

ENERGY STATEMENT

30-36 Clarendon Road, London, N8 0DJ

Produced by XCO₂ for Paul Simon Magic Homes

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EXECUTIVE SUMMARY

The energy strategy for the Jessica Buttons Development has been developed in line with the energy policies of the London Plan and of the London Borough of Haringey Local Plan policies. The three-step Energy Hierarchy has been implemented and the estimated regulated CO₂ savings on site are 70.7% for the domestic part and 57.7% for the non-domestic part of the development, against a Part L 2013 compliant scheme with SAP10.2 carbon factors.

This report assesses the predicted energy performance and carbon dioxide emissions of the proposed development at 30-36 Clarendon Road, located in the London Borough of Haringey.

The proposed development is a part two, six, eight and eleven storey building, with basement, to provide 51 residential units and 560 sqm of commercial floorspace, with access, landscaping and car and cycle parking.

In line with London Plan policy SI2 and the Haringey Local Plan policy (Development Management DPD) the residential part of the development would need to achieve a 'zero carbon' target for regulated CO₂ emissions; and a zero carbon for non-domestic in regulated CO₂ emissions against a Building Regulations (Part L 2013) compliant scheme.

Due to the current software issues of SAP10, the energy strategy outlined in this report has been developed using the FSAP2012 software with SAP 10.2 emissions factors to ensure the most accurate and reliable results are being produced. As a result, and for consistency, the SBEM has also been assessed against Part L 2013. Increased savings have been targeted for both the Be Lean and Be Green stages to account for the uplift between Part L 2013 and Part L 2021. Please refer to the methodology section for additional information.

The methodology used to determine the expected operational CO₂ emissions for the development is in accordance with the London Plan's three-step Energy Hierarchy (Policy SI2) and the CO₂ savings achieved for each step are outlined below:

BE LEAN – USE LESS ENERGY

The first step addresses reduction in energy demand, through the adoption of passive and active design measures.

The proposed energy efficiency measures include levels of insulation beyond Building Regulation requirements, low air tightness levels, efficient lighting as well as energy saving controls for space conditioning and lighting.

By means of energy efficiency measures alone, regulated CO₂ emissions are shown to reduce by:

Regulated CO ₂ Savings at Be Lean Stage (SAP2012)		
	%	t/yr
Domestic	18.4	9.6
Non-domestic	52.6	3.0
Site wide	21.7	12.6

At the 'Be Lean' stage, the proposed development meets the GLA target of 10% regulated CO₂ emission reductions for the residential portion of the scheme, and a 15% reduction for the non-domestic portion of the scheme using SAP10.2 carbon figures.

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

The application site is located in an area where district heating is not expected to be implemented in the immediate future. Wood Green is a proposed network that will be the first phase of the DEN, focusing on developments at Clarendon Square, the Chocolate Factory and other nearby sites potentially including a

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new Council office on Wood Green High Road. There is roughly an 8-10-year window for the connection to become available. Due to this, a connection at this point was not found to be feasible.

A site wide communal heating system is proposed for the residential portion of the scheme with the aim to connect to a future network if it becomes available and individual heating to the non-domestic areas. Based on the strategy proposed, no savings are achieved at the Be Clean stage.

BE GREEN – USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified photovoltaics and air source heat pumps as suitable technologies for the development.

A fully electric communal ASHP system is proposed for the residential part of the development to provide heat to the dwellings, with individual ASHP feeding the non-domestic areas. Photovoltaics will also provide electricity to the non-domestic areas.

The incorporation of renewable technologies will reduce CO₂ emissions by a further:

Regulated CO ₂ Savings at Be Green Stage (SAP2012)		
	%	t/yr
Domestic	52.3	27.4
Non-domestic	5.1	0.3
Site wide	47.7	27.7

CUMULATIVE ON-SITE SAVINGS

The overall regulated CO₂ savings on site against a Part L 2013 compliant scheme, are therefore:

Cumulative Regulated CO ₂ Savings (SAP2012)		
	%	t/yr
Domestic	70.7	37.0
Non-domestic	57.7	3.3
Site wide	69.4	40.3

CARBON OFF-SETTING

The proposed development complies with the London Plan CO₂ savings target of 35% overall.

With the SAP10.2 carbon factors, to achieve 'zero carbon' for the residential portion of the scheme, 15.3 tonnes per annum of regulated CO₂, equivalent to 460.4 tonnes over 30 years, from the new-build domestic portion should be offset offsite. The shortfall to a zero-carbon reduction from baseline for the new build non-domestic portion of the scheme would be 2.4 tonnes per annum of regulated CO₂, equivalent to 71.6 tonnes over 30 years, to be offset offsite. The equivalent payments would be £43,736 and £6,803 for the domestic and non-domestic portions of the scheme respectively.

It should be noted that these are based off the results from the scheme being assessed against Part L 2013 and therefore could slightly differ when assessed against Part L 2021.

Any carbon offset contributions will be subject to viability discussions and detailed design stage calculations.

BE SEEN

Following the implementation of the three previous stages of the hierarchy, a monitoring strategy will be put in place to ensure that the actual energy performance of the development can be monitored and reported post-occupation.

The relevant parties will also be made aware of their responsibilities at subsequent reporting stages.

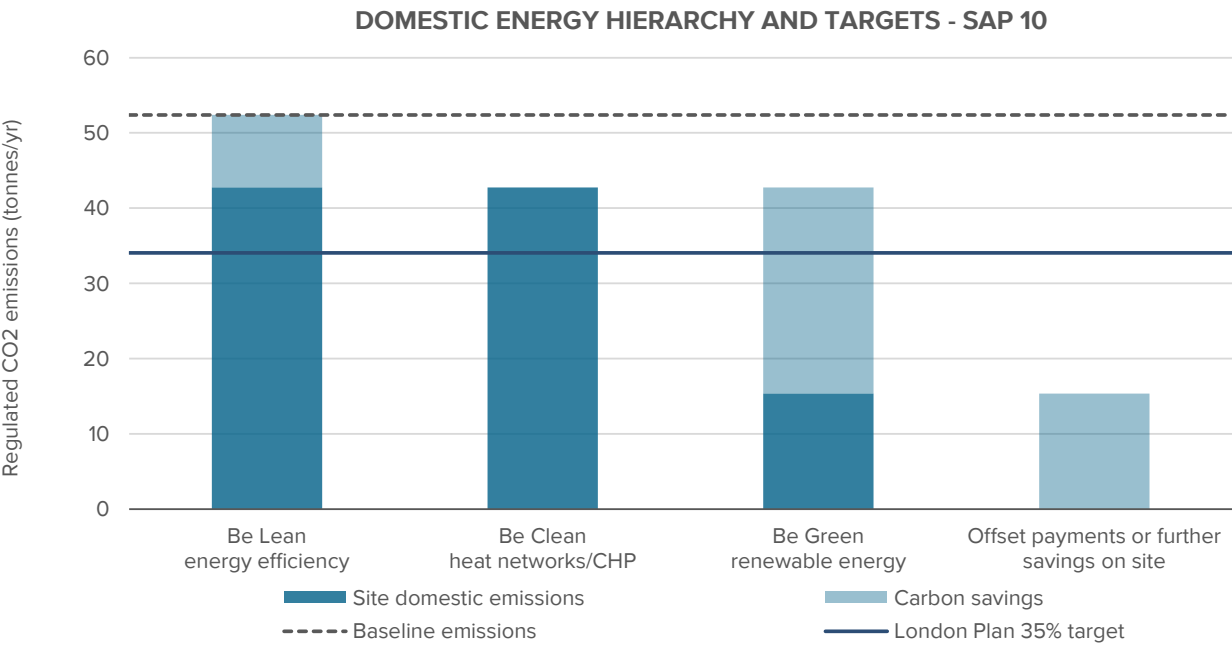


Figure 1: The Domestic Energy Hierarchy (SAP10.2 carbon factors)

