



Mayfield Medlock Limited

MAYFIELD, PHASE 1B (PLOTS J AND K)

Energy Statement





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Energy Statement

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DEVELOPMENT OVERVIEW

WSP has been appointed by Mayfield Medlock Limited to provide MEP and specialist consultancy services in relation to the engineering design of the Mayfield Phase 1B Residential development along with associated pre-planning support.

As part of this, WSP has been commissioned by Mayfield Medlock Limited (the applicant) to develop and prepare a Energy Statement for the Mayfield Residential Phase 1B (the Proposed Development) in Manchester city.

WSP were appointed in October 2023, initially to undertake Stage 1 feasibility input alongside the design team before being instructed to move to RIBA Stage 2 and Planning Support.

Background to Proposals

The proposals form the first residential phase of development as part of a wider regeneration priority area. In 2018, Manchester's Executive Committee endorsed the 'Mayfield Strategic Regeneration Framework' ('SRF'), which sets out a clear ambition to guide the redevelopment, re-modelling and refurbishment of the site within SRF boundary.

The ambition for Mayfield, as set out in the SRF, is to deliver a world class, transformational, distinctive and imaginative commercially led neighbourhood, anchored by Mayfield Park, which will become a powerhouse of socio-economic productivity.

Following the endorsement of the initial SRF by Manchester City Council in 2018, applications were submitted in 2019 and approved in 2020 relating to the Poulton, multi-storey car park, Mayfield Park and the Republic. This comprised over 400,000 sq. ft. of commercial floorspace, and these planning permissions were implemented through the discharge of pre-commencement conditions and physical works being undertaken on site in 2021.

The Mayfield Park phase of development is now complete and operational, and the Mayfield Depot has been reactivated by the existing tenant, Broadwick, who operate it as a mixed-use leisure, food, and drink destination. The permissions were revised in June 2023 to account for design changes brought about by a changing regulatory environment and because of Landsec's acquisition of the previous development partner, u+i, in 2022.

The Mayfield Partnership therefore now incorporates LandsecU+I as its development partner, alongside Manchester City Council, TfGM, Network Rail and London Continental Railways.

Overview / Form of Application

Phased redevelopment of Mayfield Phase 1b comprising site remediation and reprofiling followed by the erection of two residential blocks (Use Class C3) comprising 879 no. residential units contained within four buildings ranging from 7 storeys to 24 storeys in height (Plot J) and 9 to 28 storeys in height (Plot K), including lower ground and upper ground floor commercial spaces comprising restaurant and / or retail units (Use Class E(b) and/or E(a)), and / or indoor sports facilities (Use Class F2) together with highways works, access, servicing, rooftop plant, cycle parking and back of house, along with delivery of associated public realm and other associated works for each relevant phase.

The application for Full Planning Permission comprises:

- Remediation and reprofiling works for the site to allow for the phased erection of two residential Plots (J and K) comprising Phase 1b.
- The development plots comprise two podium levels to address the site level changes and provide a generous amount of ground floor frontage, comprising commercial space, supporting residential amenity areas that are accessible to the public, and various back of house storage spaces, surrounded by new high quality public realm.
- Above the two storey podium levels, residential blocks will provide accommodation in four buildings providing a mix of 1-, 2- and 3-bedroom units in each. The total number of residential units is circa 879 at the time of writing.
- Plot J comprises two buildings on top of a two-storey podium level, with J1 being part 7 (from lower ground) and part 17 storeys (from upper ground) and J2 being part 10 (from lower ground) and part 23 storeys (from upper ground).
- Plot K comprises two buildings on top of a two-storey lower and upper ground floor, with K1 being part 9, part 28 storeys and K2 being part 11 and part 20 storeys.
- Creation of an at-grade multi-modal access route to the south of the residential blocks that will be traffic calmed to encourage pedestrian flows whilst allowing for a service road to be created, with a buffer zone between this route and the Mancunian Way.

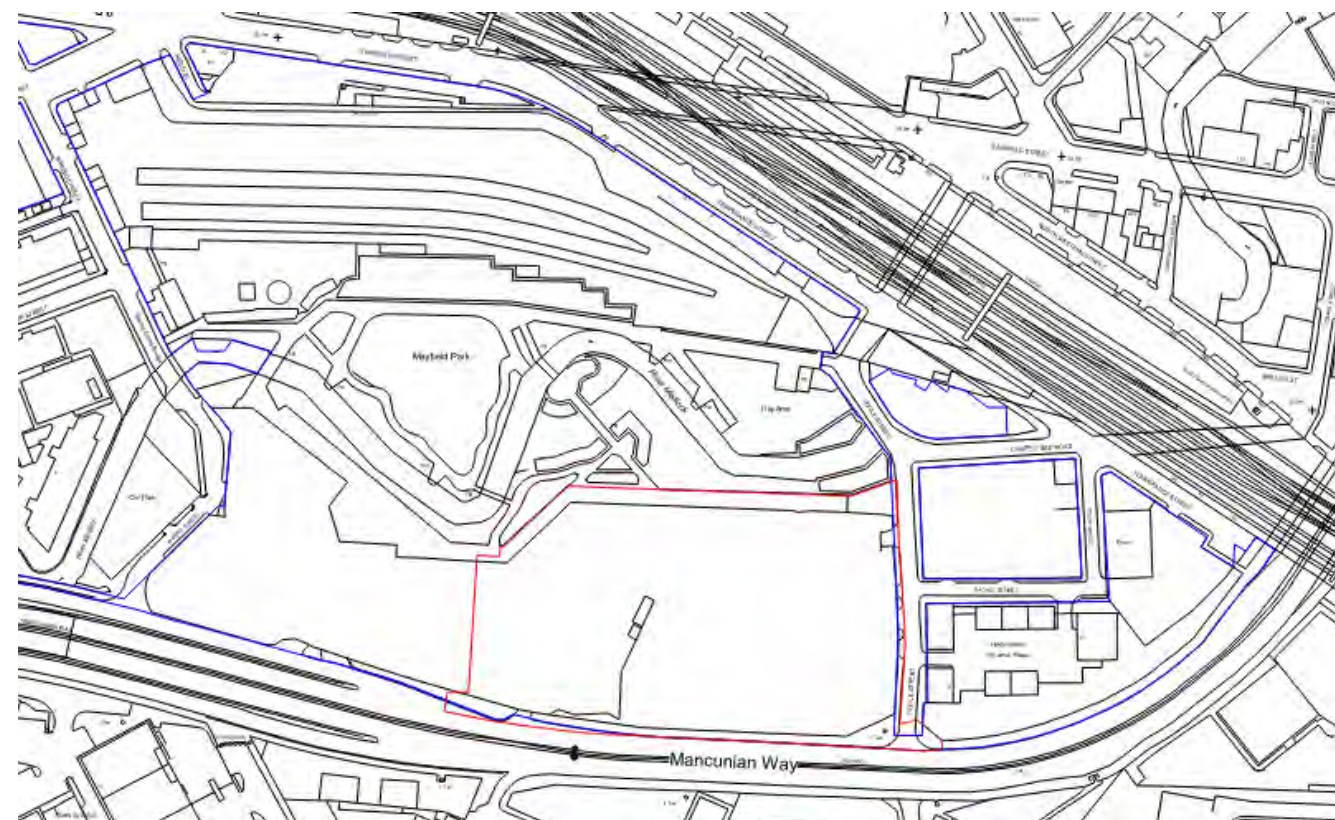


Figure 1 - Site Location Plan Showing Red Line Boundary

1. EXECUTIVE SUMMARY

This document sets out the Energy and Carbon emissions of the Mayfield Residential development. Figure 1-1 below shows the 2 no. plots K and J considered in this assessment. They are considered individually, split between domestic and non-domestic parts and as a whole sitewide development within this assessment.

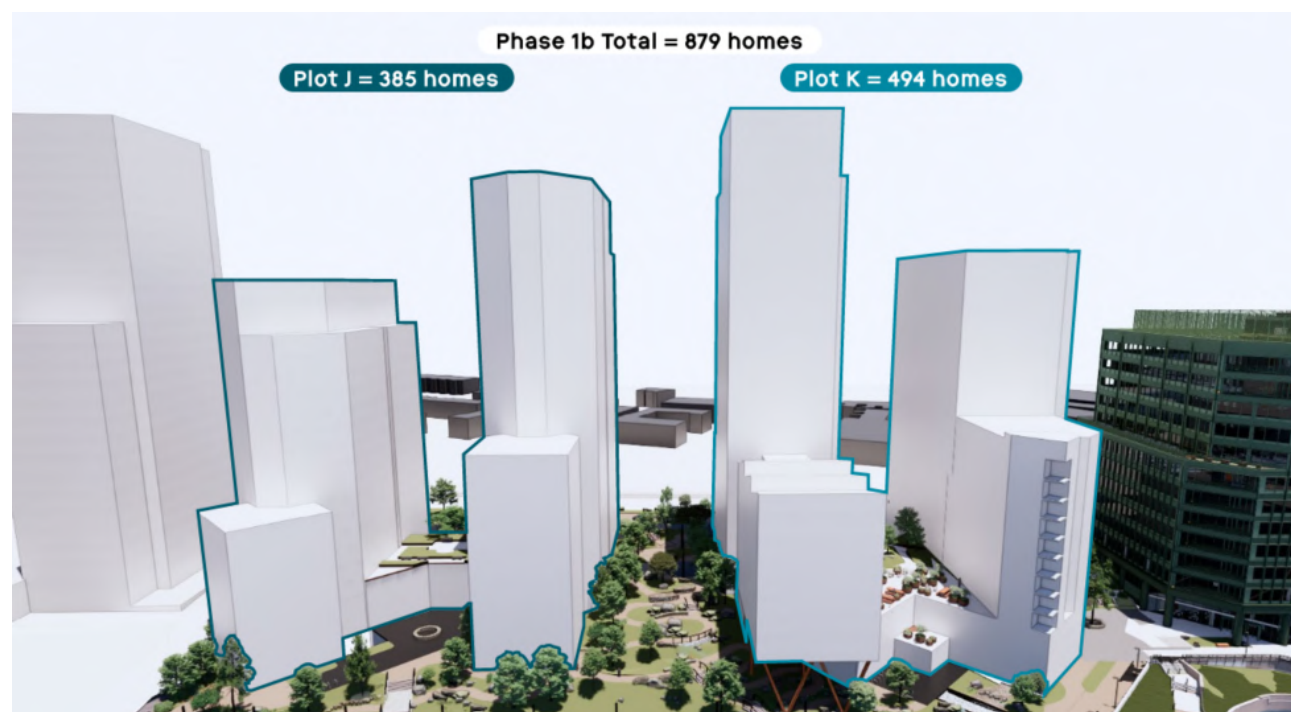


Figure 1-1 – Mayfield development Plots considered within the Energy Strategy

1.1. ENERGY AND CARBON TARGETS

The implications of the relevant targets for the Proposed Development can be summarised as follows:

- All developments must meet the prevailing Building Regulations requirements. Specifically, with regards to energy and carbon compliance, all buildings must meet the Building Regulations Approved Part L 'Target Emission Rate' (TER) requirements for the Part L revision which is current at the time of initial construction works for each developmental phase. The Proposed Development will be brought forward under Part L 2021, which will be used as the basis of the energy strategy;
- The residential components of the Proposed Development will be assessed against Approved Document L1A (AD L1A) which relates to new build residential buildings and all the non-residential components will be assessed against Approved Document L2A (AD L2A) relating to new build non-residential buildings;
- The development should meet Manchester Planning Policy EN 6 - Target Framework for CO₂ reductions from low or zero carbon energy supplies;
- Major developments should provide a reduction in expected CO₂ emissions through the use of on-site renewable energy generation, where feasible to do so.

1.2. ENERGY STRATEGY

The energy strategy has been structured in accordance with the energy hierarchy: Be Lean, Be Clean, Be Green. The proposals for the Proposed Development have been developed in accordance with the desire to achieve an energy efficient and sustainable development.

The Proposed Development will be designed to achieve optimum energy performance, and will incorporate the following design features:

- During design development, significant consideration has been given to how the building fabric will respond to its environment in order that the energy consumption of the building is reduced as far as possible through passive means. The building fabric will be designed to exceed the minimum fabric requirements of Part L1 and L2 (2021) of the Building Regulations;
- The Proposed Development will be fully electric;
- Passive design measures will be incorporated into the design to reduce energy demand and the risk of overheating;
- A high-performance building services solution is proposed for the Development;
- Domestic Hot Water for all apartments is generated by local Air Source Heat Pumps (ASHP), the heat pumps have been designed to use low GWP refrigerant R134A and have a high operational efficiency. These units also provide free cooling;
- Each residential unit will be provided with a Mechanical Ventilation Heat Recovery (MVHR) unit. This will be located and ducted at ceiling level;
- Terminal units are designed to achieve a specific fan power in operation significantly lower than the Part L 2021 limiting SFP; and
- All spaces will include 100% low energy lighting.

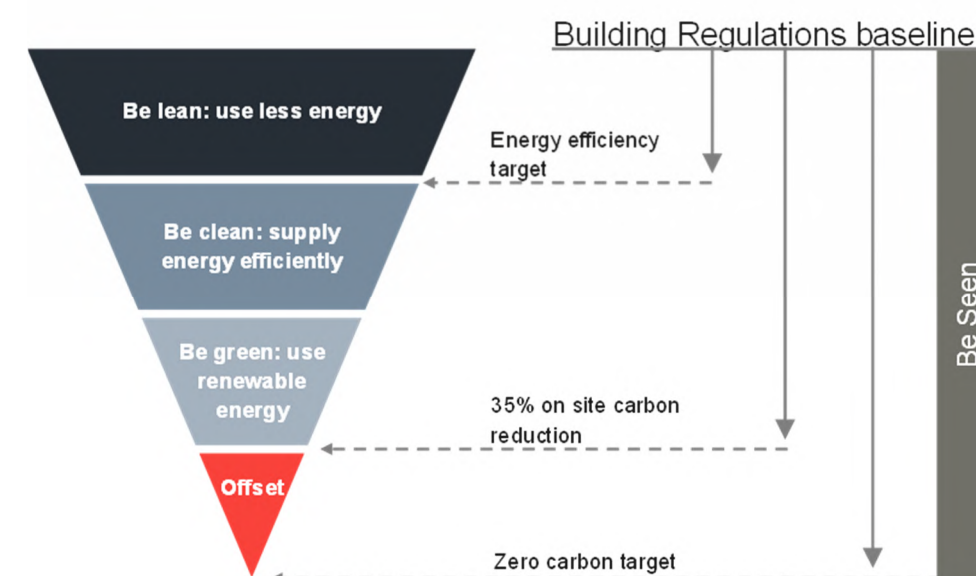


Figure 1-2 - GLA Energy Hierarchy

1.3. THE PROPOSED DEVELOPMENT

The Site is located adjacent to the north of the Mancunian Way, to the south of Mayfield Park, to the west of Hoyle Street and to the east of Mayfield Phase 1a, with Baring Street beyond.

1.3.1. BUILDING HEIGHTS:

- Plot J1 – part 7, part 17 storeys
- Plot J2 – part 10, part 23 storeys
- Plot K1 – part 7, part 27 storeys
- Plot K2 – part 9, part 20 storeys

1.3.2. NON-RESIDENTIAL AREAS

Commercial Quantum:

- Plot J - 1,175sq. m. (GIA)
- Plot K – 2,423 sq. m. (GIA)

Back of House (cycle / bin storage / plant):

- Plot J – 1,280 sq. m. (GIA)
- Plot K – 2,118 sq. m. (GIA)

Building Heights:

- Plot J1 – part 7, part 17 storeys
- Plot J2 – part 10, part 23 storeys
- Plot K1 – part 9, part 28 storeys
- Plot K2 – part 11, part 20 storeys

All retail units are treated as Shell and Core assessment only and not considered in the building or sitewide analysis.

1.3.3. RESIDENTIAL AREAS

Residential Quantum:

- Plot J1 (total 150 units):
 - 1 bed – 55 no. (37%)
 - 2 bed – 84 no. (56%)
 - 3 bed – 11 no. (7%)
- Plot J2 (total 235 units):
 - 1 bed – 68 no. (29%)
 - 2 bed – 159 no. (68%)
 - 3 bed – 8 no. (3%)
- Plot J split (total 385 units):

- 1 bed – 123 no. (32%)
- 2 bed – 243 no. (63%)
- 3 bed – 19 no. (5%)
- Plot K1 (total 278 units):
 - 1 bed – 78 no. (28%)
 - 2 bed – 181 no. (65%)
 - 3 bed – 19 no. (7%)
- Plot K2 (total 216 units):
 - 1 bed – 86 no. (40%)
 - 2 bed – 121 no. (56%)
 - 3 bed – 9 no. (4%)
- Plot K split (total 494 units):
 - 1 bed – 164 no. (33%)
 - 2 bed – 302 no. (61%)
 - 3 bed – 28 no. (6%)

1.4. ASSESMENT SUMMARY

The table below gives a high-level overview of the scheme and relevant regulations.

Table 1-1 - Overview of Scheme

Zone	Relevant Regulations	Notes
Non-Residential Areas	Approved Document L, Conservation of fuel and power, Volume 2: Buildings other than dwellings	New build
Residential Areas	Approved Document L, Conservation of fuel and power, Volume 1: Dwellings	New build
Retail Units	Approved Document L, Conservation of fuel and power, Volume 2: Buildings other than dwellings	Shell & Core

1.5. METHOD & RESULTS

Detailed energy modelling was undertaken based on the methodology from Part L1 and L2 of the Building Regulations in order to establish the baseline carbon emissions for the Proposed Development.

WSP utilised a dynamic simulation software package, the Virtual Environment (VE) suite from Integrated Environmental Solutions (IES) to calculate the non-residential carbon emissions of The Proposed Development.

The carbon emissions for the residential elements of the Proposed Development were calculated utilising Accredited Design Standard Assessment Procedure (SAP) 10 software, Elmhurst Design.

The results of the analysis for the residential element, and whole Proposed Development are shown in the tables below.

This assessment and the design of the scheme follows the energy hierarchy, all tables present the % reduction in regulated carbon emissions for each step to show individual impact:

- be lean: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures
- be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks
- be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site
- be seen: monitor, verify and report on energy performance

Table 1-2 - Carbon Emissions After Following Energy Hierarchy – Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	436.3	-
	Be Lean	407.9	7%
	Be Clean	407.9	0%
	Be Green	112.5	74%
Plot J	Baseline emissions	337.2	-
	Be Lean	331.8	2%
	Be Clean	331.8	0%
	Be Green	242	72%
Combined Results	Baseline emissions	773.5	-
	Be Lean	739.7	4%
	Be Clean	739.7	0%
	Be Green	207.8	73%

The residential elements have a betterment of 73% against Part L 2021 as a site wide development.

Table 1-3 - Carbon Emissions After Following Energy Hierarchy – Non-Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	18.4	-
	Be Lean	16.4	11%
	Be Clean	16.4	0%
	Be Green	16.2	12%
Plot J	Baseline emissions	17.9	-
	Be Lean	15.6	13%
	Be Clean	15.6	0%
	Be Green	15.4	13%
Combined Results	Baseline emissions	35.3	-
	Be Lean	31.2	12%
	Be Clean	31.2	0%
	Be Green	30.8	13%

The non- residential elements have a betterment of 13% against Part L 2021 as a site wide development.

Table 1-4 - Carbon Emissions After Following Energy Hierarchy – Site Wide

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Sitewide Results	Baseline Emissions	808.8	-
	Be Lean	770.9	5%
	Be Clean	770.9	0%
	Be Green	238.5	66%
Total Savings		570.3	71%

Providing a total saving of Tonnes CO₂ – 570.4 against baseline emissions and Target for regulated energy.

1.6. RESULTS SUMMARY

The Proposed Development aligns with national and local planning policies and the Building Regulations Part L. A fabric-first approach has been prioritised during design development, ensuring that the building fabric responds effectively to its environment. This approach minimises energy consumption through passive measures, which are further supported by the integration of highly efficient heating systems, such as air source heat pumps (ASHPs) for residential domestic hot water and cooling as well as non-residential area, whilst utilising a fully electric strategy to reduce carbon emissions.

Compliance with Part L 2021, which delivers a 27% improvement over Part L 2010, surpasses Policy EN 6's requirement for a 15% uplift on Part L 2010. The proposed development goes beyond this benchmark, achieving an impressive 71% reduction in site-wide carbon emissions relative to the Part L 2021 baseline. This performance highlights the project's commitment to sustainability and its ability to exceed both regulatory expectations and policy requirements.

1.7. PART L 2021 FABRIC ENERGY EFFICIENCY (FEE)

Elmhurst Design SAP 10 software was used to determine the FEE (Fabric Energy Efficiency) standards for all apartment dwellings.

An analysis has been undertaken on the all the new build residential buildings to establish the performance of the fabric in relation to the TFEE (Target Fabric Energy Efficiency). Results for TFEE and the DFEE (Dwelling Fabric Energy Efficiency) for all residential buildings are as follows:

Table 1-5 - Fabric energy efficiency and carbon emissions results

Development Total	Average TFEE (kWh/m ²)	Average DFEE (kWh/m ²)	Improvement
Plot K	26.19	24.91	4.89%
Plot J	29.74	28.19	5.2%

All residential areas achieve compliance with the TFEE standard. Detailed façade design and thermal bridging calculations will be performed during detailed design stage once junction details will be specified.

The final strategy for compliance with TFEE will be defined as design develops. The project will ensure compliance with the TFEE is achieved.

2. POLICY CONTEXT

2.1. POLICY CONTEXT

The Proposed development is designed in line with current national, regional, and local policy.

The key policies are set out in the National Planning Policy Framework (July 2021), Greater Manchester Places for everyone (2021), the Manchester Core Strategy Development Plan document (2012-2027) and the Manchester Climate Change Framework (2020-2025).

2.2. NATIONAL PLANNING POLICY

The National Planning Policy Framework (NPPF) sets the planning context for sustainable design and construction. It is this that Local Planning Policies are based on and adapted to account for regionally specific requirements.

The NPPF identifies three dimensions to sustainable development - economic, social, and environmental – which should be applied jointly and simultaneously:

- Economic objective – to help build a strong, responsive, and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation, and improved productivity; and by identifying and coordinating the provision of infrastructure.
- Social objective – to support strong, vibrant, and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being; and
- Environmental objective – to contribute to protecting and enhancing our natural, built, and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

The NPPF promotes the pursuit of sustainable development by seeking positive improvements to the built and natural environment, and to people’s quality of life. This will include:

- Delivering a sufficient supply of homes;
- Building a strong, competitive economy;
- Ensuring the vitality of town centres;
- Promoting healthy and safe communities;
- Promoting sustainable transport;
- Supporting high quality communications;
- Making effective use of land;
- Achieving well-designed places;
- Protecting green belt land;

- Meeting the challenge of climate change, flooding and coastal change;
- Conserving and enhancing the natural environment;
- Conserving and enhancing the historic environment; and
- Facilitating the sustainable use of materials.

