenant demise access control shall be provided as part of the tenant fitout.

Disabled Alarm Systems

The disabled persons WC alarm and Disabled persons refuge system will form part of a single centrally controlled system. The central control indicator panel will be located within the main reception.

The central indicator panel will be complete with indicator lamps and mini bleep tone generator. The remote panel will notify staff of an alert identifying specifically which WC system/refuge outstation has been activated.

Disabled persons refuge call points will be installed at all disabled refuge call locations generally positioned around the building's cores.

Disabled persons WC alarms will be located at each disabled person WC and shower within the building.

Fire alarm sounders in the vicinity of refuge communicators should mute when the communicator is in use to allow for audible speech communication.

Lightning Protection

A new/modified lightning protection system will be provided to protect the building from lightning strikes, subject to the extent of the façade solution. The lightning protection system will be designed and installed in accordance with British standard BS EN 62305:2011. The system will be designed to meet the requirements for protection and surge suppression on all electrical services.

The lightning protection system shall comprise the coverage of the new extension elements, in addition to connection as required to the complete "building wrapped" new façade elements. Local bonds and connections will be required existing plant and connection are roof and ground floor level.

Electrical Design

Passenger Lift, Firefighting Lifts and Evacuation Lifts

The 4No existing passenger lifts are to remain, as they form part of the "out of scope" element. However, it is assumed that the reconnection of power, comms and fire alarm interface systems will be required as part of the project scope.

Data/Comms Installations

The building will be provided with a complete incoming fibre back bone provision for, with comms ducting from the building / site boundary to the under croft main comms / frame room.

The Spare ducting shall be provided for future provision of 3rd party data comms serve. The data for the landlord serve and proposed data comms for the tenant demise will emanate from the comms room and distribute to the tenant riser locations and riser vertical to each tenant dedicated DP position for future fitout by the tenant.

The landlord data comm and copper line provision shall be provided for connection of.

- Autodialer systems
- Smart Buildings cloud platform
- Lift
- BMS
- Telephone lines.

The landlord IT systems shall use CAT 6A U/FTP copper data cabling installation to hard wired IT intensive areas and WIFI access points throughout the building. Data cabling will emanate from the central server racks and back bone fibres to floor level hub rooms following dedicated containment systems. Horizontal copper CAT 6A U/FTP cabling will terminate in RJ45 outlets.

Additional exchange lines will be required from an external telecoms operator and all necessary ducts, draw ropes, chambers, sealing systems and frames for termination will be provided.

TV & Digital Signage

The landlords IT structured cabling network is to be used for the distribution of TV signals, with the connection of IP enabled televisions/screens. Any IP enabled televisions and associated active and receiving equipment will be supplied and installed by the Client.

The briefing requirements for the distribution of TV services and the locations of the TV points are to be confirmed by the Client.

Tenant CAT B fit out

The following items are considered to be provided as part of the tenant CAT B scope, and therefore are not part of the proposed fitout works.

Electrical

- Provision of incoming tenant data comms services
- Tenant IT installation
- Further Tenant security systems
- Tenant AV and Digital Signage
- Tenant UPS or specialist provisions
- F&B Kitchen

KAIZEN

Consulting Engineers