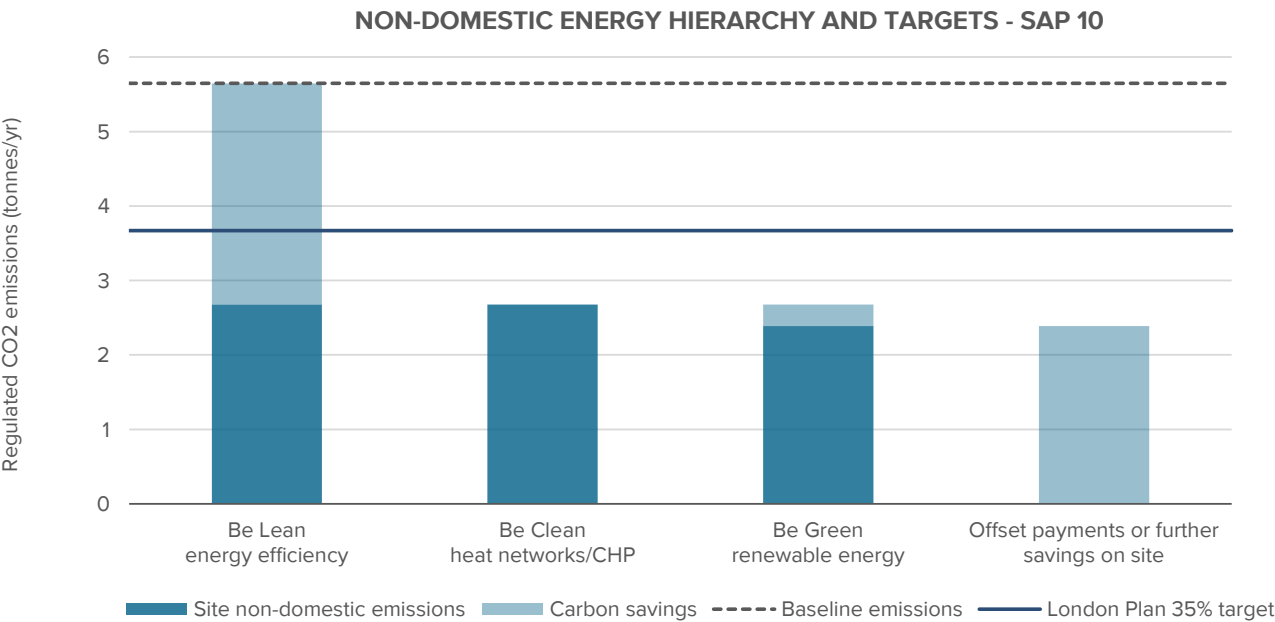


Figure 2: The Non-Domestic Energy Hierarchy (SAP10.2 carbon factors)

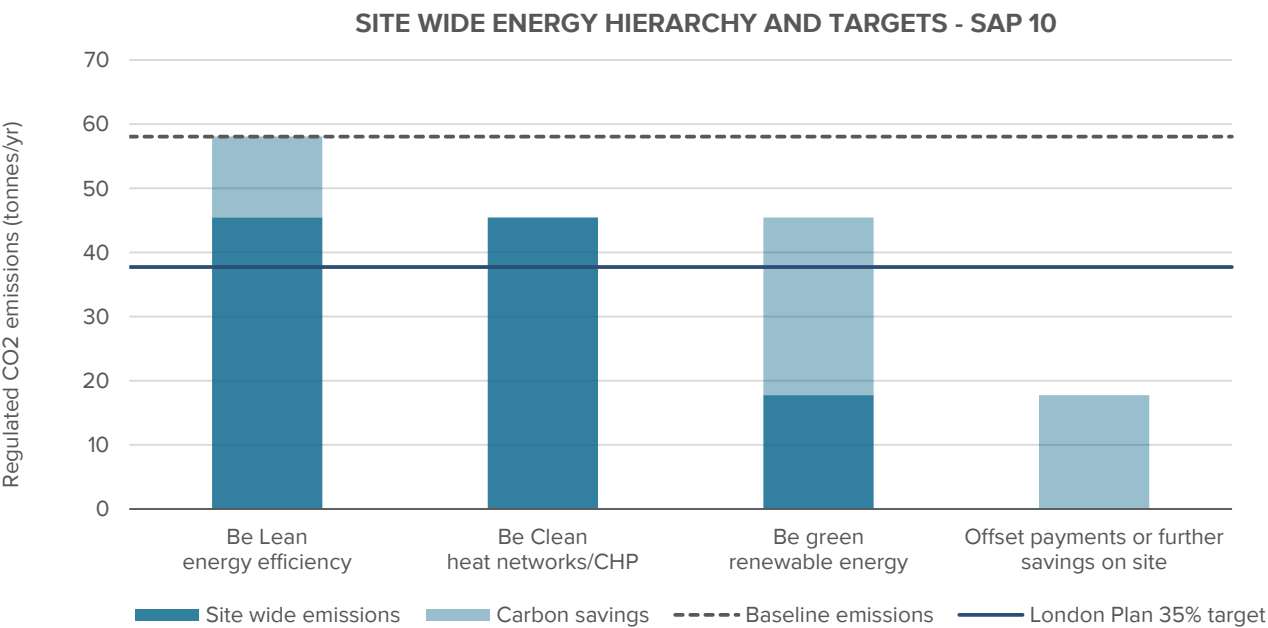


Figure 3: The Site Wide Energy Hierarchy (SAP10.2 carbon factors)

INTRODUCTION

This Chapter presents the description of the site and of the development proposal, the energy policy framework and the methodology employed for the energy assessment.

SITE & PROPOSAL

The proposal is for the demolition of the existing building and construction of a part two, six, eight and eleven storey building, with basement, to provide 51 residential units and 560 sqm of commercial floorspace, with access, landscaping and car and cycle parking. The scheme incorporates public realm enhancements and a mix of private and communal amenity space. It is located in 30-36 Clarendon Road, London N8 0DJ.