2.3. LOCAL PLANNING POLICY

2.3.1. THE MANCHESTER CORE STRATEGY 2012-2027

Table 2-1 - Summary of Key Policies in the Manchester Core Strategy 2012-2027

Policy Title	Summary of Policy
Policy EN 16: Air Quality	The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester’s principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant. When assessing the appropriateness of locations for new development the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas.
Policy EN6 Target Framework for CO ₂ reductions from low or zero carbon energy supplies	Applications for residential development of 10 or more units and all other development over 1,000 sq m will be expected as a minimum to meet the target shown below unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO ₂ emissions for all phases of the development. Domestic CO ₂ emission reduction Network development area - CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010 Electricity Intense buildings - +15% increase on Part L 2010 Micro generation area - +15%increase on Part L 2010 Non - Domestic CO ₂ emission reduction Network development area - CHP/district heating anchor or connection or where not feasible, a 15% increase on Part L 2010 Electricity intense buildings (Applies to commercial uses with a high proportion of emissions from electricity use (>45 kg CO ₂ /m ²)) - +10%increase on Part L 2010 Micro generation area - +15% increase on Part L 2010

Policy Title	Summary of Policy
Policy EN7 Energy Infrastructure opportunities	There will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to considerations. In determining proposals for development, consideration will be given to the need to safeguard strategic energy sites and network routes, both proposed or existing, where these have been identified as having strategic significance for the delivery of low or zero carbon energy infrastructure or, would be required in order to achieve the successful regeneration of an area in line with targets for reducing carbon emissions.
Policy EN 8 Adaption to climate change	All new development will be expected to be adaptable to climate change in terms of the design, layout, siting, and function of both buildings and associated external spaces. Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO2 mitigation under Policy EN6, subject to sufficient evidence to quantify their contribution to compliance.

2.4. LOCAL POLICY

2.4.1. THE PLACES FOR EVERYONE PLAN (AUGUST 2021)

Table 2-2 - Summary of The Places for Everyone Plan (August 2021) – Not yet formally adopted

Policy Title	Summary of Policy
Policy JP-S 6 Clean air	A comprehensive range of measures will be taken to support improvements in air quality, focusing particularly on locations where people live, where children learn and play, where there are impacts on the green infrastructure network and where air quality targets are not being met. These measures are listed out within Policy JP-S 6 within the places for everyone document.
Policy JP-S 2 Carbon and Energy	The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including: Promoting retrofitting Promoting the use of renewable and low carbon energy, heating, and cooling Taking a positive approach to low carbon & renewable technology. developments should be net zero carbon from 2028 by following the energy hierarchy i. Minimise energy demand; ii. Maximise energy efficiency; iii. Utilise renewable energy; iv. Utilise low carbon energy; and v. Utilise other energy sources. All new dwellings should seek a minimum 19% carbon reduction against Part L of the 2013 building regulations (Or until this level is superseded by changes to national building regulations) For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced.

Policy Title	Summary of Policy
	For non-residential developments, achieve at least BREEAM excellent standard (or equivalent) for the 'Ene 01 – reduction of energy use and carbon emissions' category rising to 'BREEAM outstanding' equivalent for ENE 01 from 2028
Policy JP-S 3 Heat and Energy Networks	The provision of decentralised energy infrastructure is critical to the delivery of the objectives for low carbon growth, carbon reductions and an increase in local energy generation.
Policy JP-S 7 Resource Efficiency	The achievement of a circular economy and a zero-waste economy will play a key role in meeting Greater Manchester's ambition of becoming a leading green city region by 2038. Measures to achieve this are set out within the policy document.

2.5. LOCAL POLICY

2.5.1. MANCHESTER CLIMATE CHANGE FRAMEWORK (AUGUST 2021)

Table 2-3 - Summary of the Manchester Climate Change Framework (2020-2025)

objective Title	Summary of Objective
5.1 Staying within our Carbon Budgets	This objective seeks to ensure that Manchester plays its full part in helping to meet the Paris Agreement objectives by keeping direct CO2 emissions within a limited carbon budget, taking commensurate action on aviation CO2 emissions, and addressing our indirect / consumption-based carbon emissions. To emit a maximum of 15 million tonnes CO2 from our homes, workplaces, and ground transport from 2018. Manchester will reduce our direct CO2 emissions by at least 50% between 2020-25. In line with this budget Manchester will emit: ▪ A maximum of 6.9 million tonnes during 2018-22 ▪ A maximum of 3.6 million tonnes during 2023-2711.
5.2 Climate Adaption and Resilience Objective	This objective seeks to ensure that Manchester adapts the city's buildings, infrastructure, and natural environment to the changing climate and to increase the climate resilience of our residents and organisations taking the following actions: 1) Act on the existing evidence and research on climate change impacts and risks to target available adaptation and resilience effort and resources. This means focusing on infrastructure, communities, and businesses at risk from flooding in particular. 2) Increase the amount of urban green infrastructure cover, aiming for a 10% increase by 2038 from 2018 levels, in line with the Greater Manchester aim20.
5.3 Health and Wellbeing	The Health and Wellbeing objective seeks to improve the health and wellbeing of everyone in Manchester through actions that also contribute to our objectives for CO2 reduction and adaption and resilience, with particular focus on those most in need.

objective Title	Summary of Objective
5.4 Inclusive, Zero Carbon and Resilient Economy	This objective seeks to ensure that Manchester establishes an inclusive, zero carbon and climate resilient economy where everyone can benefit from playing an active role in decarbonising and adapting the city to the changing climate.
6.1 Headline Areas for Urgent Action	This objective concludes the above objectives and sets out areas for urgent action. The following relevant headlines for this Energy Statement are: 1) Existing buildings - There are currently extremely low levels of domestic and non-domestic retrofitting taking place in the city. Addressing this requires significant new interventions. The aim being to get our existing buildings as close to zero carbon as possible by significantly increasing their energy efficiency and generating renewable energy on-site. 2) New buildings - We need to ensure that we build and operated new buildings to zero carbon standards as soon as possible. In order to do this the ideal way would be through the UK Government establishing a national zero carbon definition and methodology, and for Manchester City Council to implement this standard. 3) 100% Renewable Energy – Manchester needs to significantly increase the amount of electricity generated from solar photovoltaic (PV) panels. 4) Gas – The UK is pushing to stop using Natural Gas. Either replacing systems with electric systems or biogas and/ or hydrogen. 5) Transport and flying – Designs should encourage people to walk and/ or use public transport and/ or cycle. 6) Food – Seasonal produce and less waste should be encouraged 7) The things we buy and throw away – People should be encouraged to buy less, buy better, repair and recycle 8) Green Infrastructure and nature-based solutions- Parks, gardens, woodlands, and street trees should be encouraged.

2.6. BUILDING REGULATIONS (PART L)

All new buildings constructed in the UK must meet the minimum requirements of the UK Building Regulations. Specifically, with regards to energy and carbon compliance, all buildings must meet the Building Regulations Part L 'Target Emission Rate' (TER) requirements for the Part L revision which is current at the time of initial construction works for each developmental phase.

The residential components of the Proposed Development will be assessed against Approved Document L1 (AD L1) which relates to new build residential buildings and all the non-residential components will be assessed against Approved Document L2 (AD L2) relating to new build non-residential buildings.

Additionally, the new Part O, described in more detail later, requires new residential buildings to comply with a set of overheating requirements based on TM59.

2.7. CLIENT REQUIREMENTS

The client has the ambition to assess the development using Passive House Planning Package (PHPP), this is to be carried out at a later date with the following targets for operational energy and embodied carbon:

Table 2-4 - Client Carbon and Energy Brief

Criteria	Target
Operational Energy (kWh/m2)	Achievable Best Practice < 45 with Backstop < 50
EPC - Dwellings	100% minimum Bs
EPC – Non-Residential	Minimum A

2.8. SUMMARY

The main policies listed above are all relevant for the Mayfield Phase 1b Development and it will be best to encourage reductions upon Part L of the building regulations wherever possible and ensure client ambitions are also met alongside statutory requirements.

However, since the update of both the Places for Everyone Plan (August 2021) and the Manchester Core Strategy (2012-2027) there has been an update to Approved Document Part L of the Building Regulations (2021).

This new Part L is already a 27% reduction against Part L 2010 and therefore compliance alone against the latest Part L 2021 will meet local MCC policy without further reduction or betterment.

3. BASELINE

The first stage of the energy assessment is to establish the baseline or target site energy demand and CO₂ emissions based on dynamic energy modelling software for the whole Proposed Development.

3.1. BASIS OF MODELLING

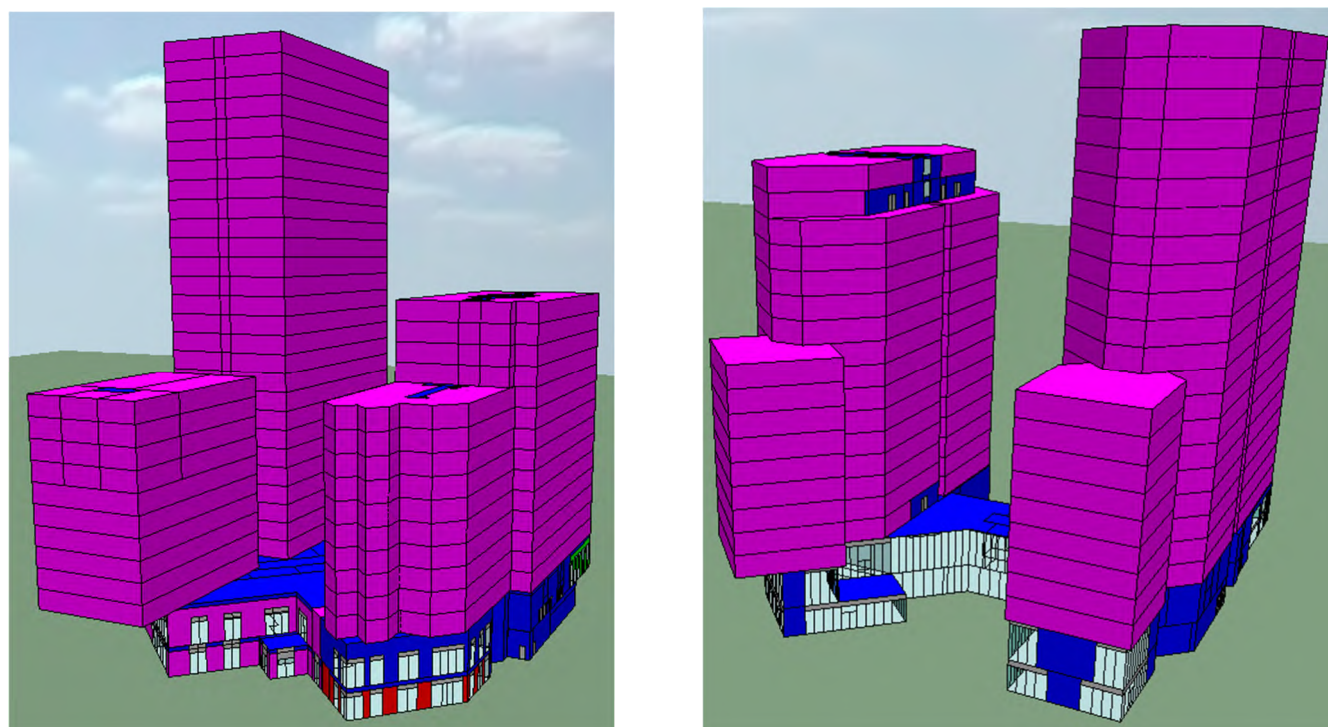
Detailed energy modelling was undertaken based on the methodology from Part L1 and L2 of the Building Regulations in order to establish the baseline carbon emissions for the Proposed Development.

The carbon emissions for the residential elements of the Proposed Development were calculated utilising Elmhurst Design Standard Assessment Procedure (10.2) 10 software. The carbon emission and fabric performance of a relevant selection of units covering 90% of the total units of the Proposed Development were assessed under SAP methodology. The selection is representative of the Proposed Development.

WSP utilised a dynamic simulation software package, the Virtual Environment (VE) suite from Integrated Environmental Solutions (IES) to calculate energy across all non-residential areas of the Proposed Development and to undertake the overheating assessment in line with Building Regulations Part O.

The carbon dioxide emission for the whole Proposed Development have been calculated as a pro-rata from the tested selection and are reported in this document.

Figure 3-1 – Images Taken From Plot K and Plot J IES models for Non-Residential Areas



3.2. BASELINE CARBON EMISSIONS

The table below summarise the baseline carbon emissions split by type and for the residential floors of the Proposed Development. Part L 2021 has been used as a basis for all calculations.

Table 3-1 Baseline Regulated Carbon Emissions Of The Scheme

Block	(Tonnes CO ₂)	Baseline Regulated Emissions (Tonnes CO ₂ per annum)
Plot K - Residential	Baseline emissions	436.3
Plot K – Non-Residential	Baseline emissions	18.4
Plot J - Residential	Baseline emissions	337.2
Plot J – Non-Residential	Baseline emissions	16.4

4. BE LEAN: DEMAND REDUCTION

The first step to achieving Building Regulations compliance and the targets outlined previously is to reduce energy demand. The measures associated with reducing demand can be termed as 'Energy Efficiency Measures'.

4.1. BUILDING FABRIC

During design development, significant consideration has been given to how the building fabric will respond to its environment in order that the energy consumption of the building is reduced as far as possible through passive means.

A façade optimisation exercise was performed which included detailed g-value, U-value and shading analysis and their impact on the cooling and heating requirements of the building as well as the impact on carbon emissions. The analysis also considered the incident solar radiation and the different requirements of the various façade orientations.

The architectural geometry, glazing area and shading elements provided in the façade are designed to maximise the passive measures, to mitigate overheating issues and maximise daylight and sunlight access within the proposed residential units. The glazing ratio for the proposed development is approximately 30% window to floor.

The building fabric of the Proposed Development is optimised to reduce heat loss in winter months and minimise heat gains in summer months with the aim of maximising the passive performance of the Proposed Development. An assessment of the building façade for each Building has been undertaken to establish the effect of differing U-values and g-values on carbon emissions and Target Fabric Energy Efficiency (TFEE) values.

A thermal bridging analysis was undertaken using SAP 2021 software calculating the length of all junctions in line with the conventions fabric systems set out in the current SAP conventions v10.2. Detailed façade design and thermal bridging calculations will be performed during detailed design stage once junction details have been specified. These will inform final U-values required for each building fabric element. The final strategy for compliance with TFEE will be defined as design develops.

It is assumed in this analysis that party wall conditions are subject between the walls separating residential units only. The party walls are assumed to be fully filled with sealed edges to achieve the U-value listed in table below. The walls between communal corridors/core areas and residential units are treated as heat loss walls and the build-ups will be required to meet the U-values.

The building fabric will be designed to exceed the limiting fabric requirements of Part L1 (2021) and Part L2 (2021) of the Building Regulations as applicable.

Table 4-1 - Building Fabric – Non-Residential Areas

Building Fabric	Current Planned Performance	Part L limiting fabric parameters
Floor U-value (W/m ² K)	0.15	0.18

Roof U-value (W/m ² K)	0.15-0.17	0.18
Wall U-value (W/m ² K)	0.18	0.26
Door (W/m ² K)	1.2-1.5	1.60
Glazing U-value (W/m ² K)	1.2	1.60
Glazing g-value	0.4	0.48
Air permeability	3 m ³ /hr.m ² @50pa	8 m ³ /hr.m ² @50pa

Table 4-2 - Building Fabric – Residential Areas

Building Fabric	Current Planned Performance	Part L limiting fabric parameters
Floor U-value (W/m ² K)	0.15	0.18
Roof U-value (W/m ² K)	0.15	0.16
Wall U-value (W/m ² K)	0.18	0.26
Door (W/m ² K)	1.2-1.5	1.60
Glazing U-value (all glazing areas excluding purge vents) (W/m ² K)	0.9	1.60
Glazing g-value	0.40	N/A
Air permeability	3 m ³ /hr.m ² @50pa	8 m ³ /hr.m ² @50pa

Table 4-3 - Thermal Bridging

SAP Ref	Identifier	Psi Values
E2	Other Lintels	0.1
E3	Sill	0.1
E4	Jamb	0.05
E5	Ground floor	0.32
E7	Party floor	0.15
E14	Flat Roof	0.16
E15	Flat roof w parapet	0.3

SAP Ref	Identifier	Psi Values
E16	Corner	0.12
E17	Corner inverted	-0.05
E18	Party wall between dwellings	0.1
E20	Exposed floor (normal)	0.32
E23	Balcony, support through wall insulation	0.2 (Schoek connection) 0.44 (Local steel connection)
E25	Staggered party wall between dwellings	0.1
P1	Ground floor	0.08
P4	Roof (insulation at rafter level)	0.033 / 2
P7	Party wall Exposed Floor	0.148 / 2

4.1.1. BUILDING SERVICES

The proposed HVAC strategy can be summarised as follows within the residential apartments:

- Each apartment will be provided with a Mechanical Ventilation Heat Recovery (MVHR) unit. This will be in the utility cupboard within each apartment and ducted at ceiling void level. Due to external noise constraints all the apartments have “peak lopping” to mitigate overheating. This provides free cooling via the ASHP within the Domestic Hot Water (DHW) system which avoids the use of openable windows to control overheating.
- The apartment heating will be provided by electric panel heaters. All heaters will be complete with 7-day timers and temperature control and fed from the consumer unit located within the utility cupboard. Within the residential bathrooms, electric towel radiators shall be provided and fitted with temperature control complete with a 7-day timer.
- Domestic hot water shall be generated within each residential apartment via dedicated Localised ASHP hot water heaters.
- Any common residential areas shall be provided with local electric hot water heaters.
- Landlord areas will be provided with local fans or heat recovery units as appropriate to control ventilation with low SFPs
- Landlord heating/ cooling shall either be by VRF systems or local elec heaters.
- All landlord domestic hot water will be Point of Use electric.

Table 4-4 - Proposed Energy Conservation Measures

Element	Design Rationale
Air Handling Plant	Ventilation is proposed to be through a dedicated supply and extract ventilation system. Outdoor intake and exhaust louvers will be formed at high level on the rear façade. The local units will achieve a specific fan power (SFP) of 0.8W/l/s or lower.
Energy Recovery	Where appropriate, MVHR systems will incorporate heat recovery systems. These transfer waste heat from the exhaust air stream to the supply air stream via a run around coil. The MVHR's will incorporate thermal wheels with a minimum heat recovery efficiency of 79%.
Residential Domestic Hot Water	DHW shall be produced by direct or storage electric heater with a seasonal efficiency of 3.5
Lighting Technology	Detailed lighting proposals will be developed during the subsequent design phases. High efficiency lighting will be provided throughout to significantly exceed the minimum requirements of the Non-Domestic Building Services Compliance Guide. This includes the use of high efficiency fluorescent and/or LED luminaires throughout currently assumed with an efficiency of 110lum/watt. Lighting has been assumed with automatic on-off controls in offices/ reception/ toilets and lifts and stores are assumed to have lighting controls manual on- auto off.
Display Lighting	Display lighting can be a significant source of energy consumption in reception areas. High efficiency display lighting will be specified throughout to reduce the carbon emissions and cooling loads associated with display lighting provision. This will exceed Part L limiting values and the limits within the Part L notional building calculation. Display lighting lamp efficacy to target 110lm/W.

The measures above set out the first steps taken to reduce the energy reduction of the non-residential areas through passive means.

4.2. OVERHEATING ANALYSIS

An overheating analysis has been undertaken for the proposed development as it is mandatory to meet the requirements set out by Approved Document Building Regulations Part O.

The steps taken to reduce potential overheating and reliance on air conditioning systems is in accordance with the following cooling hierarchy.

- Minimise internal heat generation through energy efficient design;
- Reduce the amount of heat entering a building in summer through orientation, shading, fenestration, insulation and green roofs and walls;
- Manage the heat within the building through exposed internal thermal mass and high ceilings;
- Passive ventilation; and
- Mechanical ventilation.

Dynamic thermal models have been built in IES VE 2022 to verify the internal conditions of the residential elements of the development. All residential occupied spaces have been analysed against CIBSE TM59 and are compliant.

The following weather files have been used in the analysis following guidance for overheating assessments:

- Manchester_DSY1_2020High50 (a moderately warm summer).

4.2.1. CIBSE TM59 OVERHEATING CRITERIA

For the residential apartments, in line with TM59 requirements, the analysis is conducted not only to ensure comfort during the hottest daytime periods i.e., the first criterion defined in TM52, but to also ensure a sufficient comfort level during the night. The following criteria are specified by TM59 and any space failing one of the criteria can be considered overheating:

- Criteria (a): For living rooms, kitchens, and bedrooms: The number of hours during which Delta T is greater than or equal to one degree Kelvin during the period May to September inclusive shall not be more than 3% of occupied hours; and
- Criteria (b): For bedroom comfort only: The operative temperature in the bedroom from 10pm to 7am shall not exceed 26°C for more than 1% of annual hours.

4.3. APPROVED DOCUMENT PART O

In addition to the Part L Building Regulations the Government has introduced the Approved document Part O for Overheating. This document came into effect on 15th June 2022 for use in England. This document is still based upon CIBSE TM59 methodology, however some changes have been made in response to the limitations within TM59.

A summary of the main changes introduced by Part O are outlined below:

- The document sets out the standards for overheating in new residential buildings;
- Compliance with overheating criteria will become mandatory and evidence will need to be submitted to Building Control prior to project completion;
- The document introduces 2 requirements to be met:

- Requirement O1 Overheating mitigation can be met using two methods: the simplified method (not suitable for buildings with more than one residential unit which use a communal heating or hot water system) or the dynamic thermal modelling. The second one (Dynamic thermal analysis method) is based on the TM59 methodology currently used to demonstrate compliance with planning. However, the new Approved Document sets out limits on CIBSE's TM59 methodology regarding ventilation opening hours and mitigating measures that shall be included to limit solar gains; and
 - Requirement O1(2)(a) is met if the strategy is usable by occupants taking into account acoustic, air quality and security constraints. The guidance sets out a unique methodology for checking compliance with overheating while ensuring safety and reasonable enjoyment of occupants of their residence. Enhanced coordination is required with these disciplines to ensure compliance.
- Blinds cannot be used for the purposes of demonstrating compliance with Part O;
 - Windows should be modelled as closed at night in all rooms at ground floor or easily accessible;
 - Mechanical cooling is not prohibited by the requirements, but the building should be constructed to meet minimum requirements without this;
 - The building control body should be provided with a report that demonstrates that the residential building passes CIBSE's TM59 assessment of overheating; and
 - A Home User Guide shall be provided to the owners of new dwellings with a list of information and non-technical advice on how to keep the dwelling cool in hot weather.

The development will need to comply with Part O 2021 at the as built stage, the design has been future proofed to ensure compliance later.

4.4. CONSIDERATIONS

The passive design of the units has been considered in detail, and the orientation and massing has considered its position on the application site relative to other buildings which will provide an element of shading but also to maximise daylight opportunities.

Internal layouts have also been refined to allow the daylighting requirements to be achieved without reliance on excessive amounts of glazing. Façade options have been studied to minimise heat loss and undesirable solar gains, and to investigate the introduction of external shading measures which have not been required.

4.5. MODELLING ASSUMPTIONS

For the purposes of this analysis the following key assumptions have been made based on CIBSE TM59 guidance:

Occupancy and equipment gains

- Maximum sensible heat gain of 75W/person and a maximum latent heat gain of 55W/person are assumed in living spaces;
- Lighting energy is assumed at 2W/m2 from 6pm to 11pm;
- Gain profiles are as described on the following table; and
- Free cooling provided by DHW ASHP up to 1,500W per apartment.