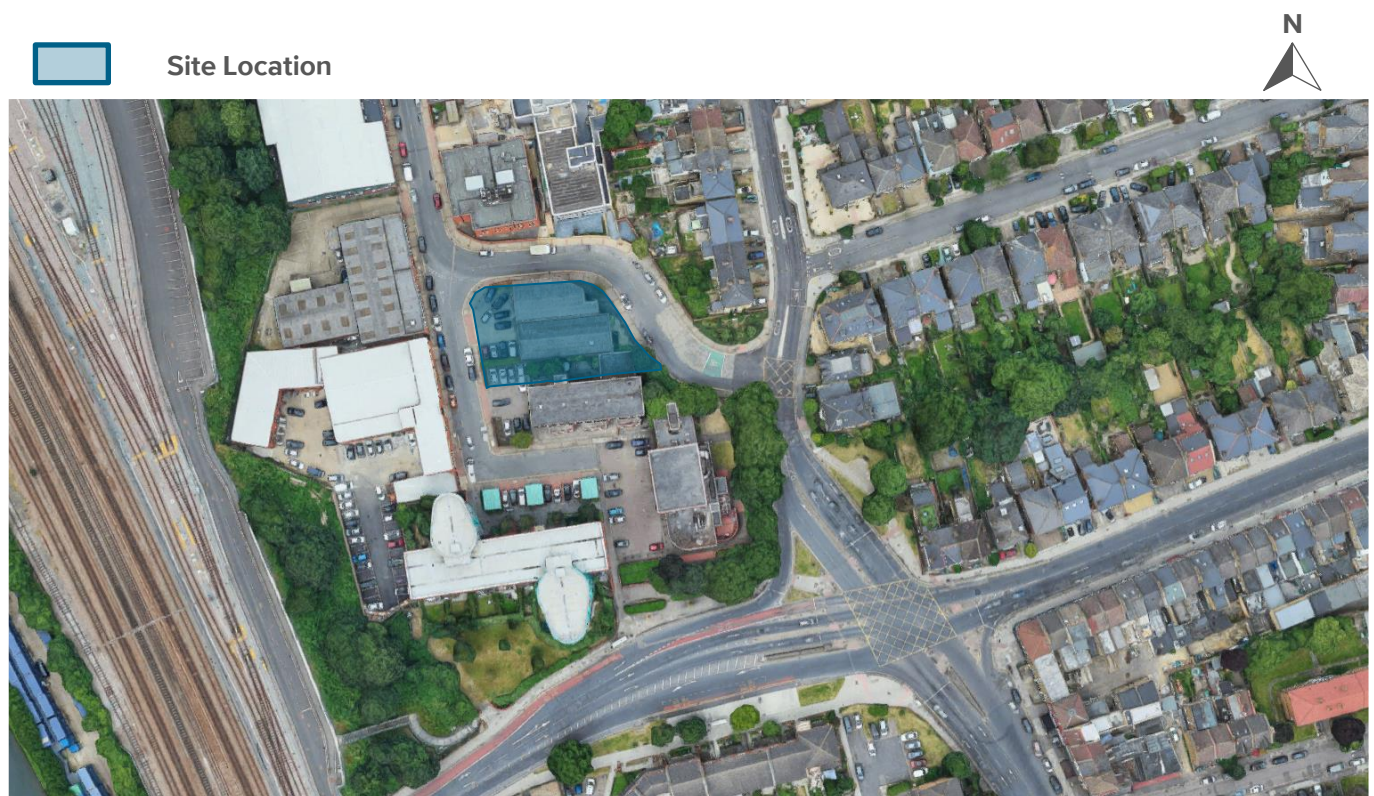


Figure 4: Approximate location of the application site.

POLICY FRAMEWORK

The proposal will seek to respond to the energy policies of the London Plan and of the policies within the London Borough of Haringey Local Plan.

The most relevant applicable energy policies in the context of the proposed development are presented below.

THE LONDON PLAN (2021)

The London Plan (2021) published 2nd March 2021 sets out the Mayor's overarching strategic spatial development strategy for greater London and underpins the planning framework from 2019 up to 2041. This document replaced the London Plan 2016.

The new Plan has a strong sustainability focus with many new policies addressing the concern to deliver a sustainable and zero carbon London, particularly addressed in chapter 9 Sustainable Infrastructure.

The following policies, related to Energy, are of relevance for the proposed development:

POLICY SI2 MINIMISING GREENHOUSE GAS EMISSIONS

This policy sets the requirements for all major developments to follow the energy hierarchy and achieve net-zero-carbon for both residential and non-residential schemes (via on-site carbon reductions and offset payments) and introduces new targets at Lean stage:

“... ”

This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

- 1) be lean: use less energy and manage demand during operation*
- 2) be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly*
- 3) be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site*
- 4) be seen: monitor, verify and report on energy performance.*

“... ”

“... ”

A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

- 1) through a cash in lieu contribution to the borough's carbon offset fund, or*
- 2) off-site provided that an alternative proposal is identified and delivery is certain.*

“... ”

This policy also sets the requirements to consider whole-life carbon emissions, including embodied carbon and unregulated emissions:

“... ”

Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e. unregulated emissions.

Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

“... ”

The policy supporting text provides additional clarifications on the requirements for major developments:

- Developments including major refurbishments should also aim to meet the net-zero carbon target.
- All developments should maximise opportunities for on-site electricity and heat production from solar technologies (photovoltaic and thermal), use innovative building materials and smart technologies.
- Recommendation to use SAP10.2 carbon factors as per GLA Energy Guidance.

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- Recommended carbon offset price of £95 per tonne CO₂.
- Requirement for major developments to monitor and report operational energy performance to the GLA.

POLICY SI 3 ENERGY INFRASTRUCTURE

This policy requires all major developments within Heat Network Priority Areas will need to utilise a communal low-temperature heating system and follow the energy hierarchy to determine the most suitable system. Where developments are utilising CHP this policy also requires them to demonstrate that 'the emissions relating to energy generation will be equivalent or lower than those of an ultra-low NO_x gas boiler'. Any combustion on site should meet the requirements of part B of Policy SI1.

POLICY SI 4 MANAGING HEAT RISK

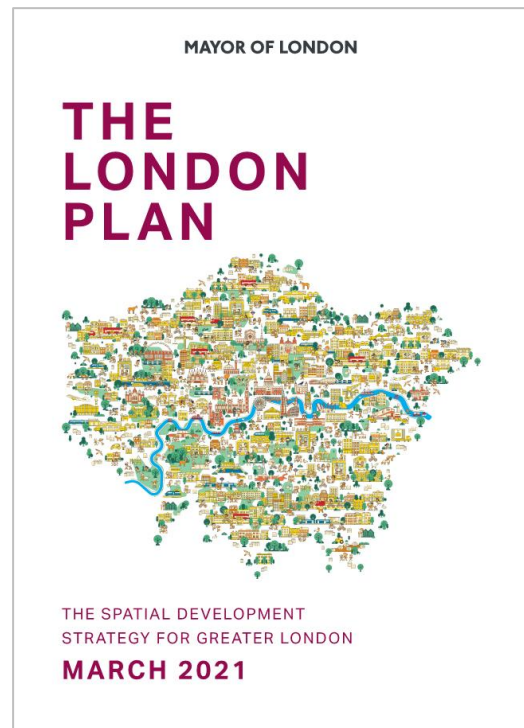
This policy requires:

A Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

- 1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure*
- 2) minimise internal heat generation through energy efficient design*
- 3) manage the heat within the building through exposed internal thermal mass and high ceilings*
- 4) provide passive ventilation*
- 5) provide mechanical ventilation*
- 6) provide active cooling systems.*

The London Plan also consists of a suite of guidance documents, such as the Energy Assessment Guidance: Greater London Authority guidance on preparing energy assessments as part of planning applications (April 2020)



GLA GUIDANCE ON PREPARING ENERGY ASSESSMENTS

This document (last updated in April 2020) provides guidance on preparing energy assessments to accompany strategic planning applications; it contains clarifications on Policy SI2, of the new London Plan, carbon reduction targets in the context of zero carbon policy, as well as detailed guidelines on the content of the Energy Assessments undertaken for planning.

The guidance document specifies the emission reduction targets the GLA will apply to applications as follows:

The regulated carbon dioxide emissions reduction target for major domestic and non-domestic development is net zero carbon, with at least a 35% on-site reduction beyond Part L 2013 of the Building Regulations.

The definition of zero carbon homes is provided on Page 54 of the guidance:

Zero carbon homes - homes forming part of major development applications (i.e. those with 10 or more units) where the residential element of the application achieves at least a 35 per cent reduction in regulated carbon dioxide emissions (beyond Part L 2013) on-site. The remaining regulated carbon dioxide emissions, to 100 per cent, are to be offset through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

The new guidance also includes changes to technical requirements relating to the use of updated carbon factors, cost estimates, overheating risk analysis, the structure of the heating hierarchy and scrutiny over the performance of heat pumps. The guidance also provides information on how the new stage of the energy hierarchy 'be seen' is expected to be carried out in energy assessments.

The structure of this report and the presentation of the carbon emission information for the development follows the guidance in this document.