Table 4-5 - Occupancy and Equipment Load Assumptions as per CIBSE TM59

Unit/Room Type	Occupancy	Equipment Load
1-bedroom apartment Kitchen/Living/Dining	1 person from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 450W from 6pm to 8pm 200W from 8pm to 10pm 110W from 9am to 6pm and from 10pm to 12pm Base load of 85W for the rest of the day
2-bedroom apartment Kitchen/Living/Dining	2 people from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 450W from 6pm to 8pm 200W from 8pm to 10pm 110W from 9am to 6pm and from 10pm to 12pm Base load of 85W for the rest of the day
3-bedroom apartment Kitchen/Living/Dining	3 people from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 450W from 6pm to 8pm 200W from 8pm to 10pm 110W from 9am to 6pm and from 10pm to 12pm Base load of 85W for the rest of the day
3-bedroom apartment Kitchen	3 people at 25% gains from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 300W from 6pm to 8pm Base load of 50W for the rest of the day
3-bedroom apartment Living Room	3 people at 75% gains from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 150W from 6pm to 8pm 60W from 9am to 6pm and from 10pm to 12pm Base load of 35W for the rest of the day
Double bedroom	2 people at 70% gains from 11pm to 8am 2 people at full gains from 8am to 9am and from 10pm to 11pm 1 person at full gains from 9am to 10pm	Peak load of 80W from 8am to 11pm Base load of 10W during sleeping hours

Unit/Room Type	Occupancy	Equipment Load
Single bedroom (too small to accommodate double bed)	1 person at 70% gains from 11pm to 8am 1 person at full gains from 8 am to 11pm	Peak load of 80W from 8am to 11pm Base load of 10W during sleeping hours

The TM59 assumptions above are stringent and worst-case scenario and assume full occupation during the day in all apartments. This is to account for vulnerable people such as children and the elderly and for people on shift work who may remain in their residences during the day.

4.5.1. VENTILATION

The usual means of reducing overheating risk is to open purge panels, however due to the noise constraints openable windows are not permitted to mitigate overheating for this scheme.

MVHR is assumed to operate continuously in residential rooms as per Part F to meet minimum fresh air requirements.

4.6. RESULTS: TM59

WSP have undertaken an initial analysis on a selection of apartment types, orientation and elevations across both Plots J and K and all apartments are compliant with CIBSE TM59 for all initial results, a dedicated report shall be issued as part of the planning application.

4.6.1. OVERHEATING IN CORRIDORS

CIBSE TM59 states that at least one corridor should be included in the overheating analysis if the corridors contain communal heating distribution pipework. The overheating test for corridors should be based on the number of annual hours for which an operative temperature of 28°C is exceeded, rather than 26°C for bedrooms. If the operative temperature exceeds 28°C for more than 3% of the total annual hours, there is a significant overheating risk.

This calculation has not been undertaken due to the services strategy of localised electric panel heaters in the apartments, as such there is no distribution pipework within corridors and risers.

4.1. BE LEAN RESULTS

Based upon the energy efficiency measures outlined and excluding the contribution of the ASHP system, the following total carbon emissions are calculated.

The carbon emissions from the Proposed Development are shown to be lower than the minimum requirements of the Building Regulations by energy efficiency measures alone.

This is achieved via the use of the energy efficiency measures proposed (including a highly efficient building fabric, 100% low energy lighting and centralised ventilation with heat recovery systems) which exceed the minimum requirements of the Regulations.

4.1.1. PLOT K & J – RESIDENTIAL

The regulated carbon emissions for the residential spaces were determined using Accredited Design SAP 10 software.

Table 4-6 - Carbon Emissions After Be Lean – Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	436.3	-
	Be Lean	407.9	7%
Plot J	Baseline emissions	337.2	-
	Be Lean	331.8	2%
Combined Results	Baseline emissions	773.5	-
	Be Lean	739.7	4%

The residential areas achieve a combined 4% betterment against the baseline after the Be Lean measures have been applied sitewide.

4.1.2. PART L 2021 FABRIC ENERGY EFFICIENCY (FEE)

Elmhurst Design SAP 10 software was used to determine the FEE (Fabric Energy Efficiency) standards for all apartments. An analysis has been undertaken on the all the new build residential buildings to establish the performance of the fabric in relation to the TFEE (Target Fabric Energy Efficiency). Results for TFEE and the DFEE (Dwelling Fabric Energy Efficiency) for all residential buildings are as follows:

Table 4-7 - Fabric Energy Efficiency And Carbon Emissions Result

	Average TFEE (kWh/m ²)	Average DFEE (kWh/m ²)	Improvement
Plot K	26.19	24.91	4.89%
Plot J	29.74	28.19	5.2%

All residential areas achieve compliance with the TFEE standard. Detailed façade design and thermal bridging calculations will be performed during detailed design stage once junction details will be specified. The final strategy for compliance with TFEE will be defined as design develops. The project will ensure compliance with the TFEE is achieved.

4.1.3. PLOT K & J – NON-RESIDENTIAL

Table 4-8 - Carbon Emissions After Be Lean – Non-Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	18.4	-
	Be Lean	16.4	11%
Plot J	Baseline emissions	17.9	-
	Be Lean	15.6	13%
Combined Results	Baseline emissions	35.3	-
	Be Lean	31.2	12%

The non-residential areas achieve combined 12% betterment against the baseline after the Be Lean measures have been applied sitewide.

5. BE CLEAN: SUPPLY ENERGY EFFICIENTLY

After consumption has been reduced through the application of energy efficiency measures, the next step is to consider heating infrastructure.

5.1. MANCHESTER CIVIC QUARTER HEAT NETWORK

The Manchester Civic Quarter Heat Network (CQHN) is a £20million energy centre located in the heart of the city. Its aim is to provide a heat and power system to several iconic buildings in and around the city of Manchester.

The new network consists of a 2km district heating network and an energy centre containing a 3.3MWe CHP engine and two 12MW gas boilers that generate energy for landmarks including Manchester Town Hall and Town Hall Extension, Central Library, Manchester Central Convention Centre, The Bridgewater Hall, Heron House, and the Manchester Art Gallery.

The existing CQHN is currently gas powered.



Figure 5-1 - Manchester District Heating Route Map

5.2. HEAT NETWORK VIABILITY

Given the decarbonisation of grid electricity, the use of mains gas for provision of heating is becoming less favourable from a sustainability perspective, as well as for air quality. Furthermore, as the grid decarbonises and electricity is utilised for heat generation the relative impact of in-use energy consumption upon whole life carbon decreases.

As the construction of heat networks is a carbon intensive process, it is not favourable from a whole life carbon perspective as well as an energy use perspective to utilise such an approach.

Decentralised solutions with the decreased infrastructure requirement and lower embodied carbon may be more environmentally sound.

Furthermore, the current network is not planned to come as far as the Mayfield Phase 1B development and currently over a mile away from the proposed development.

It is therefore not considered viable to connect into the local district heat network and in the following steps a 0% reduction is shown.

6. BE GREEN: USE RENEWABLE ENERGY

Renewable energy technologies can provide a source of energy on-site that is not primarily based on the consumption of fossil fuels or grid electricity and/or utilises a heat source that is renewable such as ground source and solar thermal systems.

A number of renewable energy technologies have been evaluated and this section discusses how they may be applied to the Proposed Development.

6.1. WIND POWER

Harnessing the kinetic energy of wind can provide a renewable source of onsite electricity generation. Wind turbines need to be positioned where a frequent and steady source of wind is available that is not too turbulent or uneven in direction. Typically, wind turbines are positioned on the roof of buildings that are significantly higher than their surroundings and or located in open areas where there is minimum disruption to prevailing winds.

The Proposed Development is located within an urban environment with near-by buildings providing turbulent wind conditions unsuitable for wind power generation. In addition, it is not considered appropriate in townscape, architectural and aviation safeguarding terms to provide wind turbines on top of buildings. On that basis, they are not suitable for the Proposed Development.

6.2. BIOMASS HEATING

Biomass heating has embodied environmental impacts from transport and fuel combustion which makes it less desirable in Air Quality Management Areas (AQMA)s, such as where the Site of the Proposed Development is located. A review of the potential impact on air quality from increased wood fuelled biomass use in London has been carried out by AEA Energy & Environment and was published in December 2007. The assessment indicates that potentially increasing the contribution from small-scale wood fuelled biomass combustion may lead to a substantial increase in nitrogen dioxide and particulate matter concentrations.

Further to this, solid biomass relies on a reliable fuel supply which must be delivered and stored on site. The Site therefore requires good access routes and space for fuel storage and plant, which could not feasibly be incorporated within the Proposed Development. It also has relatively high maintenance requirements and fuel costs.

This technology is therefore deemed to be unsuitable for the Proposed Development.

6.3. GROUND SOURCE HEATING AND/OR COOLING

Ground source heating and/or cooling may be incorporated to make use of the thermal storage and ground temperature to provide heating and/or cooling to a building. Ground source heating is an effective renewable energy source when used to provide space heating via low grade heating system such as underfloor heating. However, as there is insufficient space for the heating coils or bore holes required, it is not considered feasible for the Proposed Development.

6.4. SOLAR THERMAL HOT WATER HEATING

Solar thermal hot water (STHW) generation involves capturing solar radiant heat to preheat or heat domestic hot water. Correctly located and orientated, solar thermal systems can meet a proportion of a

building's domestic hot water dependent on the expected demand profile and available space for locating STHW panels. Due to the limited amount of available roof space, a STHW system is not proposed for the Proposed Development.

6.5. AIR SOURCE HEAT PUMPS

Air source heat pumps (ASHPs) are capable of providing heating and/or cooling utilising air temperatures. The use of ASHPs is an effective low carbon technology as they have high efficiencies for both heating and cooling.

With the decarbonising grid due to an increase in renewable energy generation, the operational impact of electrically led systems is reduced. Therefore, the benefit of heat pump technologies will improve through the lifetime of the Proposed Development. Air source heat pumps are proposed for the Proposed Development as described in the previous section.

6.6. WATER SOURCE HEAT PUMPS

Bodies of water can be used to extract or reject heat as long as there is an adequate water flow. WSHPs have a significantly higher coefficient of performance (COP) than ASHPs due to the higher temperature of the heat source which is constant throughout the year. However, due to the lack of nearby water sources, WSHPs are not proposed for the primary loop in the Proposed Development.

6.7. PHOTOVOLTAIC (PV) PANELS

Although PV systems are technically feasible for this project, they are not currently included in the design due to cost considerations. Their viability will continue to be explored as the design progresses.

6.8. GRID DECARBONISATION

Electricity is decarbonising at a rapid rate as shown via the carbon factors since 2013 within the table below. An all electric strategy is proposed for the development and due to the reductions in carbon factors, electric heating is now the favourable option for new residential developments.

Table 6-1 - SAP carbon factors

Fuel Type	Part L 2013 (kg.CO ₂ /kWh)	SAP10.0 (kg.CO ₂ /kWh)	SAP10.2 (kg.CO ₂ /kWh)
Grid Supplied Electricity	0.519	0.233	0.136
Natural Gas	0.216	0.210	0.210

6.9. SYSTEM MONITOR OF PERFORMANCE

The Proposed Development will be provided with Building Management System (BMS). This will control and monitor the building systems and services throughout the Proposed Development, provide feedback of plant, system performance and energy usage of the system. The BMS will analyse this data to enable optimum use of the engineering facilities within the Proposed Development with minimum of human intervention, and maximum energy efficiency.

The landlord services fall under the category of sub metering as the main supplies will be bulk metered as part of the building switch rooms. Both small power and lighting are to be sub metered in distribution boards in compliance with TM39:2009. This is achieved via in line meters in the distribution boards. All metering information can be collected and distributed to the BMS via the landlords unified network.

Residential units will be provided with smart metering to minimise residential unit access.

6.10. RESULTS: CARBON EMISSIONS

All renewable energy technologies which may be considered feasible for the Proposed Development have been assessed, the outcomes of which are summarised above.

From that exercise, it was concluded that both heat pumps and photovoltaic panels (subject to variability) would be suitable for inclusion in the Proposed Development.

Savings from renewable energy are shown in the below tables.

6.10.1. PLOT K & J – RESIDENTIAL

Table 6-2 - Carbon Emissions After Providing Renewable Energy – Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	436.3	-
	Be Lean	407.9	7%
	Be Clean	407.9	0%
	Be Green	112.5	74%
Plot J	Baseline emissions	337.2	-
	Be Lean	331.8	2%
	Be Clean	331.8	0%
	Be Green	242	72%
Combined Results	Baseline emissions	773.5	-
	Be Lean	739.7	4%
	Be Clean	739.7	0%
	Be Green	207.8	73%

The residential areas achieve a combined 73% betterment against the baseline after the Be Green measures have been applied sitewide.

6.10.2. PLOT K & J – NON-RESIDENTIAL

Table 6-3 - Carbon Emissions After Providing Renewable Energy – Non-Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	18.4	-
	Be Lean	16.4	11%
	Be Clean	16.4	0%
	Be Green	16.2	12%
Plot J	Baseline emissions	17.9	-
	Be Lean	15.6	13%
	Be Clean	15.6	1%
	Be Green	15.4	13%
Combined Results	Baseline emissions	35.3	-
	Be Lean	31.2	12%
	Be Clean	31.2	0%
	Be Green	30.8	13%

The non-residential areas achieve a combined 13% betterment against the baseline after the Be Green measures have been applied sitewide.

6.10.3. SITEWIDE

Table 6-4 - Carbon Emissions After Providing Renewable Energy – the Proposed Development Site Wide

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Sitewide Results	Baseline emissions	808.8	-
	Be Lean	770.9	5%
	Be Clean	770.9	0%
	Be Green	238.5	66%
Total Savings		570.3	71%

The combined site wide residential and non-residential areas achieve a combined 71% betterment against the baseline after the Be Green measures have been applied sitewide.

Providing a total saving of Tonnes Co2 – 570.4 (Tonnes CO2 per annum) against the baseline.

6.11. SUMMARY

A fabric-first approach has been prioritised during design development, ensuring that the building fabric responds effectively to its environment. This approach minimises energy consumption through passive measures, which are further supported by the integration of highly efficient heating systems, such as air source heat pumps (ASHPs) for residential domestic hot water and cooling as well as non-residential area, whilst utilising a fully electric strategy to reduce carbon emissions.

Compliance with Part L 2021, which delivers a 27% improvement over Part L 2010, surpasses Policy EN 6's requirement for a 15% uplift on Part L 2010. The proposed development goes beyond this benchmark, achieving a 71% reduction in site-wide carbon emissions relative to the Part L 2021 baseline. This performance highlights the project's commitment to sustainability and its ability to exceed both regulatory expectations and policy requirements.

7. RETAIL UNITS - SHELL AND CORE

7.1. OVERVIEW

A Part L “Shell and Core” assessment is a way to evaluate the energy performance of a building or demise that is sold or rented as a shell and core, without any services installed:

7.1.1. WHAT IS A SHELL AND CORE BUILDING?

A shell and core building is a blank canvas without services like air conditioning, lighting, or hot water. The occupier and their fit-out partner can then tailor the space as needed.

7.1.2. WHAT IS A PART L ASSESSMENT?

A Part L assessment evaluates a building's energy efficiency and carbon emissions.

It sets standards for a building's energy performance, including its insulation, heating, lighting, ventilation, and use of renewable energy.

7.1.3. WHY IS A PART L ASSESSMENT IMPORTANT FOR SHELL AND CORE BUILDINGS?

It's important for shell and core buildings because the fit-out may not comply with future Part L requirements. This can create issues when trying to let or rent the space.

Therefore, WSP have undertaken a BRUKL Compliance check for each retail space individually to check their compliance during design stage based on an assumed fit out of the spaces.

7.2. MODELLING ASSUMPTIONS

Retail units of Plot K and J are modelled to represent the assumed design of these spaces.

The floor plans and elevations of the space aligns with the information provided within architectural drawings submitted for planning.

Appropriate NCM profile have been assigned to these spaces, based on the expected activity within the space.

It is assumed that the spaces are to be conditioned by VRF systems, accompanied by mechanical ventilation with heat recovery with efficiencies and performance that aligns with other areas of the building a set out above.

High efficiency LED lighting is assumed to be used with an efficacy of 120 lm/cW and Daylight controls are assumed to be present within the spaces with external glazing.

Fabric values for the retail spaces have been captured in the ‘Be Lean’ section of the report. Retail spaces which are located at the South and West side of the building are subject to high amount of solar gain – the glazing in these spaces have an improved g-value of 0.3 from 0.4 to ensure compliance.

It is understood that all retail elevations shall be conditioned, for detailed design at a later stage and area of glazing is yet to be defined and therefore subject to change.

7.3. RESULTS

Table 7-1 – Summary of Retail Unit BRUKL Results – Plot K & J

	Retail Unit Name	Reference/ Location	Area	Target CO2 Emissions Rate (TER) (kgCO2/ m2.annum)	Building CO2 Emissions Rate (BER) (kgCO2/ m2.annum)	Pass/ Fail
Plot K	General Store	Upper Ground Floor – Southwest Corner	Non-residential	3.23	3.1	Pass
	Gym	Lower and Upper Ground Floor – North West Corner	Non-residential	6.95	5.85	Pass
	Commercial Unit 1	Upper Ground Floor – South East Corner	Non-residential	3.08	3.63	Pass
	Commercial Unit 2	Upper Ground Floor – South East Corner	Non-residential	3.51	2.95	Pass
	Restaurant	Lower Ground Floor – North East Corner	Non-residential	16.71	16.67	Pass
Plot J	Cafe	Upper Ground Floor – South West Corner	Non-residential	18.37	18.3	Pass
	Commercial Unit 1	Lower and Upper Ground Floor – North West Corner	Non-residential	3.07	2.71	Pass
	Commercial Unit 2	Lower and Upper Ground Floor – North East Corner	Non-residential	3.44	3.06	Pass
	Retail	Upper Ground Floor – South East Corner	Non-residential	3.74	3.49	Pass

The above table shows that all retail units, considered as Shell and Core, shall comply with Part L of the building regulations and that compliance shall be achievable by the occupiers subject to install and design during fit out. This compliance check sits with the occupier at time of Building Control sign off.

8. BE SEEN

The 'Seen' aspect of the Lean, Clean, Green and Seen approach to an energy strategy recognises that in the past various measures were described and adopted in the project proposals, but the reality of actual energy consumption and carbon savings was often worse than predicted.

When buildings were occasionally assessed to compare real life consumption with predicted consumption the reality was often far from the original intentions for a wide variety of reasons.

This was described in energy management circles as a 'performance gap'.

This therefore raises the need to clearly monitor the actual results against the targets derived from the design.

The 'Be Seen' aspect now formalises this process and requires an obligation for monitoring, targeting and reporting monthly figures for a minimum of 5 years.

There is a full commitment to meeting this obligation and confidence that the design targets can be achieved in practice.

A suitable Building Energy Management System (BEMS) will be applied in order to monitor energy use via sub meters.

Where there are discrepancies, the reasons behind the discrepancies will be established and corrective action taken.

8.1. PASSIVE HOUSE PLANNING PACKAGE (PHPP)

As part of the Landsec U&I brief WSP are required to assess Energy use intensity (EUI) against the aspirational targets of Operational Energy; Achievable Best Practice < 45 (kWh/m²) with Backstop < 50 (kWh/m²).

This additional modelling will be undertaken at a later stage of design.

9. SUMMARY OF RESULTS – BUILDING REGULATIONS PART L

The three principal steps taken: Be Lean (Use Less Energy), Be Clean (Supply Energy Efficiently) and finally Be Green (Renewable Technology Measures) are summarised below.

The regulated carbon emissions for the Proposed Development are calculated to be **570.4 tonnes CO₂ per annum** and the scheme achieves a sitewide betterment over Part L 2021 of 71%.

Any percentages refer to the reduction of carbon emissions from this baseline.

9.1. NON-RESIDENTIAL AREAS

This section has been modelled using the approved software IES (Integrated Environmental solutions) 2024 in order to generate a BRUKL. This BRUKL demonstrates the compliance with Part L of the building regulations and is contained within appendix A. Results are summarised below/

Table 9-1 - Carbon Emissions – Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	436.3	-
	Be Lean	407.9	7%
	Be Clean	407.9	0%
	Be Green	112.5	74%
Plot J	Baseline emissions	337.2	-
	Be Lean	331.8	2%
	Be Clean	331.8	0%
	Be Green	242	72%
Combined Results	Baseline emissions	773.5	-
	Be Lean	739.7	4%
	Be Clean	739.7	0%
	Be Green	207.8	73%

A 73% reduction in emissions demonstrates compliance with building regulations and Manchester Planning policy at this stage.

9.2. RESIDENTIAL AREAS

The regulated carbon emissions for the residential spaces were determined using Accredited Design SAP 10 software.

The tables below summarise the total baseline carbon emissions and the carbon emissions after the application of energy efficiency measures and the application of low and zero carbon technologies.

Table 9-2 - Carbon Emissions– Non-Residential (Plot K and J)

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Plot K	Baseline emissions	18.4	-
	Be Lean	16.4	11%
	Be Clean	16.4	0%
	Be Green	16.2	12%
Plot J	Baseline emissions	17.9	-
	Be Lean	15.6	0%
	Be Clean	15.6	1%
	Be Green	15.4	13%
Combined Results	Baseline emissions	35.3	-
	Be Lean	31.2	12%
	Be Clean	31.2	0%
	Be Green	30.8	13%

A 13% reduction in emissions demonstrates compliance with building regulations and Manchester Planning policy at this stage.

9.3. SITEWIDE

This provides a total sitewide Reduction in Regulated carbon emissions of 71%.

Retail units have not been considered within this as are subject to their own assessment during fit out.

Table 9-3 - Carbon Emissions – Site Wide

		Regulated Emissions (Tonnes CO ₂ per annum)	% Reduction in Regulated carbon emissions
Sitewide Results	Baseline emissions	808.8	-
	Be Lean	770.9	5%
	Be Clean	770.9	0%
	Be Green	238.5	66%
Total Savings		570.3	71%

9.4. RESULTS SUMMARY

The Proposed Development aligns with the required policies, including National and Local Planning Policy and The Building Regulations Part L.

A fabric-first approach has been prioritised during design development, ensuring that the building fabric responds effectively to its environment. This approach minimises energy consumption through passive measures, which are further supported by the integration of highly efficient heating systems, such as air source heat pumps (ASHPs) for residential domestic hot water and cooling as well as non-residential area, whilst utilising a fully electric strategy to reduce carbon emissions. Compliance with Part L 2021, which delivers a 27% improvement over Part L 2010, surpasses Policy EN 6's requirement for a 15% uplift on Part L 2010. The proposed development goes beyond this benchmark, achieving a 71% reduction in site-wide carbon emissions relative to the Part L 2021 baseline. This performance highlights the project's commitment to sustainability and its ability to exceed both regulatory expectations and policy requirements.

10. CONCLUSION

In conclusion, this report demonstrates that the Proposed Development is compliant with the relevant policies including The National Planning Policy Framework, Local Policy and The Building Regulations Part L and Part O.

The Development has been assessed in line with the Energy hierarchy:

- Be Lean;
- Be Clean;
- Be Green; and
- Be Seen.

The Proposed Development has been designed to include high efficiency fabric and passive design measures such as external shading. Active measures such as high efficiency heat pumps and PV panels have also been included in the design to ensure the building is all-electric and supports the UK's decarbonisation goal.

The reductions under the Energy Hierarchy have been maximised against the Part L 2021 notional building performance. The notional building is already a very energy efficient building but through collaborative engineering and design, the proposed building has incorporated solutions that results in a 71% reduction in regulated energy compared to the notional building.

An energy assessment using the PHPP modelling tool shall be carried out at future design stages to ensure a accurate prediction the operational energy. As the design progresses, the analysis will be updated to ensure the building will meet its energy targets.