MAYOR OF LONDON

Energy Assessment Guidance

Greater London Authority guidance on preparing energy assessments as part of planning applications (April 2020)

DRAFT

HARINGEY'S LOCAL PLAN – DEVELOPMENT MANAGEMENT DPD (JULY 2017)

Policy DM21: Sustainable Design, Layout and Construction

"All new development, including building and landscape works, will be expected to consider and implement sustainable design, layout and construction techniques. Proposals should

- Apply the energy hierarchy to minimise energy use in order to meet, and if possible, exceed, minimum carbon dioxide reduction requirements;*
- Apply the cooling hierarchy to reduce the potential for overheating and limit reliance on mechanical air conditioning systems;*
- Maximise opportunities to enhance biodiversity on-site, including through appropriate landscaping, Sustainable Drainage Systems, living roofs and green walls*
- Wherever possible, use building materials with high environmental performance ratings; and*
- Seek opportunities for locally sourced labour.*

B The Council will support appropriate measures to sustainably retrofit existing homes and non-residential buildings.

C Proposals that fail to demonstrate adequate consideration for sustainable design, layout and construction techniques will be resisted.

D Consideration will be given to the use of carbon offset payments, to be secured by planning obligations, where it can be demonstrated that proposals are unable to meet carbon dioxide emission reduction targets on-site."

Policy DM23: Environmental Protection

Air Quality

All development proposals should consider air quality and be designed to:

- Improve or mitigate the impact on air quality in the Borough; and*

- Improve or mitigate the impact on air quality for the occupiers of the building or users of the development.*

B Air quality assessments will be required for all major development and other development proposals, where appropriate.

C Where necessary, adequate mitigation must be provided.

Noise and Vibration

D The Council will seek to ensure that new noise sensitive development is located away from existing or planned sources of noise pollution. Proposals for potentially noisy development must suitably demonstrate that measures will be implemented to mitigate its impact.

E A noise assessment will be required to be submitted if the proposed development is a noise sensitive development, or an activity with the potential to generate noise.

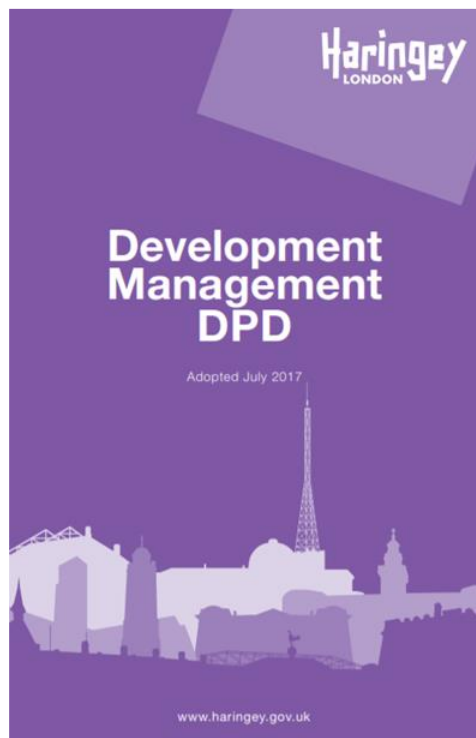
Light Pollution

F Development proposals that include external lighting must mitigate potential adverse impacts from such lighting. Where appropriate, proposals will be required to submit details demonstrating that external lighting is:

- Appropriate for its purpose in its setting;*
- Designed to minimise and provide protection from glare and light spillage, particularly to sensitive receptors such as residential properties and natural habitats, including watercourses; and*
- Energy efficient.*

G Proposals for new development will only be permitted where it is demonstrated that any risks associated with land contamination, including to human health and the environment, can be adequately addressed in order to make the development safe.

H All proposals for new development on land which is known to be contaminated, or potentially contaminated, will be required to submit a preliminary assessment to identify the level and risk of contamination and, where appropriate, a risk management and remediation strategy.



METHODOLOGY

The sections below present the methodology followed in determining the on-site and off-site carbon savings for the proposed scheme.

ON-SITE CARBON SAVINGS – THE ENERGY HIERARCHY

The methodology employed to develop the energy strategy for the scheme and achieve on-site carbon savings is in line with the GLA's *Guidance on preparing energy assessments* and is as follows:

The software used to model and calculate the energy performance and carbon emissions of the domestic element is SAP2012 and SBEM for the non-domestic elements.

Modelling in SAP2012 instead of SAP10 has been chosen due to:

- Communal gas heating, which must be used for the Be Lean stage calculations, is not functioning adequately because Stroma are currently waiting on BRE to implement the different metrics that will be used for inputting communal heating systems/ DHNs;
- MVHR input also not functioning properly due to the in-use factor of the systems not being accounted for, therefore the calculations are only including the energy used by the system and not the energy saving benefits;
- Heat interface units (HIUs) are to be input through the PCDB database within the software, however this is not yet up and running for HIUs. As a result, they cannot be accurately input.

Due to the of the above, the results being produced from the software cannot be relied upon as being accurate, therefore the approved and reliable FSAP 2012 software is to be used against SAP 10.2 carbon factors and distribution losses, with increased savings targeted for both the Be Lean and Be Green stages to account for the uplift between Part L 2013 and Part L 2021.

As a result of this, and for consistency, the SBEM has also been assessed against Part L 2013. However a Part L 2021 SBEM has also been completed to show compliance with the latest Building Regulations, the results of this will be included within the GLA

spreadsheet found in appendix E and the BRUKL reports will be provided alongside the 2013 reports in appendix C.

The **baseline** CO₂ emissions are first established, i.e. the emissions of a scheme that is compliant with Part L of the Building Regulations.

The emissions of the domestic element are established by modelling representative dwelling types and multiplying the Target Emission Rate (TER) of each type with the cumulative floor area for that type to establish the total emissions for the domestic element of the proposal. Similarly, the TER for each non-domestic element is multiplied by its floor area to establish the total emissions.

The same approach is followed to determine the energy performance and CO₂ emissions of the proposed scheme for each of the steps of the **Energy Hierarchy**. The CO₂ emissions are estimated based on the SAP Dwelling Emission Rate (DER) and SBEM Building Emission Rate (BER) figures for the domestic and non-domestic elements respectively. The Energy Hierarchy aims at delivering significant carbon savings on-site.

The three consecutive steps of the Energy Hierarchy are:

- **Be Lean** whereby the demand for energy is reduced through a range of passive and active energy efficiency measures; as part of this step the Cooling Hierarchy (see Policy SI4) is implemented and measures are proposed to reduce the demand for active cooling;
- **Be Clean** whereby as much of the remaining energy demand is supplied as efficiently as possible (e.g. by connecting to a district energy network or developing a site-wide energy network), and,
- **Be Green** whereby renewable technologies are incorporated to offset part of the carbon emissions of the development. The uptake of renewable technologies is based on feasibility and viability considerations, including their compatibility with the energy system determined in the previous step.

The implementation of the Energy Hierarchy determines the total regulated carbon savings that can be feasibly and viably achieved on site.

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The % improvement against the baseline emissions is compared to the relevant targets for each element and in case of a shortfall, savings through off-site measures should be achieved.

OFF-SITE CARBON SAVINGS – CARBON OFFSETTING

The GLA and the London Borough of Haringey has an established provision to ensure that the shortfall in carbon savings is met off-site; this comprises a carbon offset payment with a figure of £95/tonne for a period of 30 years.

The cash in lieu contribution for the domestic and non-domestic elements of the proposal is calculated and summed to provide the total carbon offset payment to be made to the Council.

The structure of the main body of the assessment follows the Methodology presented above and comprises the sections:

- Be Lean;
- Be Clean;
- Be Green.

The Conclusions section summarises the energy strategy and associated carbon savings for the proposed development.

BE LEAN – USE LESS ENERGY

The proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water and lighting. Measures will also be put in place to reduce the risk of overheating. The regulated carbon saving achieved in this step of the Energy Hierarchy is 21.7% over the site wide baseline level with SAP10.2 emission factors.