The Proposed Development outlined within this energy strategy is considered to maximise the potential carbon savings which can be achieved on the Site through the provision of:

- A highly efficient building fabric design to minimise heat gains and heat losses while allowing for efficient access to daylight;
- Low energy ventilation system including efficient heat recovery, reduced fan power and optimised control system to minimise energy consumption during operation;
- 100% low energy lighting, maximised use of LED and low energy fixtures;
- Low carbon heat provided by Air Source Heat Pumps;
- A fully electric strategy;
- Smart efficient control systems and building management system will be provided to allow for efficient control and monitoring of MEP services to minimise energy waste.

Overall, the Proposed Development is shown to achieve the following carbon reductions after following the Energy Hierarchy of Be Lean, Be Clean and Be Green when compared to Part L 2021 using SAP10.2 carbon factors

Figure 10-1 – Sitewide Residential Carbon Reduction

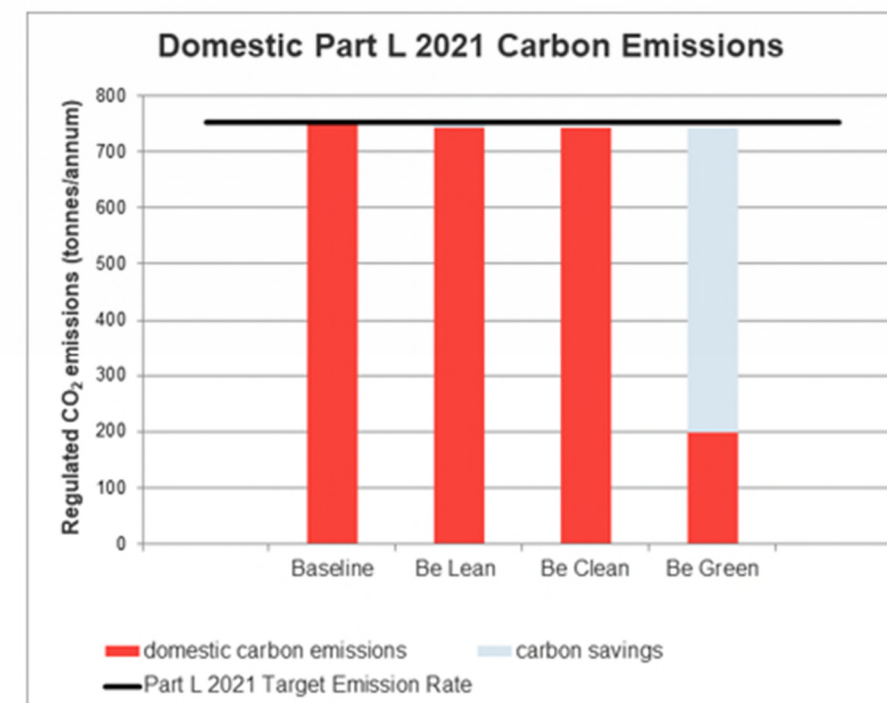
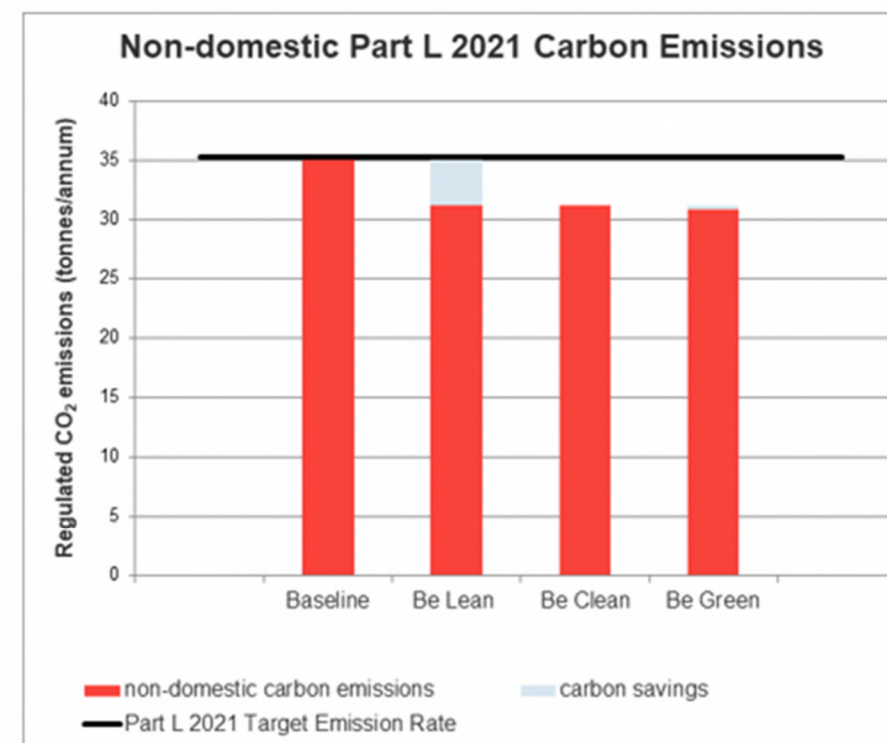


Figure 10-2 – Sitewide Non-Residential Carbon Reduction



Appendix A

BRUKLS – NON-RESIDENTIAL



Project name

Mayfield 1b Plot K Non-resi

As designed

Date: Tue Nov 19 11:26:27 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 42.26The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	2.23
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	1.95
Target primary energy rate (TPER), kWh _{PE} /m ² annum	24.35
Building primary energy rate (BPER), kWh _{PE} /m ² annum	21.41
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.16	0.18	00000001:Surf[0]
Floors	0.18	0.15	0.15	00000006:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.17	0.18	00000006:Surf[1]
Windows** and roof windows	1.6	1.32	1.37	RS000000:Surf[4]
Rooflights***	2.2	1.2	1.2	0100005A:Surf[1]
Personnel doors^	1.6	1.52	2.2	RS000000:Surf[7]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Electric Pannel Heaters + NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.67	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

2- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5.5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

3- Electric Pannel Heaters + EV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.67	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

1- Electric PoU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.005
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
00.36 Rezi Entrance	-	-	-	0.7	-	-	-	-	-	-	-	N/A
01.07 C3 Residential BOH Suite	-	-	-	0.7	-	-	-	-	-	-	-	N/A
01.08 Resi amenity	-	-	-	0.7	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
01.13 Rezi amenity WC	-	-	0.4	-	-	-	-	-	-	-	N/A
01.14 Rezi amenity WC	-	-	0.4	-	-	-	-	-	-	-	N/A
01.22 Resi amenity	-	-	-	0.7	-	-	-	-	-	-	N/A
01.29 Resi Amenity	-	-	-	0.7	-	-	-	-	-	-	N/A
01.35 C3 Residential entrance	-	-	-	0.7	-	-	-	-	-	-	N/A
01.36 C3 Residential BOH Meeting Rooms	-	-	-	0.7	-	-	-	-	-	-	N/A
01.38 C3 Residential BOH BOH Office-	-	-	-	0.7	-	-	-	-	-	-	N/A
01.40 Resi Amenity Flexible Units	-	-	-	0.7	-	-	-	-	-	-	N/A
01.72 Resi Amentity Flexible Units	-	-	-	0.7	-	-	-	-	-	-	N/A
01.76 Resi Amenity Flexible Units	-	-	-	0.7	-	-	-	-	-	-	N/A
01.83 C3 Residential Lobby	-	-	-	0.7	-	-	-	-	-	-	N/A
Concierge	-	-	-	0.7	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
00.02 Residential BOH/Plant		120	-	-
00.03 stairwell		120	-	-
00.08 C3 Residential BOH/Plant Plant		120	-	-
00.10 Plant Room		120	-	-
00.11 Corridor		120	-	-
00.14 Cupboard		120	-	-
00.15 Corridor		120	-	-
00.16 Corridor		120	-	-
00.20 Residential Bin Store		120	-	-
00.22 Corridor		120	-	-
00.23 Plant Room		120	-	-
00.25 Plant Room		120	-	-
00.26 Corridor		120	-	-
00.27 Corridor		120	-	-
00.28 Cupboard		120	-	-
00.29 Cupboard		120	-	-
00.30 Cupboard		120	-	-
00.34 Cupboard		120	-	-
00.35 Corridor		120	-	-
00.36 Rezi Entrance		120	-	-
00.45 Cupboard		120	-	-
00.46 Plant Room		120	-	-
00.47 Plant Room		120	-	-
00.48 Cupboard		120	-	-
00.49 Plant Room		120	-	-
01.03 Cupboard		120	-	-
01.04 Corridor		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
01.05 Corridor		120		-	-
01.07 C3 Residential BOH Suite		120		-	-
01.08 Resi amenity		120		-	-
01.10 Corridor		120		-	-
01.11 Corridor		120		-	-
01.12 Corridor		120		-	-
01.13 Rezi amenity WC		120		-	-
01.14 Rezi amenity WC		120		-	-
01.15 Staircase		120		-	-
01.16 Corridor		120		-	-
01.19 Corridor		120		-	-
01.20 Corridor		120		-	-
01.21 Corridor		120		-	-
01.22 Resi amenity		120		-	-
01.23 Cupboard		120		-	-
01.24 Cupboard		120		-	-
01.25 Cupboard		120		-	-
01.27 Corridor		120		-	-
01.29 Resi Amenity		120		-	-
01.30 Retail/Restaurant/Cafe Commercial unit Plant		120		-	-
01.31 C3 Residential BOH/Plant Bike Store		120		-	-
01.33 Corridor		120		-	-
01.35 C3 Residential entrance		120		-	-
01.36 C3 Residential BOH Meeting Rooms		120		-	-
01.38 C3 Residential BOH BOH Office		120		-	-
01.39 Residential BOH/Plant Bike Store		120		-	-
01.40 Resi Amenity Flexible Units		120		-	-
01.42 C3 Residential BOH/Plant Plant		120		-	-
01.45 Corridor		120		-	-
01.46 C3 Residential BOH/Plant Plant		120		-	-
01.47 Corridor		120		-	-
01.48 Corridor		120		-	-
01.49 Cupboard		120		-	-
01.50 C3 Corridor		120		-	-
01.51 Cupboard		120		-	-
01.52 Cupboard		120		-	-
01.53 Cupboard		120		-	-
01.54 Cupboard		120		-	-
01.56 Corridor		120		-	-
01.58 Corridor		120		-	-
01.59 Corridor		120		-	-
01.62 Comms Room		120		-	-
01.63 C3 Residential BOH/Plant Plant		120		-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01.64 Corridor		120	-	-
01.65 Corridor		120	-	-
01.66 Corridor		120	-	-
01.68 C3 Residential BOH/Plant Refuse		120	-	-
01.70 C3 Residential Parcel Room		120	-	-
01.72 Resi Amentity Flexible Units		120	-	-
01.73 Residential BOH/Plant Bike Store		120	-	-
01.74 Corridor		120	-	-
01.75 Residential BOH/Plant Refuse		120	-	-
01.76 Resi Amenity Flexible Units		120	-	-
01.77 C3 Residential BOH/Plant Bike Store		120	-	-
01.80 C3 Residential BOH/Plant Plant		120	-	-
01.81 C3 Residential BOH/Plant Plant		120	-	-
01.82 MoveIn/Move Out		120	-	-
01.83 C3 Residential Lobby		120	-	-
01.84 Corridor		120	-	-
02.05 Stairwell		120	-	-
02.09 Corridor		120	-	-
02.11 Cleaner's Cupboard		120	-	-
02.23 Stairwell		120	-	-
02.24 Stairwell		120	-	-
02.25 Stairwell		120	-	-
02.29 Corridor		120	-	-
02.30 Cleaner's Cupboard		120	-	-
02.35 Cleaner's Cupboard		120	-	-
02.36 Corridor		120	-	-
02.38 Stairwell		120	-	-
02.39 Stairwell		120	-	-
02.49 Corridor		120	-	-
02.50 Corridor		120	-	-
02.51 Corridor		120	-	-
02.52 Corridor		120	-	-
02.53 Corridor		120	-	-
02.54 Corridor		120	-	-
02.55 Corridor		120	-	-
02.56 Corridor		120	-	-
02.57 Corridor		120	-	-
02.58 Corridor		120	-	-
02.59 Corridor		120	-	-
02.60 Corridor		120	-	-
03.05 Corridor		120	-	-
03.06 Stairwell		120	-	-
03.07 Corridor		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80		0.3
03.12 Cleaner's Cupboard		120	-		-
03.14 Stairwell		120	-		-
03.15 Stairwell		120	-		-
03.16 Corridor		120	-		-
03.21 Corridor		120	-		-
03.22 Corridor		120	-		-
03.29 Corridor		120	-		-
03.30 Stairwell		120	-		-
03.34 Corridor		120	-		-
03.35 Cleaner's Cupboard		120	-		-
03.40 Cleaner's Cupboard		120	-		-
03.41 Corridor		120	-		-
03.43 Stairwell		120	-		-
03.44 Stairwell		120	-		-
03.54 Corridor		120	-		-
03.55 Corridor		120	-		-
03.56 Corridor		120	-		-
03.57 Corridor		120	-		-
03.58 Corridor		120	-		-
04.05 Corridor		120	-		-
04.06 Stairwell		120	-		-
04.07 Corridor		120	-		-
04.12 Cleaner's Cupboard		120	-		-
04.14 Stairwell		120	-		-
04.15 Stairwell		120	-		-
04.16 Corridor		120	-		-
04.21 Corridor		120	-		-
04.22 Corridor		120	-		-
04.28 Corridor		120	-		-
04.29 Corridor		120	-		-
04.30 Stairwell		120	-		-
04.34 Corridor		120	-		-
04.35 Cleaner's Cupboard		120	-		-
04.40 Cleaner's Cupboard		120	-		-
04.41 Corridor		120	-		-
04.43 Stairwell		120	-		-
04.44 Stairwell		120	-		-
04.54 Corridor		120	-		-
04.55 Corridor		120	-		-
04.56 Corridor		120	-		-
04.57 Corridor		120	-		-
04.58 Corridor		120	-		-
05.05 Corridor		120	-		-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]	
	Standard value	95	80	0.3	
05.06 Stairwell		120	-	-	
05.07 Corridor		120	-	-	
05.12 Cleaner's Cupboard		120	-	-	
05.14 Stairwell		120	-	-	
05.15 Stairwell		120	-	-	
05.16 Corridor		120	-	-	
05.21 Corridor		120	-	-	
05.22 Corridor		120	-	-	
05.28 Corridor		120	-	-	
05.29 Corridor		120	-	-	
05.30 Stairwell		120	-	-	
05.34 Corridor		120	-	-	
05.35 Cleaner's Cupboard		120	-	-	
05.40 Cleaner's Cupboard		120	-	-	
05.41 Corridor		120	-	-	
05.43 Stairwell		120	-	-	
05.44 Stairwell		120	-	-	
05.54 Corridor		120	-	-	
05.55 Corridor		120	-	-	
05.56 Corridor		120	-	-	
05.57 Corridor		120	-	-	
05.58 Corridor		120	-	-	
06.05 Corridor		120	-	-	
06.06 Stairwell		120	-	-	
06.07 Corridor		120	-	-	
06.12 Cleaner's Cupboard		120	-	-	
06.14 Stairwell		120	-	-	
06.15 Stairwell		120	-	-	
06.16 Corridor		120	-	-	
06.21 Corridor		120	-	-	
06.22 Corridor		120	-	-	
06.28 Corridor		120	-	-	
06.29 Corridor		120	-	-	
06.30 Stairwell		120	-	-	
06.34 Corridor		120	-	-	
06.35 Cleaner's Cupboard		120	-	-	
06.40 Cleaner's Cupboard		120	-	-	
06.41 Corridor		120	-	-	
06.43 Stairwell		120	-	-	
06.44 Stairwell		120	-	-	
06.54 Corridor		120	-	-	
06.55 Corridor		120	-	-	
06.56 Corridor		120	-	-	

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80		0.3
06.57 Corridor		120	-		-
06.58 Corridor		120	-		-
07.05 Corridor		120	-		-
07.06 Stairwell		120	-		-
07.07 Corridor		120	-		-
07.12 Cleaner's Cupboard		120	-		-
07.14 Stairwell		120	-		-
07.15 Stairwell		120	-		-
07.16 Corridor		120	-		-
07.21 Corridor		120	-		-
07.22 Corridor		120	-		-
07.28 Corridor		120	-		-
07.29 Corridor		120	-		-
07.30 Stairwell		120	-		-
07.34 Corridor		120	-		-
07.35 Cleaner's Cupboard		120	-		-
07.40 Cleaner's Cupboard		120	-		-
07.41 Corridor		120	-		-
07.43 Stairwell		120	-		-
07.44 Stairwell		120	-		-
07.54 Corridor		120	-		-
07.55 Corridor		120	-		-
07.56 Corridor		120	-		-
07.57 Corridor		120	-		-
07.58 Corridor		120	-		-
08.05 Cleaner's Cupboard		120	-		-
08.06 Corridor		120	-		-
08.08 Stairwell		120	-		-
08.09 Stairwell		120	-		-
08.19 Corridor		120	-		-
08.20 Corridor		120	-		-
08.21 Corridor		120	-		-
08.22 Corridor		120	-		-
08.28 Corridor		120	-		-
08.29 Stairwell		120	-		-
08.30 Corridor		120	-		-
08.35 Cleaner's Cupboard		120	-		-
08.37 Stairwell		120	-		-
08.38 Stairwell		120	-		-
08.39 Corridor		120	-		-
08.44 Corridor		120	-		-
08.45 Corridor		120	-		-
08.51 Corridor		120	-		-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80		0.3
08.52 Corridor		120	-		-
09.05 Cleaner's Cupboard		120	-		-
09.06 Corridor		120	-		-
09.08 Stairwell		120	-		-
09.09 Stairwell		120	-		-
09.19 Corridor		120	-		-
09.20 Corridor		120	-		-
09.21 Corridor		120	-		-
09.22 Corridor		120	-		-
09.28 Corridor		120	-		-
09.29 Stairwell		120	-		-
09.30 Corridor		120	-		-
09.35 Cleaner's Cupboard		120	-		-
09.37 Stairwell		120	-		-
09.38 Stairwell		120	-		-
09.39 Corridor		120	-		-
09.44 Corridor		120	-		-
09.45 Corridor		120	-		-
09.51 Corridor		120	-		-
09.52 Corridor		120	-		-
10.05 Cleaner's Cupboard		120	-		-
10.06 Corridor		120	-		-
10.08 Stairwell		120	-		-
10.09 Stairwell		120	-		-
10.19 Corridor		120	-		-
10.20 Corridor		120	-		-
10.21 Corridor		120	-		-
10.22 Corridor		120	-		-
10.28 Corridor		120	-		-
10.29 Stairwell		120	-		-
10.30 Corridor		120	-		-
10.35 Cleaner's Cupboard		120	-		-
10.37 Stairwell		120	-		-
10.38 Stairwell		120	-		-
10.39 Corridor		120	-		-
10.44 Corridor		120	-		-
10.45 Corridor		120	-		-
10.51 Corridor		120	-		-
10.52 Corridor		120	-		-
11.05 Cleaner's Cupboard		120	-		-
11.06 Corridor		120	-		-
11.08 Stairwell		120	-		-
11.09 Stairwell		120	-		-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]		Efficacy [lm/W]	Power density [W/m²]
	Standard value	95		80	0.3
11.19 Corridor		120		-	-
11.20 Corridor		120		-	-
11.21 Corridor		120		-	-
11.22 Corridor		120		-	-
11.28 Corridor		120		-	-
11.29 Stairwell		120		-	-
11.30 Corridor		120		-	-
11.35 Cleaner's Cupboard		120		-	-
11.37 Stairwell		120		-	-
11.38 Stairwell		120		-	-
11.39 Corridor		120		-	-
11.44 Corridor		120		-	-
11.45 Corridor		120		-	-
11.51 Corridor		120		-	-
11.52 Corridor		120		-	-
12.04 Stairwell		120		-	-
12.05 Stairwell		120		-	-
12.12 Corridor		120		-	-
12.13 Corridor		120		-	-
12.17 Corridor		120		-	-
12.18 Corridor		120		-	-
12.19 Cleaner's Cupboard		120		-	-
12.27 Cleaner's Cupboard		120		-	-
12.28 Corridor		120		-	-
12.30 Stairwell		120		-	-
12.31 Stairwell		120		-	-
12.41 Corridor		120		-	-
12.42 Corridor		120		-	-
12.43 Corridor		120		-	-
12.44 Corridor		120		-	-
13.04 Stairwell		120		-	-
13.05 Stairwell		120		-	-
13.12 Corridor		120		-	-
13.13 Corridor		120		-	-
13.17 Corridor		120		-	-
13.18 Corridor		120		-	-
13.19 Cleaner's Cupboard		120		-	-
13.27 Cleaner's Cupboard		120		-	-
13.28 Corridor		120		-	-
13.30 Stairwell		120		-	-
13.31 Stairwell		120		-	-
13.41 Corridor		120		-	-
13.42 Corridor		120		-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
13.43 Corridor		120	-	-
13.44 Corridor		120	-	-
14.04 Stairwell		120	-	-
14.05 Stairwell		120	-	-
14.12 Corridor		120	-	-
14.13 Corridor		120	-	-
14.17 Corridor		120	-	-
14.18 Corridor		120	-	-
14.19 Cleaner's Cupboard		120	-	-
14.27 Cleaner's Cupboard		120	-	-
14.28 Corridor		120	-	-
14.30 Stairwell		120	-	-
14.31 Stairwell		120	-	-
14.41 Corridor		120	-	-
14.42 Corridor		120	-	-
14.43 Corridor		120	-	-
14.44 Corridor		120	-	-
15.04 Stairwell		120	-	-
15.05 Stairwell		120	-	-
15.12 Corridor		120	-	-
15.13 Corridor		120	-	-
15.17 Corridor		120	-	-
15.18 Corridor		120	-	-
15.19 Cleaner's Cupboard		120	-	-
15.27 Cleaner's Cupboard		120	-	-
15.28 Corridor		120	-	-
15.30 Stairwell		120	-	-
15.31 Stairwell		120	-	-
15.41 Corridor		120	-	-
15.42 Corridor		120	-	-
15.43 Corridor		120	-	-
15.44 Corridor		120	-	-
16.05 Cleaner's Cupboard		120	-	-
16.06 Corridor		120	-	-
16.08 Stairwell		120	-	-
16.09 Stairwell		120	-	-
16.19 Corridor		120	-	-
16.20 Corridor		120	-	-
16.21 Corridor		120	-	-
16.22 Corridor		120	-	-
17.05 Cleaner's Cupboard		120	-	-
17.06 Corridor		120	-	-
17.08 Stairwell		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
17.09 Stairwell		120	-	-
17.19 Corridor		120	-	-
17.20 Corridor		120	-	-
17.21 Corridor		120	-	-
17.22 Corridor		120	-	-
18.05 Cleaner's Cupboard		120	-	-
18.06 Corridor		120	-	-
18.08 Stairwell		120	-	-
18.09 Stairwell		120	-	-
18.19 Corridor		120	-	-
18.20 Corridor		120	-	-
18.21 Corridor		120	-	-
18.22 Corridor		120	-	-
19.05 Cleaner's Cupboard		120	-	-
19.06 Corridor		120	-	-
19.08 Stairwell		120	-	-
19.09 Stairwell		120	-	-
19.19 Corridor		120	-	-
19.20 Corridor		120	-	-
19.21 Corridor		120	-	-
19.22 Corridor		120	-	-
20.05 Cleaner's Cupboard		120	-	-
20.06 Corridor		120	-	-
20.08 Stairwell		120	-	-
20.09 Stairwell		120	-	-
20.19 Corridor		120	-	-
20.20 Corridor		120	-	-
20.21 Corridor		120	-	-
20.22 Corridor		120	-	-
21.05 Cleaner's Cupboard		120	-	-
21.06 Corridor		120	-	-
21.08 Stairwell		120	-	-
21.09 Stairwell		120	-	-
21.19 Corridor		120	-	-
21.20 Corridor		120	-	-
21.21 Corridor		120	-	-
21.22 Corridor		120	-	-
22.05 Cleaner's Cupboard		120	-	-
22.06 Corridor		120	-	-
22.08 Stairwell		120	-	-
22.09 Stairwell		120	-	-
22.19 Corridor		120	-	-
22.20 Corridor		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
22.21 Corridor		120	-	-
22.22 Corridor		120	-	-
23.05 Cleaner's Cupboard		120	-	-
23.06 Corridor		120	-	-
23.08 Stairwell		120	-	-
23.09 Stairwell		120	-	-
23.19 Corridor		120	-	-
23.20 Corridor		120	-	-
23.21 Corridor		120	-	-
23.22 Corridor		120	-	-
24.05 Cleaner's Cupboard		120	-	-
24.06 Corridor		120	-	-
24.08 Stairwell		120	-	-
24.09 Stairwell		120	-	-
24.19 Corridor		120	-	-
24.20 Corridor		120	-	-
24.21 Corridor		120	-	-
24.22 Corridor		120	-	-
25.05 Cleaner's Cupboard		120	-	-
25.06 Corridor		120	-	-
25.08 Stairwell		120	-	-
25.09 Stairwell		120	-	-
25.19 Corridor		120	-	-
25.20 Corridor		120	-	-
25.21 Corridor		120	-	-
25.22 Corridor		120	-	-
26.05 Cleaner's Cupboard		120	-	-
26.06 Corridor		120	-	-
26.08 Stairwell		120	-	-
26.09 Stairwell		120	-	-
26.19 Corridor		120	-	-
26.20 Corridor		120	-	-
26.21 Corridor		120	-	-
26.22 Corridor		120	-	-
27.05 Cleaner's Cupboard		120	-	-
27.06 Corridor		120	-	-
27.08 Stairwell		120	-	-
27.09 Stairwell		120	-	-
27.18 Corridor		120	-	-
27.19 Corridor		120	-	-
27.20 Corridor		120	-	-
27.21 Corridor		120	-	-
28.05 Cleaner's Cupboard		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
28.06 Corridor		120	-	-
28.08 Stairwell		120	-	-
28.09 Stairwell		120	-	-
28.19 Corridor		120	-	-
28.20 Corridor		120	-	-
28.21 Corridor		120	-	-
28.22 Corridor		120	-	-
Concierge		120	120	1.125

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.36 Rezi Entrance	YES (+19.6%)	NO
01.07 C3 Residential BOH Suite	N/A	N/A
01.08 Resi amenity	N/A	N/A
01.22 Resi amenity	N/A	N/A
01.29 Resi Amenity	YES (+15.1%)	NO
01.35 C3 Residential entrance	YES (+14.2%)	NO
01.36 C3 Residential BOH Meeting Rooms	N/A	N/A
01.38 C3 Residential BOH BOH Office	N/A	N/A
01.40 Resi Amenity Flexible Units	N/A	N/A
01.72 Resi Amentity Flexible Units	N/A	N/A
01.76 Resi Amenity Flexible Units	N/A	N/A
01.83 C3 Residential Lobby	NO (-20%)	NO
Concierge	NO (-82.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	8321.3	8321.3
External area [m ²]	4562.8	4562.8
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	1070.19	0
Average U-value [W/m ² K]	0.23	0
Alpha value* [%]	26.72	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution

95 Hotels

Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools

5 Residential Institutions: Universities and Colleges

Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	0.57	0.63
Cooling	1.67	1.14
Auxiliary	0.59	0.81
Lighting	10.12	12.51
Hot water	1.6	1.49
Equipment*	54.53	54.53
TOTAL **	14.55	16.57

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0.05
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0.05</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	29.26	23.26
Primary energy [kWh _{PE} /m ²]	21.41	24.35
Total emissions [kg/m ²]	1.95	2.23

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	34.9	0	9.7	0	0	1	0	1	0	
Notional	49.3	0	9.7	0	0	1.41	0	----	----	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	29.1	234.1	1.5	15.8	1.9	5.3	4.11	5.4	5.5	
Notional	21	179.7	2.1	10.8	2.5	2.78	4.63	----	----	
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	23.4	0	6.5	0	18.5	1	0	1	0	
Notional	22.1	0	4.4	0	27.7	1.41	0	----	----	
[ST] No Heating or Cooling										
Actual	0	0	0	0	0	0	0	0	0	
Notional	0	0	0	0	0	0	0	----	----	

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Project name

Mayfield 1b Plot J Non-resi

As designed

Date: Wed Nov 20 15:27:43 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 71.84The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	2.15
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	1.86
Target primary energy rate (TPER), kWh _{PE} /m ² annum	23.56
Building primary energy rate (BPER), kWh _{PE} /m ² annum	20.47
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.18	0.18	GY000004:Surf[1]
Floors	0.18	0.15	0.15	GY000001:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	00000003:Surf[0]
Windows** and roof windows	1.6	1.2	1.2	01000017:Surf[20]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.44	1.6	GY00001B:Surf[5]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Electric Pannel Heaters + NV

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.67	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

2- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- Electric PoU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.005
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
00.32 Glasshouse Garden		-	-	-	0.7	-	-	-	-	-	-	N/A
01.14 Office		-	-	-	0.7	-	-	-	-	-	-	N/A
02.21 BTR Amenity		-	-	-	0.7	-	-	-	-	-	-	N/A
02.25 BTR Amenity		-	-	-	0.7	-	-	-	-	-	-	N/A
16.45 BTR Amenity		-	-	-	0.7	-	-	-	-	-	-	N/A
16.47 BTR Amenity		-	-	-	0.7	-	-	-	-	-	-	N/A
01.48 Reception		-	-	-	0.7	-	-	-	-	-	-	N/A
01.48 Glasshouse Foyer		-	-	-	0.7	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
00.01 Switchroom		120	-	-
00.02 stairwell		120	-	-
00.03 BOH(refuse)		120	-	-
00.06 stairwell		120	-	-
00.07 Corridor		120	-	-
00.08 Corridor		120	-	-
00.09 stairwell		120	-	-
00.11 Corridor		120	-	-
00.12 Corridor		120	-	-
00.13 Corridor		120	-	-
00.14 Corridor		120	-	-
00.16 stairwell		120	-	-
00.17 stairwell		120	-	-
00.18 Corridor		120	-	-
00.19 BOH (Acillary/plant)		120	-	-
00.20 Corridor		120	-	-
00.23 Corridor		120	-	-
00.24 Sub/s		120	-	-
00.25 Stairwell		120	-	-
00.26 BOH Refuse		120	-	-
00.28 BOH (acillary/plant)		120	-	-
00.29 Corridor		120	-	-
00.32 Glasshouse Garden		120	-	-
00.33 Corridor		120	-	-
00.xx Cupboard		120	-	-
01.01 Double Sub/s		120	-	-
01.02 Switch Room		120	-	-
01.04 BOH Refuse		120	-	-
01.05 Gen Room		120	-	-
01.07 Corridor		120	-	-
01.08 Corridor		120	-	-
01.09 Stairwell		120	-	-
01.10 Stairwell		120	-	-
01.11 Corridor		120	-	-
01.12 Comms		120	-	-
01.13 BOH - move in storage		120	-	-
01.14 Office		120	-	-
01.16 Stairwell		120	-	-
01.17 Corridor		120	-	-
01.18 Corridor		120	-	-
01.19 Corridor		120	-	-
01.20 Stairwell		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80		0.3
01.21 Corridor		120	-		-
01.23 Stairwell		120	-		-
01.24 Sub/s		120	-		-
01.25 BOH (refuse)		120	-		-
01.26 Switch Room		120	-		-
01.27 Cycle Store		120	-		-
01.28 Stairwell		120	-		-
01.30 BOH(ancillary/plant)		120	-		-
01.38 Post Room		120	-		-
01.41 Post Room		120	-		-
01.42 Corridor		120	-		-
01.43 BOH (Refuse)		120	-		-
01.49 Comms		120	-		-
01.50 Comms		120	-		-
02.03 Cupboard		120	-		-
02.04 Corridor		120	-		-
02.07 Stairwell		120	-		-
02.09 Corridor		120	-		-
02.15 Stairwell		120	-		-
02.16 Corridor		120	-		-
02.21 BTR Amenity		120	-		-
02.22 Corridor		120	-		-
02.23 Corridor		120	-		-
02.24 Corridor		120	-		-
02.25 BTR Amenity		120	-		-
02.29 Stairwell		120	-		-
02.30 Stairwell		120	-		-
02.32 Corridor		120	-		-
02.33 Corridor		120	-		-
02.36 Corridor		120	-		-
02.37 Corridor		120	-		-
02.42 Corridor		120	-		-
02.46 Cupboard		120	-		-
02.47 Corridor		120	-		-
03.03 Cupboard		120	-		-
03.04 Corridor		120	-		-
03.07 Stairwell		120	-		-
03.09 Corridor		120	-		-
03.15 Stairwell		120	-		-
03.16 Corridor		120	-		-
03.21 Corridor		120	-		-
03.22 Corridor		120	-		-
03.23 Corridor		120	-		-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
03.27 Stairwell		120	-	-
03.28 Stairwell		120	-	-
03.30 Corridor		120	-	-
03.31 Corridor		120	-	-
03.34 Corridor		120	-	-
03.35 Corridor		120	-	-
03.40 Corridor		120	-	-
03.44 Cupboard		120	-	-
03.45 Corridor		120	-	-
04.03 Cupboard		120	-	-
04.04 Corridor		120	-	-
04.07 Stairwell		120	-	-
04.09 Corridor		120	-	-
04.15 Stairwell		120	-	-
04.16 Corridor		120	-	-
04.21 Corridor		120	-	-
04.22 Corridor		120	-	-
04.23 Corridor		120	-	-
04.27 Stairwell		120	-	-
04.28 Stairwell		120	-	-
04.30 Corridor		120	-	-
04.31 Corridor		120	-	-
04.34 Corridor		120	-	-
04.35 Corridor		120	-	-
04.40 Corridor		120	-	-
04.44 Cupboard		120	-	-
04.45 Corridor		120	-	-
05.03 Cupboard		120	-	-
05.04 Corridor		120	-	-
05.07 Stairwell		120	-	-
05.09 Corridor		120	-	-
05.15 Stairwell		120	-	-
05.16 Corridor		120	-	-
05.21 Corridor		120	-	-
05.22 Corridor		120	-	-
05.23 Corridor		120	-	-
05.27 Stairwell		120	-	-
05.28 Stairwell		120	-	-
05.30 Corridor		120	-	-
05.31 Corridor		120	-	-
05.34 Corridor		120	-	-
05.35 Corridor		120	-	-
05.40 Corridor		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
05.44 Cupboard		120	-	-
05.45 Corridor		120	-	-
06.03 Cupboard		120	-	-
06.04 Corridor		120	-	-
06.07 Stairwell		120	-	-
06.09 Corridor		120	-	-
06.15 Stairwell		120	-	-
06.16 Corridor		120	-	-
06.21 Corridor		120	-	-
06.22 Corridor		120	-	-
06.23 Corridor		120	-	-
06.27 Stairwell		120	-	-
06.28 Stairwell		120	-	-
06.30 Corridor		120	-	-
06.31 Corridor		120	-	-
06.34 Corridor		120	-	-
06.35 Corridor		120	-	-
06.40 Corridor		120	-	-
06.44 Cupboard		120	-	-
06.45 Corridor		120	-	-
07.03 Cupboard		120	-	-
07.04 Corridor		120	-	-
07.07 Stairwell		120	-	-
07.09 Corridor		120	-	-
07.15 Stairwell		120	-	-
07.16 Corridor		120	-	-
07.21 Corridor		120	-	-
07.22 Corridor		120	-	-
07.23 Corridor		120	-	-
07.27 Stairwell		120	-	-
07.28 Stairwell		120	-	-
07.30 Corridor		120	-	-
07.31 Corridor		120	-	-
07.34 Corridor		120	-	-
07.35 Corridor		120	-	-
07.40 Corridor		120	-	-
07.44 Cupboard		120	-	-
07.45 Corridor		120	-	-
08.03 Cupboard		120	-	-
08.04 Corridor		120	-	-
08.07 Stairwell		120	-	-
08.09 Corridor		120	-	-
08.15 Stairwell		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
08.16 Corridor		120	-	-
08.21 Corridor		120	-	-
08.22 Corridor		120	-	-
08.23 Corridor		120	-	-
08.27 Stairwell		120	-	-
08.28 Stairwell		120	-	-
08.30 Corridor		120	-	-
08.31 Corridor		120	-	-
08.34 Corridor		120	-	-
08.35 Corridor		120	-	-
08.40 Corridor		120	-	-
08.44 Cupboard		120	-	-
08.45 Corridor		120	-	-
09.03 Cupboard		120	-	-
09.04 Corridor		120	-	-
09.07 Stairwell		120	-	-
09.09 Corridor		120	-	-
09.15 Stairwell		120	-	-
09.16 Corridor		120	-	-
09.21 Corridor		120	-	-
09.22 Corridor		120	-	-
09.23 Corridor		120	-	-
09.27 Stairwell		120	-	-
09.28 Stairwell		120	-	-
09.30 Corridor		120	-	-
09.31 Corridor		120	-	-
09.34 Corridor		120	-	-
09.35 Corridor		120	-	-
09.40 Corridor		120	-	-
09.44 Cupboard		120	-	-
09.45 Corridor		120	-	-
10.03 Cupboard		120	-	-
10.04 Corridor		120	-	-
10.07 Stairwell		120	-	-
10.09 Corridor		120	-	-
10.15 Stairwell		120	-	-
10.16 Corridor		120	-	-
10.21 Corridor		120	-	-
10.22 Corridor		120	-	-
10.23 Corridor		120	-	-
10.27 Stairwell		120	-	-
10.28 Stairwell		120	-	-
10.30 Corridor		120	-	-

General lighting and display lighting		General luminaire		Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]	
	Standard value	95	80	0.3	
10.31 Corridor		120	-	-	
10.34 Corridor		120	-	-	
10.35 Corridor		120	-	-	
10.40 Corridor		120	-	-	
10.44 Cupboard		120	-	-	
10.45 Corridor		120	-	-	
11.03 Cupboard		120	-	-	
11.04 Corridor		120	-	-	
11.07 Stairwell		120	-	-	
11.09 Corridor		120	-	-	
11.15 Stairwell		120	-	-	
11.16 Corridor		120	-	-	
11.21 Corridor		120	-	-	
11.22 Corridor		120	-	-	
11.26 Stairwell		120	-	-	
11.27 Stairwell		120	-	-	
11.29 Corridor		120	-	-	
11.32 Corridor		120	-	-	
11.33 Corridor		120	-	-	
11.38 Corridor		120	-	-	
11.42 Cupboard		120	-	-	
11.43 Corridor		120	-	-	
11.44 Corridor		120	-	-	
11.45 Corridor		120	-	-	
12.03 Cupboard		120	-	-	
12.04 Corridor		120	-	-	
12.07 Stairwell		120	-	-	
12.09 Corridor		120	-	-	
12.15 Stairwell		120	-	-	
12.16 Corridor		120	-	-	
12.21 Corridor		120	-	-	
12.22 Corridor		120	-	-	
12.26 Stairwell		120	-	-	
12.27 Stairwell		120	-	-	
12.29 Corridor		120	-	-	
12.32 Corridor		120	-	-	
12.33 Corridor		120	-	-	
12.38 Corridor		120	-	-	
12.42 Cupboard		120	-	-	
12.43 Corridor		120	-	-	
12.44 Corridor		120	-	-	
12.45 Corridor		120	-	-	
13.03 Cupboard		120	-	-	

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
13.04 Corridor		120	-	-
13.07 Stairwell		120	-	-
13.09 Corridor		120	-	-
13.15 Stairwell		120	-	-
13.16 Corridor		120	-	-
13.21 Corridor		120	-	-
13.22 Corridor		120	-	-
13.26 Stairwell		120	-	-
13.27 Stairwell		120	-	-
13.29 Corridor		120	-	-
13.32 Corridor		120	-	-
13.33 Corridor		120	-	-
13.38 Corridor		120	-	-
13.42 Cupboard		120	-	-
13.43 Corridor		120	-	-
13.44 Corridor		120	-	-
13.45 Corridor		120	-	-
14.03 Cupboard		120	-	-
14.04 Corridor		120	-	-
14.07 Stairwell		120	-	-
14.09 Corridor		120	-	-
14.15 Stairwell		120	-	-
14.16 Corridor		120	-	-
14.21 Corridor		120	-	-
14.22 Corridor		120	-	-
14.26 Stairwell		120	-	-
14.27 Stairwell		120	-	-
14.29 Corridor		120	-	-
14.32 Corridor		120	-	-
14.33 Corridor		120	-	-
14.38 Corridor		120	-	-
14.42 Cupboard		120	-	-
14.43 Corridor		120	-	-
14.44 Corridor		120	-	-
14.45 Corridor		120	-	-
15.03 Cupboard		120	-	-
15.04 Corridor		120	-	-
15.07 Stairwell		120	-	-
15.09 Corridor		120	-	-
15.15 Stairwell		120	-	-
15.16 Corridor		120	-	-
15.21 Corridor		120	-	-
15.22 Corridor		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
15.26 Stairwell		120	-	-
15.27 Stairwell		120	-	-
15.29 Corridor		120	-	-
15.32 Corridor		120	-	-
15.33 Corridor		120	-	-
15.38 Corridor		120	-	-
15.42 Cupboard		120	-	-
15.43 Corridor		120	-	-
15.44 Corridor		120	-	-
15.45 Corridor		120	-	-
16.03 Cupboard		120	-	-
16.04 Corridor		120	-	-
16.07 Stairwell		120	-	-
16.09 Corridor		120	-	-
16.15 Stairwell		120	-	-
16.16 Corridor		120	-	-
16.21 Corridor		120	-	-
16.22 Corridor		120	-	-
16.26 Stairwell		120	-	-
16.28 Corridor		120	-	-
16.29 Cupboard		120	-	-
16.31 Corridor		120	-	-
16.32 Corridor		120	-	-
16.36 Corridor		120	-	-
16.38 Cupboard		120	-	-
16.40 Cupboard		120	-	-
16.41 Corridor		120	-	-
16.42 Corridor		120	-	-
16.43 Corridor		120	-	-
16.44 Corridor		120	-	-
16.45 BTR Amenity		120	-	-
16.46 Stairwell		120	-	-
16.47 BTR Amenity		120	-	-
16.48 Corridor		120	-	-
17.03 Stairwell		120	-	-
17.12 Corridor		120	-	-
17.16 Cupboard		120	-	-
17.17 Corridor		120	-	-
17.20 Stairwell		120	-	-
17.22 Corridor		120	-	-
17.28 Stairwell		120	-	-
17.29 Corridor		120	-	-
17.34 Corridor		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
17.35 Corridor		120	-	-
17.36 Corridor		120	-	-
18.03 Cupboard		120	-	-
18.04 Corridor		120	-	-
18.07 Stairwell		120	-	-
18.09 Corridor		120	-	-
18.15 Stairwell		120	-	-
18.16 Corridor		120	-	-
18.21 Corridor		120	-	-
18.22 Corridor		120	-	-
18.23 Corridor		120	-	-
19.03 Cupboard		120	-	-
19.04 Corridor		120	-	-
19.07 Stairwell		120	-	-
19.09 Corridor		120	-	-
19.15 Stairwell		120	-	-
19.16 Corridor		120	-	-
19.21 Corridor		120	-	-
19.22 Corridor		120	-	-
19.23 Corridor		120	-	-
20.03 Cupboard		120	-	-
20.04 Corridor		120	-	-
20.07 Stairwell		120	-	-
20.09 Corridor		120	-	-
20.15 Stairwell		120	-	-
20.16 Corridor		120	-	-
20.21 Corridor		120	-	-
20.22 Corridor		120	-	-
20.23 Corridor		120	-	-
21.03 Cupboard		120	-	-
21.04 Corridor		120	-	-
21.07 Stairwell		120	-	-
21.09 Corridor		120	-	-
21.15 Stairwell		120	-	-
21.16 Corridor		120	-	-
21.21 Corridor		120	-	-
21.22 Corridor		120	-	-
21.23 Corridor		120	-	-
22.03 Cupboard		120	-	-
22.04 Corridor		120	-	-
22.07 Stairwell		120	-	-
22.09 Corridor		120	-	-
22.15 Stairwell		120	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
22.16 Corridor		120	-	-
22.21 Corridor		120	-	-
22.22 Corridor		120	-	-
22.23 Corridor		120	-	-
01.48 Reception		120	120	1.125
01.48 Glasshouse Foyer		120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.32 Glasshouse Garden	N/A	N/A
01.14 Office	N/A	N/A
02.21 BTR Amenity	N/A	N/A
02.25 BTR Amenity	N/A	N/A
16.45 BTR Amenity	N/A	N/A
16.47 BTR Amenity	N/A	N/A
01.48 Reception	NO (-76%)	NO
01.48 Glasshouse Foyer	YES (+57.4%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	7801.4	7801.4
External area [m ²]	4493.3	4493.3
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	1516.28	1327.12
Average U-value [W/m ² K]	0.34	0.3
Alpha value* [%]	25.75	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
Restaurants and Cafes/Drinking Establishments/Takeaways
Offices and Workshop Businesses
General Industrial and Special Industrial Groups
Storage or Distribution

97 Hotels

Residential Institutions: Hospitals and Care Homes
Residential Institutions: Residential Schools

3 Residential Institutions: Universities and Colleges

Secure Residential Institutions
Residential Spaces
Non-residential Institutions: Community/Day Centre
Non-residential Institutions: Libraries, Museums, and Galleries
Non-residential Institutions: Education
Non-residential Institutions: Primary Health Care Building
Non-residential Institutions: Crown and County Courts
General Assembly and Leisure, Night Clubs, and Theatres
Others: Passenger Terminals
Others: Emergency Services
Others: Miscellaneous 24hr Activities
Others: Car Parks 24 hrs
Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	0.16	0.23
Cooling	2	2.46
Auxiliary	1.05	0.64
Lighting	9.73	11.88
Hot water	1.02	0.88
Equipment*	69.56	69.56
TOTAL **	13.96	16.09

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0.07
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0.07</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	28.39	43.21
Primary energy [kWh _{PE} /m ²]	20.47	23.56
Total emissions [kg/m ²]	1.86	2.15

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	9.6	0	2.7	0	0	1	0	1	0
Notional	2.4	0	0.5	0	0	1.41	0	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	6.2	155.2	0.3	11.5	5.2	5.4	3.74	5.4	5
Notional	12.3	236	1.2	14.2	2.6	2.78	4.63	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Appendix B

BRUKLS - RETAIL



Project name

Mayfield 1b Plot K General Store

As designed

Date: Tue Nov 19 14:19:16 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 140The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.23
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.1
Target primary energy rate (TPER), kWh _{PE} /m ² annum	35.27
Building primary energy rate (BPER), kWh _{PE} /m ² annum	34.46
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.15	0.15	0100004B:Surf[2]
Floors	0.18	0.15	0.15	0100004B:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	0100004B:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	BC000001:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors [^]	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