In line with GLA guidance, gas-boilers with gross efficiency of 89.5% have been included for supply of space heating and hot water for all spaces within the scheme in the SAP calculations. Also in line with GLA guidance, ASHP with a gross-efficiency of 264% has been included for the space heating within the SBEM calculations.

PASSIVE DESIGN MEASURES

ENHANCED U-VALUES

The heat loss of different building fabric elements is dependent upon their U-value. A building with low U-values provides better levels of insulation and reduced heating demand during the cooler months.

The proposed development will incorporate high levels of insulation and high-performance glazing beyond Part L 2021 targets in order to reduce the demand for space heating and cooling.

The tables to the right demonstrate the improved performance of the proposed building fabric beyond the Building Regulations requirements for both domestic and non-domestic uses.

AIR TIGHTNESS IMPROVEMENT

Heat loss may also occur due to air infiltration. Although this cannot be eliminated altogether, good construction detailing, and the use of best practice construction techniques can minimise the amount of air infiltration.

The proposed development will aim to improve upon the Part L 2013 minimum standards for air tightness by targeting air permeability rates of 3 m³/m².h at 50Pa for all new build residential units and 2.5 m³/m².h at 50Pa for non-domestic areas.

Table 1: Thermal Envelope U-values

Domestic (U-values in W/m ² .K)			
Element	Building Regulations	Proposed	Improvement
Walls	0.26	0.15	42%
Floor	0.18	0.1	44%
Roof	0.16	0.1	38%
Windows	1.6	1.2	25%

Non-domestic (U-values in W/m ² .K)			
Element	Building Regulations	Proposed	Improvement
Walls	0.26	0.15	42%
Floor	0.18	0.1	44%
Roof	0.18	0.1	44%
Windows	1.6	1.2	25%

REDUCING THE NEED FOR ARTIFICIAL LIGHTING

The development has been designed to maximise daylight in all habitable spaces as a way of improving the health and wellbeing of its occupants.

All of the habitable areas will benefit from large areas of glazing to increase the amount of daylight within the internal spaces where possible. This is expected to reduce the need for artificial lighting whilst delivering pleasant, healthy spaces for occupants.

FABRIC ENERGY EFFICIENCY

The predicted performance of the dwellings was also assessed based on comfortable internal temperatures

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being maintained. The energy demand of the dwelling per square metre is represented by the Dwelling Fabric Energy Efficiency (DFEE) and in order to reach Part L1A compliance this must not exceed the Target Fabric Energy Efficiency (TFEE). In Table 2 below a summary of the findings from the assessment is presented and it demonstrates that the DFEE does not exceed the TFEE.

Table 2: Area Averaged Target and Dwelling Fabric Energy Efficiency for the residential portion of the scheme

Fabric Energy Efficiency		
TFEE (kWh/m ² .yr)	DFEE (kWh/m ² .yr)	Improvement
53.9	42.4	21.4%

ACTIVE DESIGN MEASURES

HIGH EFFICACY LIGHTING

The development intends to incorporate low energy lighting fittings throughout the residential and non-residential spaces. All light fittings will be specified as low energy lighting, and will accommodate LED, compact fluorescent (CFLs) or fluorescent luminaires only.

HEAT RECOVERY VENTILATION

Mechanical ventilation heat recovery (MVHR) is proposed for both the residential and non-residential portions of the development. The mechanical ventilation system will include heat recovery in order to achieve ventilation in the most energy-efficient way.

COMFORT COOLING

Air source heat pumps with high energy efficiency ratios may be used for both heating and cooling in the non-residential portions of the development, therefore the impact of active cooling in terms of energy use and carbon emissions will be minimised. Additionally, trim cooling in the form of cooling coils will be incorporated within the heat recovery units in the residential dwellings.

CONTROLS

Advanced lighting and space conditioning controls will be incorporated, specifically:

- For residential communal and non-residential areas of infrequent use, occupant sensors will be fitted for lighting, whereas day lit areas will incorporate daylight sensors where appropriate;
- Heating controls in dwellings will include programmers, TRV's and a charging system that will be linked to use of the communal heating,
- Space conditioning in the non-domestic areas will be controlled by optimum start/stop and local time controls.

MONITORING

In addition to the above design measures, the development will incorporate monitoring equipment and systems to enable occupiers to monitor and reduce their energy use.

Smart meters will be installed to monitor the heat and electricity consumption of each dwelling; the display board will demonstrate real-time and historical energy use data and will be installed at an accessible location within the dwellings.

WASTE WATER HEAT RECOVERY

The implementation of waste water heat recovery systems at the residential elements and non-domestic elements of the scheme have not been considered suitable for the following reason(s):

- Given the size of the scheme the only economically viable option would be a centralised system and application of such a solution would increase the overall building height in order to bring wastewater back to a central location. The additional height was deemed to make the scheme unviable.

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MINIMISING OVERHEATING

The potential risk of overheating will be mitigated by incorporating passive and active design measures, in line with the London Plan Policy SI4 and the Cooling Hierarchy, as follows.

THE COOLING HIERARCHY

REDUCING THE AMOUNT OF HEAT ENTERING THE BUILDING IN SUMMER

External shading elements, such as balconies, integrated across the elevations shall significantly reduce solar gains into occupied spaces. Internal blinds may be included to further reduce the amount of heat entering the building.

MINIMISING INTERNAL HEAT GENERATION THROUGH ENERGY EFFICIENT DESIGN

The distribution of heat infrastructure within the residential parts of the development will be designed to reduce the lateral pipework lengths within the internal spaces to reduce heat loss. Heat sources and pipework will be sufficiently insulated (following CIBSE CoP1 guidelines).

USE OF THERMAL MASS AND HIGH CEILINGS TO MANAGE THE HEAT WITHIN THE BUILDING

During peak summer periods the thermal mass of the building will absorb and store excess heat. The building will release its heat in the cooler evenings to allow for cooler internal spaces dampening the peak diurnal weather conditions.

MECHANICAL VENTILATION

MVHR is proposed for both the residential and non-residential portions of the scheme. The MVHR will be capable of operating in summer bypass mode allowing for the dissipation of any heat build-up during peak summer conditions. The units will also have an integrated cooling coil to minimise the overheating risk due to noise restrictions limiting openable windows.

OVERHEATING RISK ASSESSMENT

An overheating assessment was undertaken for representative 'worst case' dwellings in line with CIBSE TM59 and Part O of the Building Regulations. Dynamic thermal modelling was conducted using three design weather years, also accounting for climate change scenarios.

The assessment concluded that a hybrid strategy of passive and active measures will be required to comply with Part O of the Building Regulations.

The passive measures to be incorporated into the design include control glazing, external shading, and efficient lighting.

The active measure involves the incorporation of trim cooling in the form of cooling coils within the MVHR systems. This is due to noise restrictions, highlighted within the acoustic report in accordance with the Part O methodology, meaning there could not be a reliance on openable windows to bedrooms overnight.

The Overheating Assessment can be seen in full in Appendix A.

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ACTIVE COOLING PROPOSALS

Based on the above, active cooling will be required for both the residential and non-residential portions of the scheme.

The following table presents the cooling demand figures for the non-domestic elements of the development.

Table 3: Non-domestic cooling demand

	Area weighted average non-domestic cooling demand (MJ/m ²)	Total area weighted non-domestic cooling demand (MJ/year)
Actual	111.1	61394
Notional	113.8	62886

BE LEAN CO₂ EMISSIONS

At the ‘Be Lean’ stage, the proposed development meets the GLA target of 10% regulated CO₂ emission reductions for the residential portion of the scheme, and a 15% reduction for the non-domestic portion of the scheme.

Energy cost to residents is also reduced through the implementation of energy efficiency measures outlined within this section.