[^] For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5.5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU Commercial Unit 1

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
01.44 E(a,b,c) Retail/Restorant/Cafe General-Store		0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01.43 Plant Room		120	-	-
01.44 E(a,b,c) Retail/Restorant/Cafe General Store		120	120	1.25

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01.44 E(a,b,c) Retail/Restorant/Cafe General Store	YES (+72.6%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	153.1	153.1
External area [m ²]	331.9	331.9
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	103.75	96.93
Average U-value [W/m ² K]	0.31	0.29
Alpha value* [%]	25.91	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

100	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.73	2.11
Cooling	6.95	3.17
Auxiliary	1.7	2.18
Lighting	11.39	15
Hot water	1.84	1.48
Equipment*	40.82	40.82
TOTAL **	23.61	23.94

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	135.79	73.84
Primary energy [kWh _{PE} /m ²]	34.46	35.27
Total emissions [kg/m ²]	3.1	3.23

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	35.9	112.2	1.9	7.6	1.9	5.3	4.11	5.4	5.5
	Notional	23	57.6	2.3	3.5	2.4	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot K Gym

As designed

Date: Tue Nov 19 11:41:22 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 724.72The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	6.95
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	5.85
Target primary energy rate (TPER), kWh _{PE} /m ² annum	75.43
Building primary energy rate (BPER), kWh _{PE} /m ² annum	63.78
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.16	0.18	0000003F:Surf[0]
Floors	0.18	0.15	0.15	00000047:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	00000032:Surf[0]
Windows** and roof windows	1.6	1.35	1.37	GY000002:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.36	1.36	GY000000:Surf[3]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5.5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.005
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
00.37 Gm Entrance		-	-	-	0.7	-	-	-	-	-	-	N/A
00.38 Gym Sauna Steam Room		-	-	-	0.7	-	-	-	-	-	-	N/A
00.39 Gym Male Chnaging Room		-	-	-	0.7	-	-	-	-	-	-	N/A
00.40 Gym Female Changing Room		-	-	-	0.7	-	-	-	-	-	-	N/A
00.42 Gym Staff Room		-	-	-	0.7	-	-	-	-	-	-	N/A
00.44 Gym Pool		-	-	-	0.7	-	-	-	-	-	-	N/A
00.50 Gym Reception		-	-	-	0.3	-	-	-	-	-	-	N/A
00.51 Gym Fitness Room		-	-	-	0.7	-	-	-	-	-	-	N/A
00.52 Gym Free Weights		-	-	-	0.7	-	-	-	-	-	-	N/A
00.53 Gym Fitness Room		-	-	-	0.7	-	-	-	-	-	-	N/A
00.57 Gym Male Chnaging Room Showers		-	-	-	0.7	-	-	-	-	-	-	N/A
00.58 Gym Female Changing Room Showers		-	-	-	0.7	-	-	-	-	-	-	N/A
01.41 Gym		-	-	-	0.7	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
00.18 Pool Plant Room		120	-	-
00.19 Gym/Pool Commercial Bin Store		120	-	-
00.37 Gm Entrance		120	-	-
00.38 Gym Sauna Steam Room		120	-	-
00.39 Gym Male Chnaging Room		120	-	-
00.40 Gym Female Changing Room		120	-	-
00.41 Gym Towel/Cleaners Store		120	-	-
00.42 Gym Staff Room		120	-	-
00.43 Gym dry WC		120	-	-
00.44 Gym Pool		120	-	-
00.50 Gym Reception		120	120	1.125
00.51 Gym Fitness Room		120	-	-
00.52 Gym Free Weights		120	-	-
00.53 Gym Fitness Room		120	-	-
00.54 Gym Circulation		120	-	-
00.55 Gym Circulation		120	-	-
00.56 Gym Circulation		120	-	-
00.57 Gym Male Chnaging Room Showers		120	-	-
00.58 Gym Female Changing Room Showers		120	-	-
01.28 Staircase		120	-	-
01.41 Gym		120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.37 Gm Entrance	NO (-30.6%)	NO
00.38 Gym Sauna Steam Room	N/A	N/A
00.39 Gym Male Chnaging Room	N/A	N/A
00.40 Gym Female Changing Room	N/A	N/A
00.42 Gym Staff Room	N/A	N/A
00.44 Gym Pool	N/A	N/A
00.50 Gym Reception	NO (-61.7%)	NO
00.51 Gym Fitness Room	N/A	N/A
00.52 Gym Free Weights	NO (-82.9%)	NO
00.53 Gym Fitness Room	NO (-5.8%)	NO
00.57 Gym Male Chnaging Room Showers	N/A	N/A
00.58 Gym Female Changing Room Showers	N/A	N/A
01.41 Gym	NO (-24.6%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	1713.3	1713.3
External area [m ²]	2370.2	2370.2
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	638.24	683.28
Average U-value [W/m ² K]	0.27	0.29
Alpha value* [%]	26.06	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
100 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.48	8.01
Cooling	1.83	1.58
Auxiliary	6.49	8.5
Lighting	11.79	15.44
Hot water	18.62	17.5
Equipment*	63.45	63.45
TOTAL **	43.22	51.03

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	112.62	106.51
Primary energy [kWh _{PE} /m ²]	63.78	75.43
Total emissions [kg/m ²]	5.85	6.95

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	101.1	32.1	5.3	2.2	6.8	5.3	4.11	5.4	5.5
	Notional	94.7	31.2	9.5	1.9	8.8	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot K Restaurant

As designed

Date: Tue Nov 19 13:20:36 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 272.92The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.71
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	16.67
Target primary energy rate (TPER), kWh _{PE} /m ² annum	182.59
Building primary energy rate (BPER), kWh _{PE} /m ² annum	182.41
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	00000013:Surf[5]
Floors	0.18	0.15	0.15	00000013:Surf[28]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.2	1.2	00000013:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.36	1.36	00000013:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5.5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU Restaurant

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
00.09 E(a,b,c) Retail/Residential/Cafe F&B	F&B	-	-	0.7	-	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
00.09 E(a,b,c) Retail/Residential/Cafe F&B	120	120	1.25
00.13 Corridor	120	-	-
00.17 F&B Bin Store	120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.09 E(a,b,c) Retail/Residential/Cafe F&B	NO (-5.6%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	329.6	329.6
External area [m ²]	475.4	475.4
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	156.8	142.16
Average U-value [W/m ² K]	0.33	0.3
Alpha value* [%]	25.52	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
100	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.06	1.42
Cooling	5.29	4.73
Auxiliary	2.75	3.53
Lighting	14.42	19.31
Hot water	100.36	94.92
Equipment*	96.28	96.28
TOTAL **	123.88	123.93

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	98.5	93.2
Primary energy [kWh _{PE} /m ²]	182.41	182.59
Total emissions [kg/m ²]	16.67	16.71

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	24.4	94.6	1.3	6.4	3.3	5.3	4.11	5.4	5.5
	Notional	17.2	95.4	1.7	5.7	4.3	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot J Cafe Reduced Glazing

As designed

Date: Thu Nov 21 11:10:43 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 66.83The CO₂ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	18.3
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	18.37
Target primary energy rate (TPER), kWh _{PE} /m ² annum	200
Building primary energy rate (BPER), kWh _{PE} /m ² annum	200.75
Do the building's emission and primary energy rates exceed the targets?	BER > TER BPER > TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.18	0.18	CY000000:Surf[0]
Floors	0.18	0.15	0.15	CY000000:Surf[4]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	CY000000:Surf[5]
Windows** and roof windows	1.6	1.2	1.2	01000010:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.23	1.36	CY000000:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU cafe

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
01.45 Cycle hub / Coffee shop	-	-	-	0.7	-	-	-	-	-	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
01.44 BOH (ancillary/plant)	120	-	-
01.45 Cycle hub / Coffee shop	120	120	1.25

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01.45 Cycle hub / Coffee shop	NO (-37.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	77.4	77.4
External area [m ²]	203.2	203.2
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	66.32	76.47
Average U-value [W/m ² K]	0.33	0.38
Alpha value* [%]	25	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
86	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
14	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.2	2.12
Cooling	4.45	6.01
Auxiliary	7.54	3.69
Lighting	18.83	24.9
Hot water	104.24	99.02
Equipment*	159.23	159.23
TOTAL **	136.26	135.73

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	83.1	121.35
Primary energy [kWh _{PE} /m ²]	200.75	200
Total emissions [kg/m ²]	18.37	18.3

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	27	69.3	1.4	5.2	8.7	5.4	3.74	5.4	5
	Notional	24.6	116	2.5	7	4.3	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot J Commercial Unit 1

As designed

Date: Wed Nov 20 15:31:36 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 230.87The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.07
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.71
Target primary energy rate (TPER), kWh _{PE} /m ² annum	32.64
Building primary energy rate (BPER), kWh _{PE} /m ² annum	29.18
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	GY000017:Surf[1]
Floors	0.18	0.15	0.15	GY000017:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	GY00002C:Surf[36]
Windows** and roof windows	1.6	1.2	1.2	GY000017:Surf[6]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.21	1.36	GY000017:Surf[2]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.005
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
00.27 Commercial	-	-	-	0.7	-	-	-	-	-	-	-	N/A
01.15 Commercial	-	-	-	0.7	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value		95	80	0.3
00.27 Commercial		120	120	1.25
01.15 Commercial		120	120	1.25

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.27 Commercial	NO (-30.8%)	NO
01.15 Commercial	NO (-14.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	461.7	461.7
External area [m ²]	732.6	732.6
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	386.25	341.02
Average U-value [W/m ² K]	0.53	0.47
Alpha value* [%]	25	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

100	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	3.9	5.77
Cooling	1.66	0.58
Auxiliary	3.12	2.38
Lighting	8.45	11.48
Hot water	2.53	1.61
Equipment*	20.26	20.26
TOTAL **	19.66	21.83

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	98.19	67.48
Primary energy [kWh _{PE} /m ²]	29.18	32.64
Total emissions [kg/m ²]	2.71	3.07

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	75.8	22.4	3.9	1.7	3.1	5.4	3.74	5.4	5
	Notional	57.8	9.7	5.8	0.6	2.4	2.78	4.63	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot J Commercial Unit 2

As designed

Date: Wed Nov 20 15:35:47 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 188.16The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.44
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.06
Target primary energy rate (TPER), kWh _{PE} /m ² annum	36.8
Building primary energy rate (BPER), kWh _{PE} /m ² annum	33.06
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	00000004:Surf[23]
Floors	0.18	0.15	0.15	00000004:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	00000004:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	00000004:Surf[4]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.22	1.36	00000004:Surf[38]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.005
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
00.21 Commercial	-	-	-	0.7	-	-	-	-	-	-	-	N/A
01.29 Commercial	-	-	-	0.7	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3	
00.21 Commercial	120	120	1.25	
00.22 BOH (refuse)	120	-	-	
01.29 Commercial	120	120	1.25	

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00.21 Commercial	YES (+12.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01.29 Commercial	YES (+2.1%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	390	390
External area [m ²]	729.9	729.9
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	429.02	323.45
Average U-value [W/m ² K]	0.59	0.44
Alpha value* [%]	25	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
96	Retail/Financial and Professional Services Restaurants and Cafes/Drinking Establishments/Takeaways Offices and Workshop Businesses General Industrial and Special Industrial Groups Storage or Distribution
4	Hotels Residential Institutions: Hospitals and Care Homes Residential Institutions: Residential Schools Residential Institutions: Universities and Colleges Secure Residential Institutions Residential Spaces Non-residential Institutions: Community/Day Centre Non-residential Institutions: Libraries, Museums, and Galleries Non-residential Institutions: Education Non-residential Institutions: Primary Health Care Building Non-residential Institutions: Crown and County Courts General Assembly and Leisure, Night Clubs, and Theatres Others: Passenger Terminals Others: Emergency Services Others: Miscellaneous 24hr Activities Others: Car Parks 24 hrs Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.35	5.7
Cooling	2.71	1.06
Auxiliary	3.01	2.3
Lighting	8.61	14.09
Hot water	2.6	1.56
Equipment*	34.9	34.9
TOTAL **	22.29	24.71

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	140.56	74.74
Primary energy [kWh _{PE} /m ²]	33.06	36.8
Total emissions [kg/m ²]	3.06	3.44

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	107.8	37.8	5.5	2.8	3.1	5.4	3.74	5.4	5
	Notional	59.1	18.3	5.9	1.1	2.4	2.78	4.63	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot J Retail

As designed

Date: Wed Nov 20 15:48:50 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 154.18The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.74
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.49
Target primary energy rate (TPER), kWh _{PE} /m ² annum	40.27
Building primary energy rate (BPER), kWh _{PE} /m ² annum	37.95
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.18	0.18	01000012:Surf[13]
Floors	0.18	0.15	0.15	01000012:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	01000012:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	01000012:Surf[6]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.2	1.2	01000012:Surf[4]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU retail

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.005
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
01.03 Retail/Restaurant/Cafe		-	-	-	0.7	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01.03 Retail/Restaurant/Cafe		120	120	1.25

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01.03 Retail/Restaurant/Cafe	YES (+18.6%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	154.2	154.2
External area [m ²]	370.6	370.6
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	182.21	136.98
Average U-value [W/m ² K]	0.49	0.37
Alpha value* [%]	25	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

100	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.91	5.6
Cooling	3.39	1.27
Auxiliary	3.12	2.38
Lighting	12.16	16.24
Hot water	2.12	1.61
Equipment*	20.26	20.26
TOTAL **	25.7	27.1

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	141.08	77.15
Primary energy [kWh _{PE} /m ²]	37.95	40.27
Total emissions [kg/m ²]	3.49	3.74

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	95.5	45.6	4.9	3.4	3.1	5.4	3.74	5.4	5
	Notional	56	21.1	5.6	1.3	2.4	2.78	4.63	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot K Commercial Unit 1

As designed

Date: Tue Nov 19 13:45:18 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 75The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	4.08
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.63
Target primary energy rate (TPER), kWh _{PE} /m ² annum	43.98
Building primary energy rate (BPER), kWh _{PE} /m ² annum	39.82
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.15	0.15	RT000001:Surf[7]
Floors	0.18	0.15	0.15	RT000001:Surf[13]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.2	1.2	RT000001:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors [^]	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

[^] For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5.5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU Commercial Unit 1

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I		
	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
01.78 Retail/Restaurant/Cafe Commercial unit		-	-	0.7	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01.78 Retail/Restaurant/Cafe Commercial unit		120	120	1.25

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01.78 Retail/Restaurant/Cafe Commercial unit	YES (+35.6%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	75	75
External area [m ²]	176.1	176.1
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	74.52	66.73
Average U-value [W/m ² K]	0.42	0.38
Alpha value* [%]	25.96	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

100	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.13	6.61
Cooling	5.86	3.05
Auxiliary	1.85	2.38
Lighting	11.94	16
Hot water	2.28	1.61
Equipment*	20.26	20.26
TOTAL **	27.07	29.65

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	184.56	116.91
Primary energy [kWh _{PE} /m ²]	39.82	43.98
Total emissions [kg/m ²]	3.63	4.08

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	97.9	86.7	5.1	5.9	1.9	5.3	4.11	5.4	5.5
Notional	66.1	50.8	6.6	3	2.4	2.78	4.63	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
- Cool dem [MJ/m2] = Cooling energy demand
- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
- Aux con [kWh/m2] = Auxiliary energy consumption
- Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
- Cool SSEER = Cooling system seasonal energy efficiency ratio
- Heat gen SSEFF = Heating generator seasonal efficiency
- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

Project name

Mayfield 1b Plot K Commercial Unit 2

As designed

Date: Tue Nov 19 14:07:40 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.27

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.27

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 55The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.51
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.95
Target primary energy rate (TPER), kWh _{PE} /m ² annum	38.12
Building primary energy rate (BPER), kWh _{PE} /m ² annum	32.34
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.15	0.15	RT000002:Surf[4]
Floors	0.18	0.15	0.15	RT000002:Surf[5]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	-	-	No flat roofs in building
Windows** and roof windows	1.6	1.2	1.2	RT000002:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors [^]	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

[^] For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- MVHR + VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5.4	5.5	0	-	0.85
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Electric PoU Commercial Unit 1

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.004
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
	ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
01.79 Retail/Restaurant/Cafe Commercial unit	Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01.79 Retail/Restaurant/Cafe Commercial unit		120	120	1.25

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01.79 Retail/Restaurant/Cafe Commercial unit	YES (+30.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	55.4	55.4
External area [m ²]	92	92
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	28.7	26.11
Average U-value [W/m ² K]	0.31	0.28
Alpha value* [%]	25.44	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

100	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	1.97	2.21
Cooling	3.17	2.15
Auxiliary	1.85	2.38
Lighting	12.49	17.42
Hot water	2.49	1.61
Equipment*	20.25	20.25
TOTAL **	21.97	25.77

* 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.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	84.43	57.92
Primary energy [kWh _{PE} /m ²]	32.34	38.12
Total emissions [kg/m ²]	2.95	3.51

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	37.6	46.8	2	3.2	1.9	5.3	4.11	5.4	5.5
Notional	22.1	35.8	2.2	2.1	2.4	2.78	4.63	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Appendix C

SAP CALCULATIONS



Block Compliance



Block Reference	K1_Level 07_option 02	Issued on Date	13/11/2024
Block Name	akshay garg		
Calculation Type	New Build (As Designed)		

Assessor Details	Yi Lui	Assessor ID	CN38-0001
Client			

Block Compliance Report - DER				
Block Reference: K1_Level 07_option 02		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
K1_L07_01 - 00001	71.59	3.68	12.39	70.30 %
K1_L07_02 - 00001	39.11	3.45	14.77	76.64 %
K1_L07_03 - 00001	82.81	3.15	10.84	70.94 %
K1_L07_04&05 - 00001	72.78	3.14	12.38	74.64 %
K1_L07_04&05 - 00001	72.78	3.14	12.38	74.64 %
K1_L07_06 - 00001	76.22	3.68	12.80	71.25 %
K1_L07_07 - 00001	86.54	3.71	12.39	70.06 %
K1_L07_08&09 - 00001	50.28	3.62	14.35	74.77 %
K1_L07_08&09 - 00001	50.28	3.62	14.35	74.77 %
Totals:	602.39	31.19	116.65	
Average DER = 3.46 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 12.71 kgCO ₂ /m ²	72.80 %			

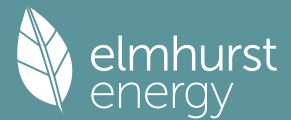
Block Compliance Report - DFEE				
Block Reference: K1_Level 07_option 02		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
K1_L07_01 - 00001	71.59	26.49	26.04	-1.75 %
K1_L07_02 - 00001	39.11	18.06	17.96	-0.56 %
K1_L07_03 - 00001	82.81	22.94	22.03	-4.16 %
K1_L07_04&05 - 00001	72.78	22.89	26.45	13.45 %
K1_L07_04&05 - 00001	72.78	22.89	26.45	13.45 %
K1_L07_06 - 00001	76.22	27.25	29.32	7.04 %

Block Compliance

K1_L07_07 - 00001	86.54	28.39	29.83	4.81 %
K1_L07_08&09 - 00001	50.28	23.40	26.60	12.05 %
K1_L07_08&09 - 00001	50.28	23.40	26.60	12.05 %
Totals:	602.39	215.72	231.27	
Average DFEE = 24.44 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 26.11 kgCO ₂ /m ²	6.41 %			

Block Compliance Report - DPER				
Block Reference: K1_Level 07_option 02		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
K1_L07_01 - 00001	71.59	38.76	68.33	43.28 %
K1_L07_02 - 00001	39.11	37.09	82.13	54.84 %
K1_L07_03 - 00001	82.81	33.29	59.84	44.37 %
K1_L07_04&05 - 00001	72.78	33.35	68.27	51.15 %
K1_L07_04&05 - 00001	72.78	33.35	68.27	51.15 %
K1_L07_06 - 00001	76.22	38.70	70.51	45.11 %
K1_L07_07 - 00001	86.54	38.86	68.18	43.00 %
K1_L07_08&09 - 00001	50.28	38.54	79.38	51.45 %
K1_L07_08&09 - 00001	50.28	38.54	79.38	51.45 %
Totals:	602.39	330.48	644.29	
Average DPER = 36.56 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 70.14 kgCO ₂ /m ²	47.87 %			

Block Compliance



Block Reference	K2-Level 9 (option 02)	Issued on Date	13/11/2024
Block Name	akshay garg		
Calculation Type	New Build (As Designed)		

Assessor Details	Yi Lui	Assessor ID	CN38-0001
Client			

Block Compliance Report - DER				
Block Reference: K2-Level 9 (option 02)		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
K2_L09_01 - 00001	75.46	4.08	13.22	69.14 %
K2_L09_02 - 00001	39.12	3.45	14.66	76.47 %
K2_L09_03 - 00001	71.60	3.70	12.34	70.02 %
K2_L09_04 - 00001	50.27	3.63	14.31	74.63 %
K2_L09_05 - 00001	73.67	3.15	12.22	74.22 %
K2_L09_06 - 00001	57.26	3.57	14.17	74.81 %
K2_L09_07 - 00001	54.51	3.35	13.44	75.07 %
K2_L09_08&09 - 00001	72.77	2.91	11.95	75.65 %
K2_L09_08&09 - 00001	72.77	2.91	11.95	75.65 %
K2_L09_10 - 00001	51.19	5.33	17.12	68.87 %
K2_L09_11 - 00001	50.18	5.20	17.00	69.41 %
K2_L09_12 - 00001	50.69	4.87	16.36	70.23 %
K2_L09_13 - 00001	101.59	5.68	14.33	60.36 %
K2_L09_14 - 00001	72.84	4.79	14.56	67.10 %
Totals:	893.92	56.62	197.63	
Average DER = 4.07 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 13.91 kgCO ₂ /m ²	70.73 %			

Block Compliance Report - DFEE				
Block Reference: K2-Level 9 (option 02)		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
K2_L09_01 - 00001	75.46	31.31	31.23	-0.27 %
K2_L09_02 - 00001	39.12	18.03	17.92	-0.62 %

Block Compliance

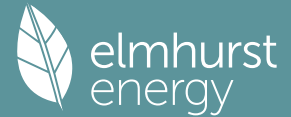
K2_L09_03 - 00001	71.60	26.64	26.30	-1.28 %
K2_L09_04 - 00001	50.27	23.64	26.81	11.80 %
K2_L09_05 - 00001	73.67	23.08	26.35	12.40 %
K2_L09_06 - 00001	57.26	24.47	29.24	16.33 %
K2_L09_07 - 00001	54.51	22.47	24.02	6.48 %
K2_L09_08&09 - 00001	72.77	21.06	24.05	12.43 %
K2_L09_08&09 - 00001	72.77	21.06	24.05	12.43 %
K2_L09_10 - 00001	51.19	36.10	39.75	9.17 %
K2_L09_11 - 00001	50.18	35.18	38.69	9.07 %
K2_L09_12 - 00001	50.69	33.21	35.98	7.70 %
K2_L09_13 - 00001	101.59	42.25	42.64	0.93 %
K2_L09_14 - 00001	72.84	34.89	36.60	4.68 %
Totals:	893.92	393.38	423.63	
Average DFEE = 28.73 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 30.78 kgCO ₂ /m ²	6.64 %			

Block Compliance Report - DPER				
Block Reference: K2-Level 9 (option 02)		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
K2_L09_01 - 00001	75.46	42.76	72.40	40.94 %
K2_L09_02 - 00001	39.12	37.06	81.20	54.36 %
K2_L09_03 - 00001	71.60	38.95	67.76	42.52 %
K2_L09_04 - 00001	50.27	38.62	78.79	50.98 %
K2_L09_05 - 00001	73.67	33.36	67.09	50.28 %
K2_L09_06 - 00001	57.26	37.82	77.89	51.44 %
K2_L09_07 - 00001	54.51	35.64	74.15	51.94 %
K2_L09_08&09 - 00001	72.77	30.96	65.74	52.91 %
K2_L09_08&09 - 00001	72.77	30.96	65.74	52.91 %

Block Compliance

K2_L09_10 - 00001	51.19	55.67	93.99	40.77 %
K2_L09_11 - 00001	50.18	54.33	93.36	41.81 %
K2_L09_12 - 00001	50.69	51.07	89.89	43.19 %
K2_L09_13 - 00001	101.59	58.74	78.06	24.75 %
K2_L09_14 - 00001	72.84	49.94	79.67	37.32 %
Totals:	893.92	595.88	1085.73	
Average DPER = 42.79 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 76.35 kgCO ₂ /m ²	43.96 %			

Block Compliance



Block Reference	J1	Issued on Date	13/11/2024
Block Name	akshay garg		
Calculation Type	New Build (As Designed)		

Assessor Details	Yi Lui	Assessor ID	CN38-0001
Client			

Block Compliance Report - DER				
Block Reference: J1		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
J1_L13_A001 - 00001	45.60	4.80	16.85	71.51 %
J1_L13_A002 - 00001	70.20	3.27	12.06	72.89 %
J1_L13_A004 - 00001	70.20	3.27	12.06	72.89 %
J1_L13_A003 - 00001	70.30	3.42	11.62	70.57 %
J1_L13_A005 - 00001	52.70	4.08	14.96	72.73 %
J1_L13_A006 - 00001	51.30	4.21	15.22	72.34 %
J1_L13_A010 - 00001	51.30	4.21	15.22	72.34 %
J1_L13_A009 - 00001	70.20	3.42	12.49	72.62 %
J1_L13_A007 - 00001	70.20	3.42	12.49	72.62 %
J1_L13_A008 - 00001	70.30	4.27	13.22	67.70 %
Totals:	622.30	38.37	136.19	
Average DER = 3.77 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 13.36 kgCO ₂ /m ²	71.78 %			

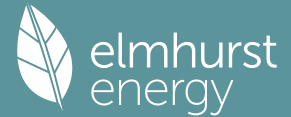
Block Compliance Report - DFEE				
Block Reference: J1		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
J1_L13_A001 - 00001	45.60	32.90	35.33	6.88 %
J1_L13_A002 - 00001	70.20	23.51	24.82	5.29 %
J1_L13_A004 - 00001	70.20	23.51	24.82	5.29 %
J1_L13_A003 - 00001	70.30	23.74	22.42	-5.90 %
J1_L13_A005 - 00001	52.70	27.92	31.25	10.67 %
J1_L13_A006 - 00001	51.30	28.71	31.71	9.44 %

Block Compliance

J1_L13_A010 - 00001	51.30	28.71	31.71	9.44 %
J1_L13_A009 - 00001	70.20	25.12	26.80	6.27 %
J1_L13_A007 - 00001	70.20	25.12	26.80	6.27 %
J1_L13_A008 - 00001	70.30	31.20	29.89	-4.40 %
Totals:	622.30	270.44	285.54	
Average DFEE = 26.69 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 28.02 kgCO ₂ /m ²	4.75 %			

Block Compliance Report - DPER				
Block Reference: J1		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
J1_L13_A001 - 00001	45.60	50.44	92.59	45.52 %
J1_L13_A002 - 00001	70.20	34.60	66.22	47.75 %
J1_L13_A004 - 00001	70.20	34.60	66.22	47.75 %
J1_L13_A003 - 00001	70.30	36.20	63.86	43.31 %
J1_L13_A005 - 00001	52.70	43.01	82.19	47.67 %
J1_L13_A006 - 00001	51.30	44.40	83.62	46.90 %
J1_L13_A010 - 00001	51.30	44.40	83.62	46.90 %
J1_L13_A009 - 00001	70.20	36.17	68.50	47.20 %
J1_L13_A007 - 00001	70.20	36.17	68.50	47.20 %
J1_L13_A008 - 00001	70.30	44.66	72.45	38.36 %
Totals:	622.30	404.65	747.77	
Average DPER = 39.76 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 73.33 kgCO ₂ /m ²	45.78 %			

Block Compliance



Block Reference	J2	Issued on Date	13/11/2024
Block Name	akshay garg		
Calculation Type	New Build (As Designed)		

Assessor Details	Yi Lui	Assessor ID	CN38-0001
Client			

Block Compliance Report - DER				
Block Reference: J2		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
J2_L13_A006 - 00001	51.30	4.21	15.22	72.34 %
J2_L13_A007 - 00001	70.20	3.42	12.49	72.62 %
J2_L13_A008 - 00001	70.30	4.27	13.22	67.70 %
J2_L13_A009 - 00001	70.20	3.42	12.49	72.62 %
J2_L13_A010 - 00001	51.30	4.21	15.22	72.34 %
J2_L13_A001 - 00001	74.30	3.73	13.11	71.55 %
J2_L13_A002 - 00001	73.30	3.43	11.96	71.32 %
J2_L13_A003 - 00001	70.50	3.38	11.71	71.14 %
J2_L13_A004 - 00001	42.38	3.46	14.94	76.84 %
J2_L13_A005 - 00001	70.70	3.74	13.22	71.71 %
Totals:	644.48	37.27	133.58	
Average DER = 3.71 kgCO ₂ /m ²	% DER/TER	PASS		
Average TER = 13.17 kgCO ₂ /m ²	71.84 %			

Block Compliance Report - DFEE				
Block Reference: J2		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
J2_L13_A006 - 00001	51.30	28.71	31.71	9.44 %
J2_L13_A007 - 00001	70.20	25.12	26.80	6.27 %
J2_L13_A008 - 00001	70.30	31.20	29.89	-4.40 %
J2_L13_A009 - 00001	70.20	25.12	26.80	6.27 %
J2_L13_A010 - 00001	51.30	28.71	31.71	9.44 %
J2_L13_A001 - 00001	74.30	27.50	30.90	11.02 %

Block Compliance

J2_L13_A002 - 00001	73.30	24.21	25.15	3.73 %
J2_L13_A003 - 00001	70.50	23.50	22.47	-4.62 %
J2_L13_A004 - 00001	42.38	20.87	23.05	9.46 %
J2_L13_A005 - 00001	70.70	27.36	30.00	8.78 %
Totals:	644.48	262.32	278.47	
Average DFEE = 26.32 kgCO ₂ /m ²	% DFEE/TFEE	PASS		
Average TFEE = 27.83 kgCO ₂ /m ²	5.45 %			

Block Compliance Report - DPER				
Block Reference: J2		Block Name: akshay garg		
Property-Assessment Reference	Floor area (m ²)	DPER (kWh/m ² /yr)	TPER (kWh/m ² /yr)	% DPER/TPER
J2_L13_A006 - 00001	51.30	44.40	83.62	46.90 %
J2_L13_A007 - 00001	70.20	36.17	68.50	47.20 %
J2_L13_A008 - 00001	70.30	44.66	72.45	38.36 %
J2_L13_A009 - 00001	70.20	36.17	68.50	47.20 %
J2_L13_A010 - 00001	51.30	44.40	83.62	46.90 %
J2_L13_A001 - 00001	74.30	39.23	71.79	45.35 %
J2_L13_A002 - 00001	73.30	36.22	65.61	44.80 %
J2_L13_A003 - 00001	70.50	35.81	64.57	44.54 %
J2_L13_A004 - 00001	42.38	37.02	82.77	55.27 %
J2_L13_A005 - 00001	70.70	39.37	72.69	45.84 %
Totals:	644.48	393.45	734.12	
Average DPER = 39.13 kgCO ₂ /m ²	% DPER/TPER	PASS		
Average TPER = 72.36 kgCO ₂ /m ²	45.92 %			

Appendix D

TM59 OVERHEATING REPORT





0199-MAY-WSP-K0X-XX-RP-YE-500104

Mayfield Phase 1b – Plot J & K - TM59 & AVO

Considerations – Rev 00

TO	Mayfield Medlock Ltd	FROM	Yijun Liu / Alistair Lambert
DATE	22 November 2024	CONFIDENTIALITY	Confidential
SUBJECT	TM59 Initial Overheating Assessment – Residential Apartments		

EXECUTIVE SUMMARY

This Design Development Note (DDN) has been produced to assess the overheating risk for a sample of apartments within the development of Mayfield Phase 1b – Plot J & K.

CIBSE TM59 methodology has been utilised to assess the overheating risk within a relevant selection of units. Compliance with TM59 minimum criteria has been analysed using the Manchester weather Centre data. Current scenario weather files were considered with the possibility of considering future weather files at further stages. Apartments were selected based on engineering judgement for worst case and include a selection of apartment typologies, elevation and heights to ensure a wide coverage with impetus to likely worst case scenarios due to location and form.

Due acoustic constraints, the analysis assumes that window or purge ventilation openings cannot be used for overheating and remain closed at all time, therefore overheating shall be mitigated by passive and mechanical means only.

Mayfield Phase 1b – Plot J & K High-rise apartments pass CIBSE TM59. Typical apartments are highlighted below:

For Plot K: (Shown below in Figures 1 to 3)

- K1-Level 7 & 27
- K2-Level 9 & 19

For Plot J: (Shown below in Figures 4 to 6)

- J1-Level 13 & 16
- J2-Level 13 & 22

Plot K Images



Figure 1: Plot K1 Level 7 and K2 Level 9

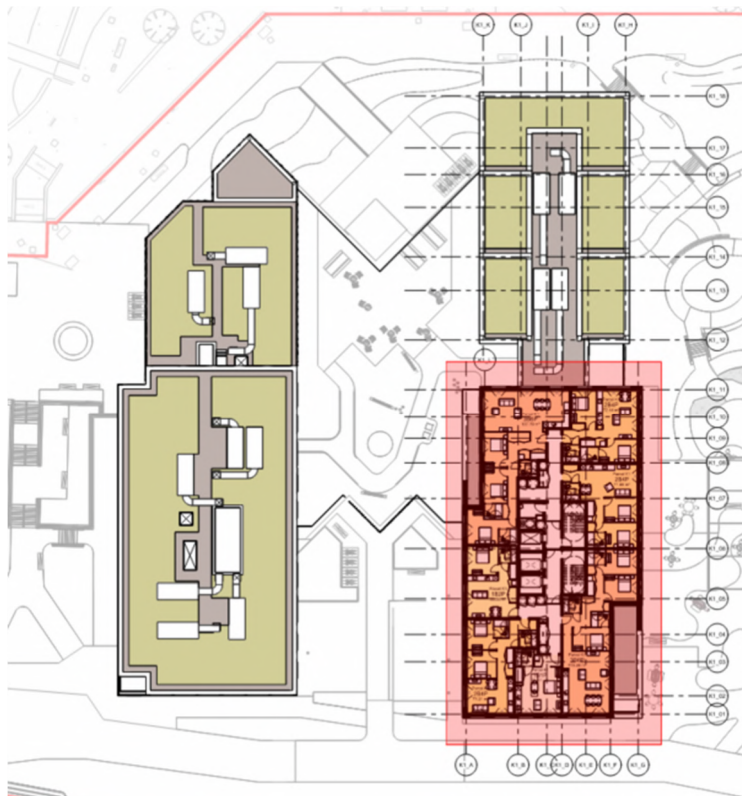


Figure 2: Plot K1 Level 27

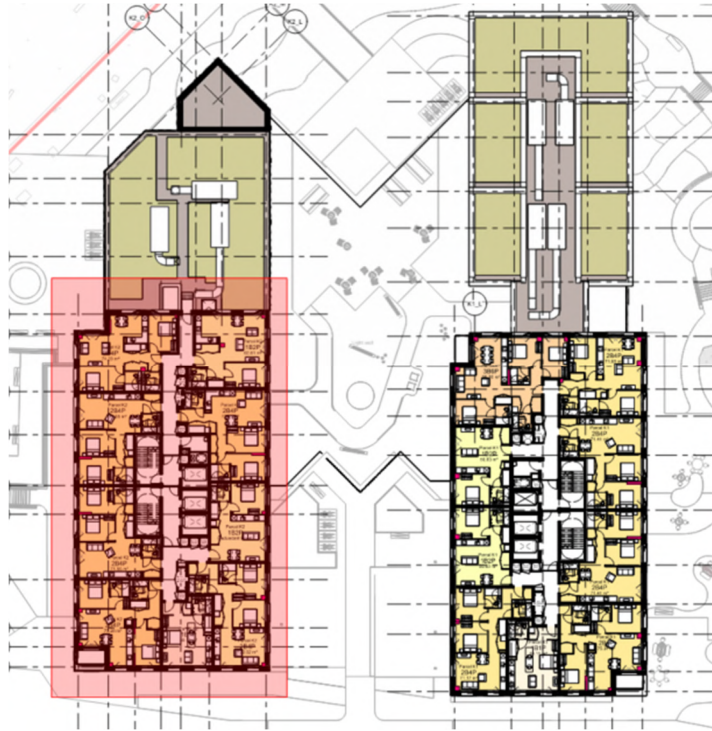


Figure 3: Plot K2 Level 19

Plot J Images

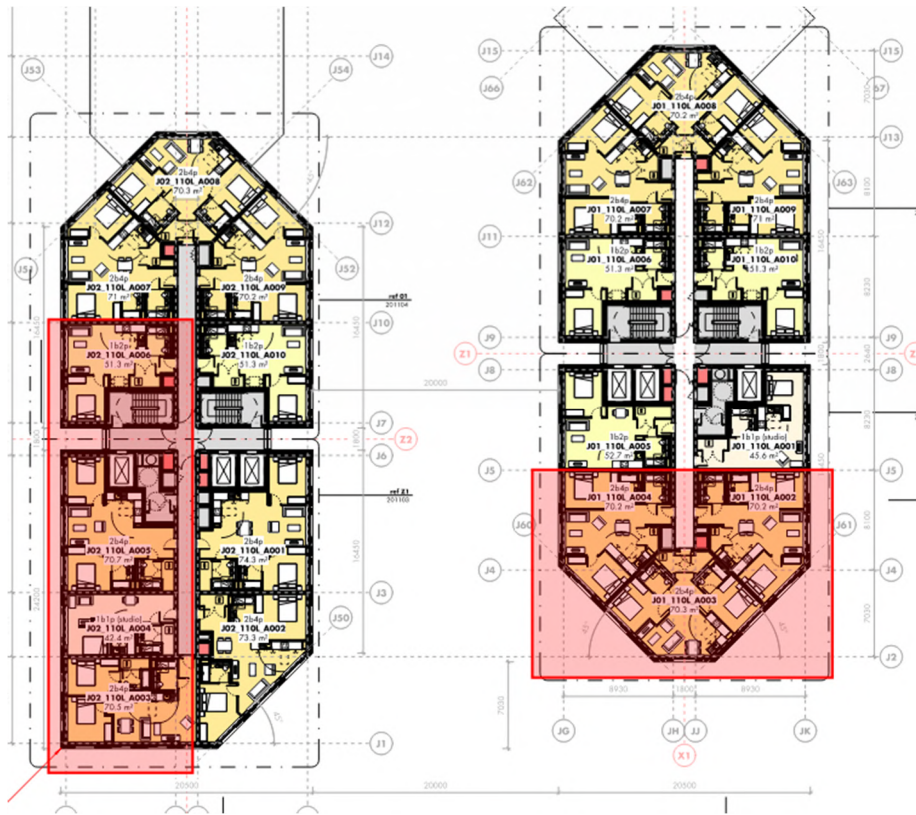


Figure 4: Plot J1 and J2 - Level 13

METHODOLOGY

The overheating study has been carried out in line with the recommendations made by the CIBSE documents 'TM52: 2013: The Limits of Thermal Comfort: Avoiding Overheating', and 'TM59 2017: Design Methodology for the Assessment of Overheating Risk in Homes'.

Compliance with TM59 is based on passing both of the following two criteria, as the homes are 'predominantly naturally ventilated, including homes that have mechanical ventilation with heat recovery (MVHR), with good opportunities for natural ventilation in the summer'. We shall be using the following:

- Criteria (a): For living rooms, kitchens and bedrooms: The number of hours during which the operative temperature of the space is above the adaptive temperature of the space by one-degree Kelvin during the period May to September inclusive shall not be more than 3% of occupied hours.
- Criteria (b): For bedrooms only: The operative temperature in the bedroom from 10pm to 7am shall not exceed 26°C for more than 1% of annual hours (i.e. 33 or more hours is a fail).

WSP utilised a dynamic simulation software package, the Virtual Environment (VE) suite from Integrated Environmental Solutions (IES) to perform overheating assessments according to CIBSE TM52 (2013) and TM59 (2017) guidance.

The sample size has been selected based on the guidance from the CIBSE TM59 document.

"Sample Size: Guidance – The assessment should try to identify all the dwellings that are at risk of overheating. These are likely to be those (a) with large glazing areas, (b) on the topmost floor, (c) having less shading, (d) having large, sun-facing windows, (e) having a single aspect, or (c) having limited optioning windows."

The IES models were developed based on the design received by architects SEW (Plot K) and ShedKM (Plot J) architects on the 31st October. The samples apartments were modelled in IES-VE software and tested for overheating according to TM59 methodology (sample floor/ apartment) shown in Figures 7 to 11, (views taken from IES model). These floor levels were assessed as considered "worst case" based on the façade detailing and massing of the site taking into account the adjacent buildings which have been modelled as shown below.

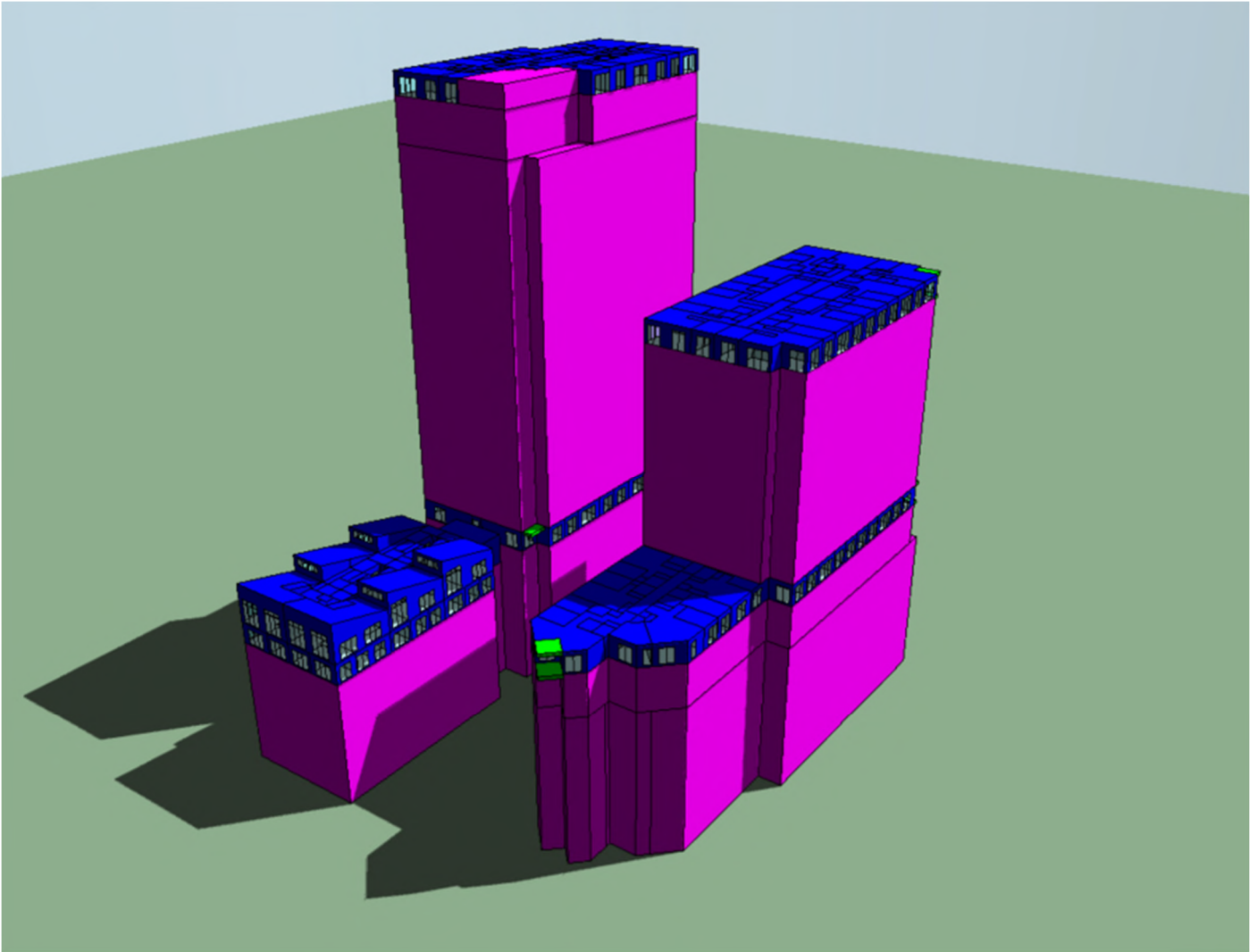


Figure 7: Plot K1 and K2, IES model- K1 on the left side of the picture, K2 on the right side