BE CLEAN – SUPPLY ENERGY EFFICIENTLY

Connection to a district heat network was not found to be feasible for this project. Communal heating strategies with a future connection consideration proposed for the residential portions of the scheme. At the Be Clean stage there were no further savings.

ENERGY SYSTEM HIERARCHY

The energy system for the development has been selected in accordance with the London Plan decentralised energy hierarchy. The hierarchy listed in Policy SI3 states that energy systems should consider:

1. Connection to existing heating and cooling networks;
2. Site wide CHP network; and,
3. Communal heating and cooling.

Local heat and power sources minimise distribution losses and achieve greater efficiencies when compared to separate energy systems, thus reducing CO₂ emissions.

In a communal energy system, energy in the form of heat, cooling, and/or electricity is generated from a central source and distributed via a network of insulated pipes to surrounding residences.

CONNECTION TO AN EXISTING OR PROPOSED NETWORK

The London Heat Map identifies existing and potential opportunities for decentralised energy projects in London. It builds on the 2005 London Community Heating Development Study.

An excerpt from the London Heat Map can be seen on the following page which shows the energy demand for different areas. Darker shades of red signify areas where energy demand is high. The map also highlights any existing and proposed district heating networks within the vicinity of the development.

A review of the map shows that there are no existing or proposed heat networks within proximity to the site.

According to Haringey's proposed district heating networks there is a proposed network for Wood Green. Wood Green is a proposed network that will be the first phase of the DEN, focusing on developments at Clarendon Square, the Chocolate Factory and other nearby sites potentially including a new Council office on Wood Green High Road. There is currently a 10-year window for the connection to become available. Due to this, a connection at this point was not found to be feasible and low carbon heating on site is proposed.

SITE WIDE CHP

Taking into consideration the decarbonisation of the grid as well as the fact that the heat pumps are a substantially lower carbon system than gas-based or direct electric solutions, it is recommended the heating and domestic hot water production of the new building is served by a heat pump technology.

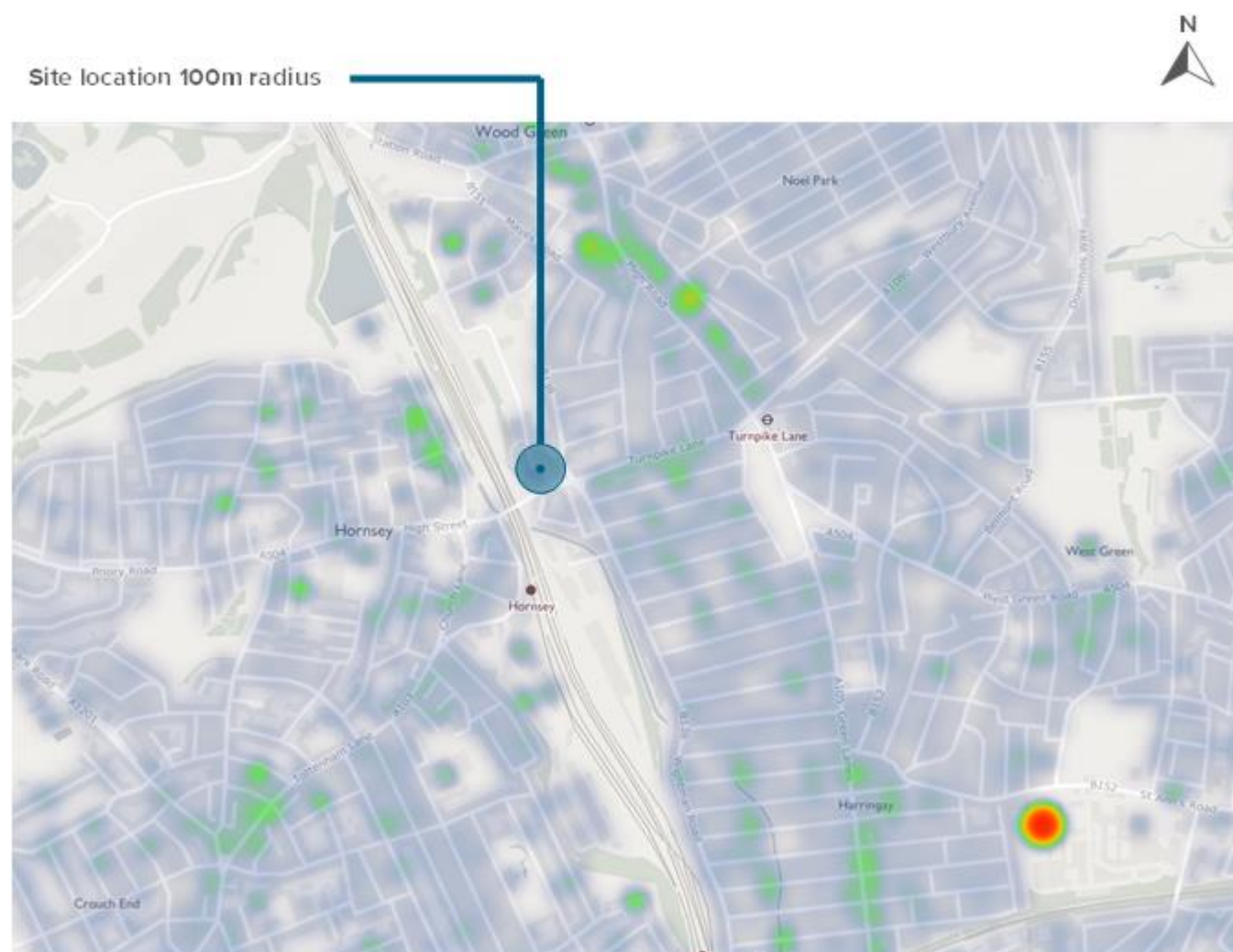


Figure 5: Excerpt from the London Heat Map. Existing district networks outlined in yellow, proposed networks in red.

ENERGY STATEMENT

COMMUNAL HEATING

A communal heating strategy is to be implemented within the residential portion of the scheme through a centralised energy centres comprising ASHP.

INDIVIDUAL HEATING

An individual strategy has been proposed for the non-residential portion of the scheme. Therefore, the space heating and hot water will be provided by individual ASHP and electric instantaneous water heaters.

BE CLEAN CO₂ EMISSIONS

By means of communal heating, regulated CO₂ emissions for the proposed development will be further reduced over the Lean stage.

This is achieved via the provision of both communal and individual ASHP in comparison to the notional system included at the Be Lean stage.

BE GREEN – USE RENEWABLE ENERGY

The renewable technologies feasibility study carried out for the development identified photovoltaics and air source heat pumps as suitable technologies for the development. The regulated carbon saving achieved in this step of the Energy Hierarchy is 47.7% over the site wide baseline level with SAP10.2 emission factors.

RENEWABLE TECHNOLOGIES FEASIBILITY STUDY

Methods of generating on-site renewable energy (Green) were assessed, once Lean and Clean measures were taken into account.

The development of Jessica Buttons Factory will benefit from an energy efficient building fabric which will reduce the energy consumption of the proposed development in the first instance. A range of renewable technologies were subsequently considered including:

- Biomass;
- Ground/water source heat pumps;
- Air source heat pump;
- Wind energy;
- Photovoltaic panels, and,
- Solar thermal panels.

In determining the appropriate renewable technology for the site, the following factors were considered:

- CO₂ savings achieved;
- Site constraints;
- Maintenance;
- Lifetime, and;
- Any potential visual impacts.

RENEWABLE ENERGY APPRAISAL SUMMARY

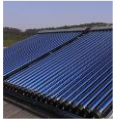
The table on the following page summarises the factors taken into account in determining the appropriate renewable technologies for this project. This includes estimated capital cost, lifetime, level of maintenance and level of impact on external

appearance. The final column indicates the feasibility of the technology in relation to the site conditions (10 being the most feasible and 0 being infeasible). It is important to note that the information provided is indicative and based upon early project stage estimates.

The feasibility study demonstrates that photovoltaics and ASHP would be the most feasible renewable technologies for the proposed Jessica Buttons development.

ENERGY STATEMENT

Table 4. Summary of renewable technologies feasibility study

		Comments	Lifetime	Maintenance	Impact on external appearance	Site feasibility
Biomass		Not adopted – burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.	20 yrs.	High	High	1
PV		Adopted	25 yrs.	Low	Med	9
Solar thermal		Not adopted – Include site specific reason for ST not being adopted.	25 yrs.	Low	Med	6
GSHP		Not adopted -the installation of ground loops requires significant space, additional time at the beginning of the construction process and very high capital costs.	20 yrs.	Med	Low	4
ASHP		Adopted	20 yrs.	Med	Med	9
Wind		Not adopted - Wind turbines located at the site will have a significant visual impact on the site and surroundings.	25 yrs.	Med	High	1

DETAILED ASSESSMENT OF PHOTOVOLTAIC PANELS

Four types of solar cells are available on the market at present and these are mono-crystalline, poly-crystalline, thin film and hybrid panels. Although mono-crystalline and hybrid cells are the most expensive, they are also the most efficient with an efficiency rate of 12-20%. Poly-crystalline cells are cheaper but they are less efficient (9-15%). Thin film cells are only 5-8% efficient but can be produced as thin and flexible sheets.

Photovoltaics are considered a suitable technology for this development for the following reasons:

- The development provides an extent of roof space for the installation of PV panels;
- PV arrays are relatively easy to install when compared to other renewable systems; and
- PV panels provide a significant amount of CO₂ savings.

The PV shall comprise 17.8kWp 118.65m²) of horizontal roof mounted arrays. The PV array will be connected to both the domestic part (landlord areas) and the for non-domestic parts of the development. 2.8kWp will be attributed to the commercial area, with the remaining 15kWp feeding the residential portion.

The table on the right summarises the technical data of the domestic and non-domestic parts of the scheme for the proposed PV array and estimated CO₂ savings from the application of this technology. In total the PV installation would produce regulated CO₂ savings of 3.1% for the development.

An indicative area for the installation of the PV panels on the roof can be found in the following page.

The performance and output of the PV system will be monitored, in line with the Be Seen policy.

Table 5: Summary of technical/operational data and estimated CO₂ savings for PVs

Photovoltaics (Domestic)	
Module efficiency	15 %
Orientation	South
Carbon intensity for electricity	0.136 kgCO ₂ /kWh
Predicted site solar energy	950.6 kWh/m ² .yr
System losses	20 %
System peak power	15 kWp
Array area	100 m ²
Primary energy offset by PV	11,407 kWh/yr.
Total CO ₂ savings	1.6 t/yr.
Regulated baseline CO ₂ emissions	58.0 t/yr.
Total baseline CO ₂ emissions	76.0 t/yr.
% Regulated CO ₂ reduction*	2.7% %
% Total CO ₂ reduction*	2.0 %
Photovoltaics (Non-Domestic)	
Module efficiency	15 %
Orientation	South
Carbon intensity for electricity	0.136 kgCO ₂ /kWh
Predicted site solar energy	914 kWh/m ² .yr
System losses	20 %
System peak power	2.8 kWp
Array area	18.65 m ²
Primary energy offset by PV	1,917 kWh/yr.
Total CO ₂ savings	0.3 t/yr.
Regulated baseline CO ₂ emissions	58.0 t/yr.
Total baseline CO ₂ emissions	76.0 t/yr.
% Regulated CO ₂ reduction*	0.4 %
% Total CO ₂ reduction*	0.3 %

* % reduction from site baseline



Figure 6: Monocrystalline PV arrays

DETAILED ASSESSMENT OF AIR SOURCE HEAT PUMPS

Air source heat pumps (ASHPs) employ the same technology as ground source heat pump (GSHPs). However, instead of using heat exchangers buried in the ground, heat is extracted from the external ambient air.

The efficiency of heat pumps is very much dependent on the temperature difference between the heat source and the space required to be heated. As a result, ASHPs tend to have a lower COP than GSHPs. This is due to the varying levels of air temperature throughout the year when compared to the relatively stable ground temperature. The lower the difference between internal and external air temperature, the more efficient the system.

ASHP is considered a suitable technology for the development for the following reasons:

- It is a high efficiency system that can cater for the space heating and cooling of the most energy-intensive areas of the proposed development;
- Requires less capital cost than GSHP and other renewable technologies;
- It can be integrated with the proposed ventilation strategy; and,
- It is simple to install when compared to other renewable technologies and will work well alongside PV.

End-users will be supplied with regular information to control and operate the system e.g. at point of occupancy and maintenance visits.

The performance of the heat pump system post construction will be monitored to ensure it is achieving the expected performance, in line with the Be Seen policy.

The table to the right summarises the technical data for the proposed ASHP and estimated CO₂ savings from the application of this technology. As per GLA guidance, the majority of savings experienced through proposing ASHP are accounted for within the Be Lean section. In total the ASHP technology would produce regulated CO₂ savings of 44.6% for the residential part of the development.

Table 6: Summary of technical/operational data and estimated CO₂ savings for ASHP

ASHP for domestic spaces	
COP heating	1.7
Carbon intensity of electricity	0.136 kgCO ₂ /kWh
Proportion of domestic space heating and hot water met by ASHP	100 %
Energy met by ASHP	167,260 kWh/yr.
Energy used by ASHP	100,061 kWh/yr.
Total CO ₂ savings	25.9 t/yr.
Regulated baseline CO ₂ emissions	58.0 t/yr.
Total baseline CO ₂ emissions	76.0 t/yr.
% Regulated CO ₂ reduction*	44.6 %
% Total CO ₂ reduction*	34.0 %
ASHP for non-domestic spaces	
COP heating	3.2
COP cooling	6.0
Carbon intensity of electricity	0.136 kgCO ₂ /kWh
Proportion of non-domestic space heating met by ASHP	100 %
Proportion of non-domestic hot water met by ASHP	0 %
Proportion of non-domestic space cooling met by ASHP	100 %
Energy met by ASHP	32,469 kWh/yr.
Energy used by ASHP	5,650 kWh/yr.
Total CO ₂ savings	- t/yr.
Regulated baseline CO ₂ emissions	- t/yr.
Total baseline CO ₂ emissions	- t/yr.
% Regulated CO ₂ reduction*	- %
% Total CO ₂ reduction*	- %

* % reduction from site baseline



Figure 7: Outdoor units of ASHP

ENERGY STATEMENT

BE GREEN CO₂ EMISSIONS

Following the measures adopted at Lean stage, further savings can be obtained through the incorporation of the proposed PV panels and ASHP. Through the integrated performance of the proposed measures at each step in the Energy Hierarchy, the development meets the relevant London Plan and London Borough of Haringey policies.

ESTIMATION OF OPERATIONAL FUEL COSTS

This section provides an early-stage estimation of the operation costs of the development from an energy perspective.

OPERATIONAL COSTS

The annual estimated operational fuel cost predictions associated with the development as a whole using SAP and SBEM methodologies are outlined in the table below.

It should be appreciated that the operational fuel costs presented in this report are solely based on Building Regulations Part L compliance calculations carried out at early design stage. These estimations do not necessarily reflect the actual operational costs, and do not take into consideration occupant behaviour and account for costs associated with un-regulated energy use.

It is noted that Renewable Heat Incentive (RHI) is available for both domestic and non-domestic developments with air source heat pumps and photovoltaics installed. This will be explored in more detail post-planning and post-construction so the applicant can seek a financial subsidiary with the more detailed design information required (e.g. EPCs).