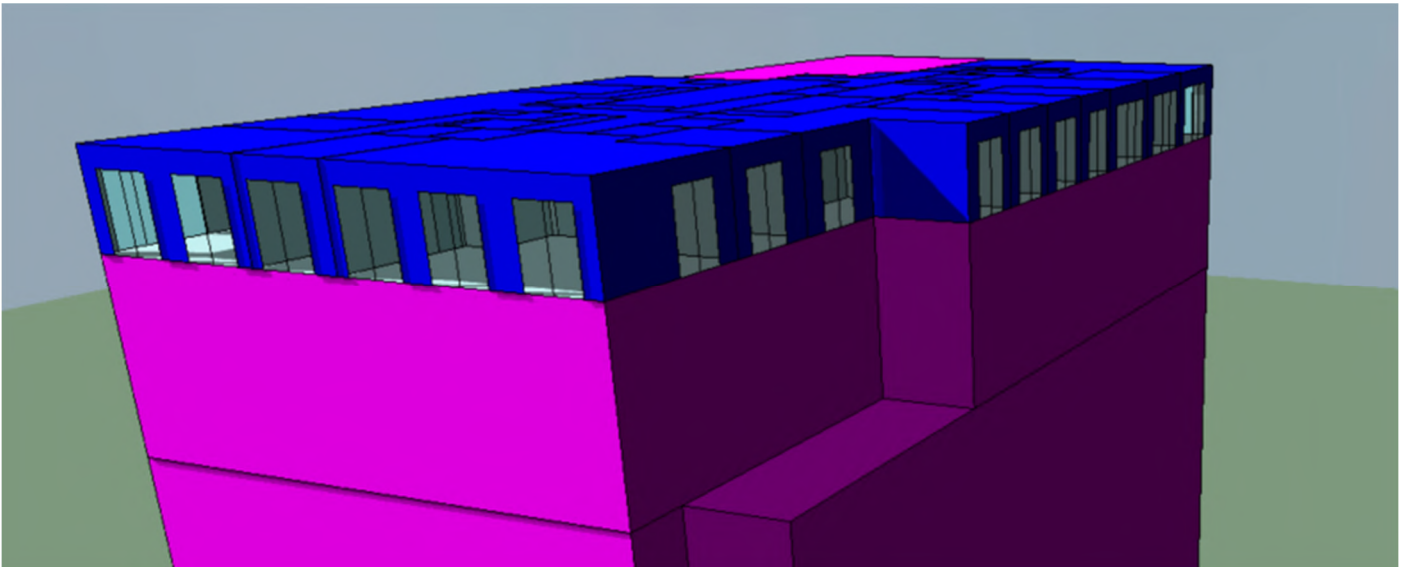


Figure 8: Plot K1 Level 27



Figure 9: Plot K1 Level 7

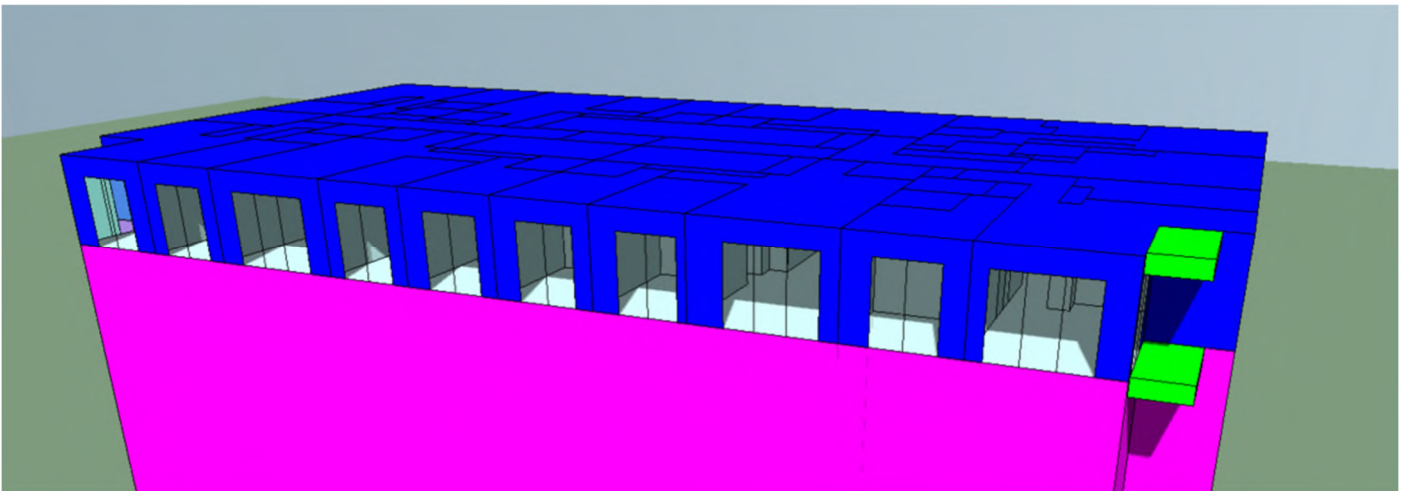


Figure 10: Plot K2 Level 19

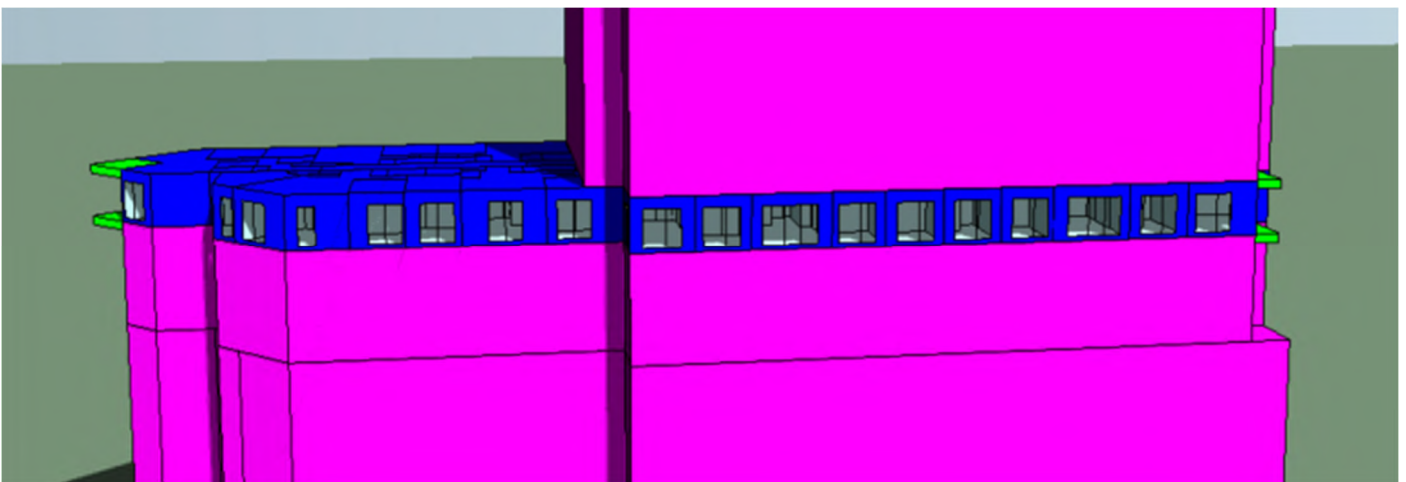


Figure 11: Plot K2 Level 9

MODELLING ASSUMPTIONS

Occupancy and equipment gains are specified by the TM59 guidance. For clarity, the following assumptions have been used and the proposals for purge vent openings are also detailed below:

Table 1 – Model assumptions – Residential

Assumptions	Target performance
Wall (W/m ² . K) (including frame and thermal bridging)	0.18 W/m ² K
Glazing G-value (all glazing areas excluding purge vents)	0.4
Glazing U-value (all glazing areas excluding purge vents)	0.9
Glazing G-value, including perforated walls within the purge panel.	0.2
Glazing U-value, including perforated walls within the purge panel.	0.9
Floor plan & Façade layout	As per architecture layouts from SEW & ShedKM
Angle of north	0
Weather data	Manchester_DSY1_2020High50.epw
Bedroom ventilation (l/s)	29 (boost mode)
Bathroom ventilation (l/s)	29 (boost mode)
Open Plan Livingroom and Kitchen Cooling ventilation (l/s)	29 (boost mode)
Air Infiltration (ACH)	0.15
Purge vent panel design	None are openable
Open Plan Livingroom and Kitchen Cooling (W)	Maximum cooling capacity of the unit is 1.5 kW, and this will be distributed between the living areas and the bedrooms based on the airflow rates that are being supplied into each of the spaces as follows: - Living rooms : 500W (provided by ASHP in Free Cooling Mode) when internal temperature is above 24 °C - Bedrooms : 250W / per bedroom (provided by ASHP in Free Cooling Mode) when internal temperature is above 24 °C
Bedroom Cooling (W)	
Air Permeability (m ³ /h/m ² @ 50 Pa)	3
Internal gains for Bedrooms	Occupancy Maximum Sensible gain - 75 W/Person Maximum Latent gain - 55 W/Person

	Occupant Density – 2 people Lighting Maximum Sensible gain – 2 W/m ² Maximum Power Consumption - 2 W/m ² Equipment Gain Maximum Sensible gain - 80 W Maximum Latent gain - 0 W
Internal gains for Open Plan Livingroom and Kitchen	Occupancy Maximum Sensible gain - 75 W/Person Maximum Latent gain - 55 W/Person Occupant Density – 3 people Lighting Maximum Sensible gain – 2 W/m ² Maximum Power Consumption - 2 W/m ² Equipment Gain Maximum Sensible gain - 450 W Maximum Latent gain - 0 W

MEP Strategy and KERS System Overview:

The eco-friendly KERS Weatherby indoor heat pump is a combined heat recovery and hot water system with storage cylinder. Using energy in the outdoor air to provide low cost, low carbon renewable hot water. KERS's heater less design produces hot water temperatures up to 65 deg C solely using heat pump technology, resulting in greater energy savings.

The KERS Cool Boost System offers all the benefits of an MVHR with the added bonus of a cooling module for the extreme summer months, meaning homes can have a constant source of clean, fresh air and remain habitable - set to an optimal comfort temperature all year round.

The KERS cooling system works in conjunction with an MVHR Systems. Both systems work independently when no cooling is required. Once the temperature within the apartment exceeds 24 Degrees, the MVHR System will first use the cooler external air to reduce the internal temperature. If the external temperature is equal or higher than the internal temperature, the MVHR System then sends a signal to the Coolboost Module to activate the cooling controls and provides free cooling to the apartment via the MVHR ducting. Air will be taken from the room, absorbing the energy and the resultant cool air will be diverted into the room to supply free cooling. Specialist software and internal dampers will allow the control strategy to work.

The maximum cooling capacity of the unit is 1.5 kW, and this will be distributed between the living areas and the bedrooms based on the airflow rates that are being supplied into each of the spaces.

RESULTS

The following section sets out the results from the TM59 overheating study with acoustic considerations applied. Note that there is no TM59 criteria for closing windows at any time but windows in each room should be controlled separately and modelled as open when both the internal dry bulb temperature exceeds 22 °C and the room is occupied.

Plot K

Table 2

Space	Criterion 01 % Hours Top Tmax >= 1°C		Criterion 02 Bedroom only Hours between 10pm – 7am > 26°C (per annum)	
K1_L07_07_2B4P_Bed-room01	0	Pass	0	Pass
K1_L07_07_2B4P_Bed-room02	0	Pass	0	Pass
K1_L07_08_1B2P_Bed-room01	0	Pass	0	Pass
K1_L07_08_1B2P_LKD	0	Pass	#N/A	#N/A
K1_L07_09_1B2P_Bed-room01	0	Pass	0	Pass
K1_L07_09_1B2P_LKD	0	Pass	#N/A	#N/A
K1_L07_01_2B4P_Bed-room01	0	Pass	0	Pass
K1_L07_01_2B4P_Bed-room02	0	Pass	0	Pass
K1_L07_02_1B1P_LKD	0	Pass	0	Pass
K1_L07_03_2B4P_Bed-room01	0	Pass	0	Pass
K1_L07_03_2B4P_Bed-room02	0	Pass	0	Pass
K1_L07_04_2B4P_Bed-room02	0	Pass	0	Pass
K1_L07_04_2B4P_Bed-room01	0	Pass	0	Pass
K1_L07_04_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L07_05_2B4P_Bed-room01	0	Pass	0	Pass
K1_L07_05_2B4P_Bed-room02	0	Pass	0	Pass



K1_L07_05_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L07_06_2B4P_Bedroom01	0	Pass	0	Pass
K1_L07_06_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L07_06_2B4P_Bedroom02	0	Pass	0	Pass
K2_L09_01_2B4P_Bedroom1	0.1	Pass	0	Pass
K2_L09_01_2B4P_Bedroom2	0	Pass	0	Pass
K2_L09_01_2B4P_LKD	0	Pass	#N/A	#N/A
K2_L09_02_1B1P_LKD	0	Pass	0	Pass
K2_L09_03_2B4P_Bedroom2	0	Pass	0	Pass
K2_L09_03_2B4P_Bedroom1	0	Pass	0	Pass
K2_L09_03_2B4P_LKD	0	Pass	#N/A	#N/A
K2_L09_04_1B2P_Bedroom	0	Pass	0	Pass
K2_L09_04_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L09_05_2B4P_Bedroom1	0	Pass	0	Pass
K2_L09_06_1B2P_Bedroom	0	Pass	0	Pass
K2_L09_06_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L09_11_1B2P_Bedroom	0	Pass	0	Pass
K2_L09_11_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L09_12_1B2P_Bedroom	0	Pass	0	Pass
K2_L09_13_3B6P_Bedroom1	0	Pass	0	Pass
K2_L09_13_3B6P_Bedroom2	0	Pass	0	Pass
K2_L09_13_3B6P_LKD	0	Pass	#N/A	#N/A
K2_L09_13_3B6P_Bedroom3	0	Pass	0	Pass
K2_L09_14_2B4P_Bedroom2	0	Pass	0	Pass
K2_L09_14_2B4P_LKD	0	Pass	#N/A	#N/A
K2_L09_14_2B4P_Bedroom1	0	Pass	0	Pass
K2_L09_10_1B2P_Bedroom	0	Pass	0	Pass
K2_L09_10_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L09_07_1B2P_Bedroom	0.2	Pass	0	Pass
K2_L09_07_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L09_08_2B4P_Bedroom1	0.6	Pass	0	Pass

K2_L09_08_2B4P_LKD	0.1	Pass	#N/A	#N/A
K2_L09_08_2B4P_Bedroom2	0.2	Pass	0	Pass
K2_L09_09_2B4P_Bedroom1	0.2	Pass	0	Pass
K2_L09_09_2B4P_Bedroom2	0.6	Pass	0	Pass
K2_L09_09_2B4P_LKD	0.1	Pass	#N/A	#N/A
K1_L07_01_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L07_07_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L07_10_3B6P_Bedroom02	0	Pass	0	Pass
K1_L07_10_3B6P_Bedroom03	0	Pass	0	Pass
K1_L07_10_3B6P_Bedroom01	0	Pass	0	Pass
K1_L07_11_3B6P_Bedroom01	0	Pass	0	Pass
K1_L07_11_3B6P_Bedroom02	0	Pass	0	Pass
K1_L07_11_3B6P_Bedroom03	0	Pass	0	Pass
K1_L07_12_3B6P_Bedroom01	0.1	Pass	0	Pass
K1_L07_12_3B6P_Bedroom02	0	Pass	0	Pass
K1_L07_12_3B6P_Bedroom03	0	Pass	0	Pass
K1_L07_15_3B6P_Bedroom03	0	Pass	0	Pass
K1_L07_03_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L07_15_3B6P_Bedroom02	0	Pass	0	Pass
K1_L07_15_3B6P_Bedroom01	0.4	Pass	0	Pass
K1_L07_13_3B6P_Bedroom02	0	Pass	0	Pass
K1_L07_13_3B6P_Bedroom01	0	Pass	0	Pass
K1_L07_14_3B6P_Bedroom03	0	Pass	0	Pass



K1_L07_14_3B6P_Bed-room01	1.2	Pass	0	Pass
K1_L07_13_3B6P_Bed-room03	0.7	Pass	0	Pass
K2_L09_05_2B4P_Bedroom2	0	Pass	0	Pass
K2_L09_05_2B4P_LKD	0	Pass	#N/A	#N/A
K2_L09_12_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L19_01_2B4P_Bedroom1	0.8	Pass	0	Pass
K2_L19_01_2B4P_Bedroom2	0.1	Pass	0	Pass
K2_L19_02_1B1P_LKD	0	Pass	0	Pass
K2_L19_03_2B4P_Bedroom2	0	Pass	0	Pass
K2_L19_03_2B4P_Bedroom1	0	Pass	0	Pass
K2_L19_03_2B4P_LKD	0	Pass	#N/A	#N/A
K2_L19_04_1B2P_Bedroom	0	Pass	0	Pass
K2_L19_04_1B2P_LKD	0	Pass	#N/A	#N/A
K2_L19_05_2B4P_Bedroom1	0	Pass	0	Pass
K2_L19_08_2B4P_Bedroom1	1.2	Pass	0	Pass
K2_L19_08_2B4P_LKD	0.3	Pass	#N/A	#N/A
K2_L19_08_2B4P_Bedroom2	0.8	Pass	0	Pass
K2_L19_09_2B4P_Bedroom1	0.8	Pass	0	Pass
K2_L19_09_2B4P_Bedroom2	1.3	Pass	0	Pass
K2_L19_09_2B4P_LKD	0.3	Pass	#N/A	#N/A
K2_L19_05_2B4P_Bedroom2	0	Pass	0	Pass
K2_L19_05_2B4P_LKD	0	Pass	#N/A	#N/A
K2_L19_07_2B4P_Bedroom2	0.6	Pass	0	Pass
K2_L19_07_2B4P_Bedroom1	0	Pass	0	Pass
K2_L19_07_2B4P_LKD	0.1	Pass	#N/A	#N/A
K2_L19_06_2B4P_Bedroom2	0	Pass	0	Pass
K2_L19_06_2B4P_Bedroom1	0	Pass	0	Pass
K2_L19_06_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L27_04_2B4P_Bedroom2	0	Pass	0	Pass
K1_L27_04_2B4P_Bedroom1	0	Pass	0	Pass
K1_L27_04_2B4P_LKD	0	Pass	#N/A	#N/A

K1_L27_02_2B4P_Bedroom2	0	Pass	0	Pass
K1_L27_02_2B4P_Bedroom1	0.2	Pass	0	Pass
K1_L27_03_1B2P_LKD	0	Pass	#N/A	#N/A
K1_L27_03_1B2P_Bedroom	0	Pass	0	Pass
K1_L27_05_2B4P_Bedroom1	0.6	Pass	0	Pass
K1_L27_05_2B4P_LKD	0	Pass	#N/A	#N/A
K1_L27_05_2B4P_Bedroom2	0	Pass	0	Pass
K1_L27_06_2B4P_Bedroom2	1.3	Pass	0	Pass
K1_L07_12_3B6P_LKD	0.1	Pass	#N/A	#N/A
K1_L07_11_3B6P_LKD	0	Pass	#N/A	#N/A
K1_L07_10_3B6P_LKD	0	Pass	#N/A	#N/A
K1_L07_14_3B6P_Bedroom02	1.8	Pass	0	Pass
K2_L19_01_2B4P_LKD	1.3	Pass	#N/A	#N/A
K1_L27_01_1B2P_Bedroom	0.6	Pass	0	Pass
K1_L27_01_1B2P_LKD	1.1	Pass	#N/A	#N/A
K1_L27_06_2B4P_Bedroom1	0.7	Pass	0	Pass
K1_L27_02_2B4P_LKD	0.6	Pass	#N/A	#N/A
K1_L27_06_2B4P_LKD	1.5	Pass	#N/A	#N/A
K1_L07_14_3B6P_LKD	2.5	Pass	#N/A	#N/A
K1_L07_13_3B6P_LKD	0	Pass	#N/A	#N/A
K1_L07_15_3B6P_LKD	1.1	Pass	#N/A	#N/A

Plot J

Table 3

Space	Criterion 01 % Hours Top Tmax >= 1°C		Criterion 02 Bedroom only Hours between 10pm – 7am > 26°C (per annum)	
J01_113L_A002_2B4P_Bedroom1	0	Pass	0	Pass
J01_113L_A002_2B4P_Bedroom2	0	Pass	0	Pass
J01_113L_A002_2B4P_LKD	0	Pass	#N/A	#N/A
J01_113L_A003_2B4P_Bedroom2	0	Pass	0	Pass



J01_113L_A003_2B4P_LKD	0	Pass	#N/A	#N/A
J01_113L_A003_2B4P_Bedroom1	0.1	Pass	0	Pass
J01_113L_A004_2B4P_Bedroom2	0	Pass	0	Pass
J01_113L_A004_2B4P_Bedroom1	0	Pass	0	Pass
J01_113L_A004_2B4P_LKD	0	Pass	#N/A	#N/A
J01_113L_A005_1B2P_Bedroom1	0	Pass	0	Pass
J01_113L_A005_1B2P_LKD	0	Pass	#N/A	#N/A
J01_113L_A006_1B2P_Bedroom1	0	Pass	0	Pass
J01_113L_A006_1B2P_LKD	0	Pass	#N/A	#N/A
J01_113L_A010_1B2P_Bedroom1	0	Pass	0	Pass
J01_113L_A010_1B2P_LKD	0	Pass	#N/A	#N/A
J01_113L_A009_2B4P_Bedroom1	0	Pass	0	Pass
J01_113L_A009_2B4P_Bedroom2	0	Pass	0	Pass
J01_113L_A009_2B4P_LKD	0	Pass	#N/A	#N/A
J01_113L_A007_2B4P_Bedroom1	0	Pass	0	Pass
J01_113L_A007_2B4P_Bedroom2	0	Pass	0	Pass
J01_113L_A007_2B4P_LKD	0	Pass	#N/A	#N/A
J01_113L_A008_2B4P_Bedroom2	0	Pass	0	Pass
J01_113L_A008_2B4P_Bedroom1	0	Pass	0	Pass
J01_113L_A008_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A003_2B4P_Bedroom2	0.6	Pass	0	Pass
J02_113L_A003_2B4P_Bedroom1	0	Pass	0	Pass
J02_113L_A003_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A002_2B4P_Bedroom1	0	Pass	0	Pass
J02_113L_A002_2B4P_Bedroom1	0	Pass	0	Pass
J02_113L_A002_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A001_2B4P_Bedroom1	0	Pass	0	Pass
J02_113L_A001_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A001_2B4P_Bedroom2	0	Pass	0	Pass
J02_113L_A004_1B1P(Studio)	0	Pass	0	Pass

J02_113L_A005_2B4P_Bedroom2	0.7	Pass	0	Pass
J02_113L_A005_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A005_2B4P_Bedroom1	0.5	Pass	0	Pass
J02_113L_A006_1B2P_Bedroom1	0.6	Pass	0	Pass
J02_113L_A006_1B2P_LKD	0	Pass	#N/A	#N/A
J02_113L_A010_1B2P_Bedroom1	0	Pass	0	Pass
J02_113L_A010_1B2P_LKD	0	Pass	#N/A	#N/A
J02_113L_A009_2B4P_Bedroom1	0	Pass	0	Pass
J02_113L_A009_2B4P_Bedroom2	0	Pass	0	Pass
J02_113L_A009_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A007_2B4P_Bedroom2	0.4	Pass	0	Pass
J02_113L_A007_2B4P_Bedroom1	0.1	Pass	0	Pass
J02_113L_A007_2B4P_LKD	0	Pass	#N/A	#N/A
J02_113L_A008_2B4P_Bedroom1	0	Pass	0	Pass
J02_113L_A008_2B4P_Bedroom2	0	Pass	0	Pass
J02_113L_A008_2B4P_LKD	0	Pass	#N/A	#N/A
J02_122L_A002_2B4P_Bedroom1	0	Pass	0	Pass
J02_122L_A002_2B4P_Bedroom1	0	Pass	0	Pass
J02_122L_A002_2B4P_LKD	0	Pass	#N/A	#N/A
J02_122L_A004_1B1P(Studio)	0	Pass	0	Pass
J02_122L_Studio	1.9	Pass	0	Pass
L15_J01_A003_LKD	2.7	Pass	#N/A	#N/A
L15_J01_A003_Bedroom 01	0.2	Pass	0	Pass
L15_J01_A002_Lounge	0	Pass	#N/A	#N/A
L15_J01_A002_Bedroom 01	0	Pass	0	Pass
L16_J01_A003_Bedroom 02	0	Pass	0	Pass
L16_J01_A003_Bedroom 03	0.2	Pass	0	Pass
L16_J01_A002_LKD	0	Pass	#N/A	#N/A
L16_J01_A002_Bedroom 02	0	Pass	0	Pass
L16_J01_A002_Bedroom 03	0	Pass	0	Pass

CONCLUSION

Plot K and Plot J successfully meet the TM59 overheating criteria, as detailed in Tables 2 and 3 above. This achievement is particularly significant given the stringent requirements for acoustic and air quality compliance, and the analysis assumes that window or purge ventilation openings cannot be used for overheating and remain closed at all times, therefore overheating shall be mitigated by passive and mechanical means only.

The results indicate that both plots can provide a thermally comfortable living environment without compromising on essential environmental standards. This compliance ensures that future residents will benefit from thermal comfort, while also being protected from external noise and air pollution.



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