Annual administration costs of the residential communal system will be covered confirmed by the management company, they are therefore considered to have a more accurate understanding of these associated costs and given the nature of the scheme, closer to completion of the development.

Table 7. Estimated operational fuel cost for Jessica Buttons Factory

		Unit
Space heating energy demand	64,630	kWh/year
Hot water energy demand	84,900	kWh/year
Other electricity consumption	173,660	kWh/year
Per unit cost - electricity	0.17	£/kWh
Per unit cost - gas	0.03	£/kWh
Annual operational cost - electricity	82,410	£/year
Annual operational cost - gas	-	£/year
Total annual operational energy fuel cost	82,410	£/year

CONCLUSIONS

Following the implementation of the three-step Energy Hierarchy, the cumulative CO₂ savings on site are estimated at 70.7% for the domestic part and 57.7% for the non-domestic part of the development, against a Part L 2013 compliant scheme. The regulated CO₂ savings for the site as a whole are 69.4% with SAP10.2 emission factors. These increased carbon savings have been targeted to account for the uplift between Part L 2013 and Part L 2021 and to ensure the proposed development would be in line with the new Building Regulations.

ON SITE CO₂ SAVINGS

By implementing the three step Energy Hierarchy as detailed in the previous sections, the Regulated CO₂ emissions for the development have been reduced against a Part L 2013 compliant scheme through onsite measures alone by:

Cumulative Regulated CO ₂ Savings		
	SAP10 10.2	
	%	t/yr
Domestic	70.7	37.0
Non-domestic	57.7	3.3
Site wide	69.4	40.3

OFF SITE CO₂ SAVINGS: CARBON OFFSET PAYMENT

The proposed development exceeds the London Plan CO₂ savings target of 35% overall.

With the SAP10.2 carbon factors, to achieve 'zero carbon' for the residential portion of the scheme, 15.3 tonnes per annum of regulated CO₂, equivalent to 460.4 tonnes over 30 years, from the new-build domestic portion should be offset offsite. The shortfall to a zero carbon reduction from baseline for the non-domestic portion of the scheme would be 2.4 tonnes per annum of regulated CO₂, equivalent to 71.6 tonnes over 30 years, to be offset offsite.

DOMESTIC CUMULATIVE SAVINGS

Any carbon offset contributions will be subject to viability discussions and detailed design stage calculations when the SAP 10 software is reliable and accurate.

The tables in the following pages summarise the implementation of the Energy Hierarchy for the proposed scheme and detail the CO₂ emissions and savings against the baseline scheme for each step of the hierarchy; as well as the savings achieved through carbon offset.

Separate tables are presented for the domestic and non-domestic parts of the development; as well as for the site as a whole.

Overall, the proposed development has been designed to meet energy policies set out by the GLA and the London Borough of Haringey, which demonstrates the client and the design team's commitment to enhancing sustainability of the scheme.

BE SEEN

Following the implementation of the three previous stages of the hierarchy, a monitoring strategy will be put in place to ensure that the actual energy performance of the development can be monitored and reported post-occupation. The relevant parties will also be made aware of their responsibilities at subsequent reporting stages.

ENERGY STATEMENT

Table 8: CO₂ emissions after each step of the Energy Hierarchy for the domestic part of the development

	Carbon dioxide emissions for domestic buildings (tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline	52.4	16.5
After energy demand reduction	42.8	16.5
After heat network/CHP	42.8	16.5
After renewable energy	15.3	16.5

Table 9: Regulated CO₂ savings from each stage of the Energy Hierarchy for the domestic part of the development

	Regulated domestic carbon dioxide savings	
	Tonnes CO ₂ per annum	% over baseline
Savings from energy demand reduction	9.6	18.4
Savings from heat network/CHP	0.0	0.0
Savings from renewable energy	27.4	52.3
Cumulative on site savings	37.0	70.7
Cumulative for offset payments	460.4 tonnes over 30 years	

NON-DOMESTIC CUMULATIVE SAVINGS

Table 1: CO₂ emissions after each step of the Energy Hierarchy for the non-domestic part of the development

	Carbon dioxide emissions for non-domestic buildings (tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline	5.6	1.4
After energy demand reduction	2.7	1.4
After heat network/CHP	2.7	1.4
After renewable energy	2.4	1.4

Table 2: Regulated CO₂ savings from each stage of the Energy Hierarchy for the non-domestic part of the development

	Regulated non-domestic carbon dioxide savings	
	Tonnes CO ₂ per annum	% over baseline
Savings from energy demand reduction	3.0	52.6
Savings from heat network/CHP	0.0	0.0
Savings from renewable energy	0.3	5.1
Cumulative on site savings	3.3	57.7
Shortfall from zero carbon	71.6 tonnes over 30 years	

ENERGY STATEMENT

SITE-WIDE CUMULATIVE SAVINGS

Table 3: Site wide regulated CO₂ emissions and savings

	Total regulated emissions (tonnes CO ₂ /year)	Regulated CO ₂ savings (tonnes CO ₂ /year)	Percentage saving (%)
Baseline	58.0	-	-
Be Lean	45.4	12.6	21.7
Be Clean	45.4	0.0	0.0
Be Green	17.7	27.7	47.7
Total	-	40.3	69.4
Offset to zero carbon for domestic		460.4 tonnes over 30 years	
Offset for non-domestic to zero carbon		71.6 tonnes over 30 years	

APPENDIX A – OVERHEATING RISK ASSESSMENT

OVERHEATING RISK ASSESSMENT

9.543 – 30-36 CLARENDON ROAD, LONDON, N8 0DJ

07/10/2022 by AM, reviewed by LW

All habitable residential rooms assessed at the proposed development at 30-36 Clarendon Road were found to meet the Part O overheating risk criteria for the London Weather Centre DSY1 future weather data set (2020 High 50 Percentile) when incorporating a combination of natural ventilation and solar control techniques in the design. Due to noise restrictions, an analysis has also been undertaken assuming windows are not able to open overnight. As a result, the provision of trim cooling as part of the MVHR system is recommended to mitigate overheating risk in bedrooms. The non-residential spaces were found to require an element of comfort cooling due to lack of natural ventilation at basement. The design incorporates natural ventilation, solar control glazing, external shading and efficient lighting to ensure cooling need only be used during the hottest periods.

EXECUTIVE SUMMARY

An overheating risk analysis has been conducted for the proposed development at 30-36 Clarendon Road at the old Jessica Buttons factory, located in the London Borough (LB) of Haringey. The purpose of this analysis is to test the design of the proposed scheme and ensure the mitigation of overheating risk as far as possible within the occupied zones across the development. This will ensure the comfort of the occupants as well as future-proof the scheme by taking into account projected increased ambient air temperatures resulting from climate change.

In order to assess the thermal performance of the development, models were constructed using thermal simulation software. The internal temperature was estimated for all the habitable internal spaces. Lighting, occupancy and ventilation conditions were input based on Part O methodology.

With the aim of giving the most robust consideration, performance of the various occupied rooms was compared with Approved Document Part O of the Building Regulations, which relies on the CIBSE Technical Memorandum 59¹ performance recommendations, with some further added restrictions. These are rigorous targets that determine the acceptability of overheating based on the temperature differential between the internal and the external environment (ΔT), considering the frequency of high temperature difference beyond which the level of overheating is considered unacceptable. Specifically, for bedrooms, the methodology further aims to evaluate comfort during the sleeping hours by setting a maximum number of hours for which the operative temperature can exceed 26°C. Part O is part of the Building Regulations 2021 and is currently the most appropriate assessment methodology for assessing overheating risk in residential properties in the UK.

¹ CIBSE TM59:2017 – Design Methodology for the assessment of overheating risk in homes

CIBSE Technical Memorandum (TM52) is the recommended methodology assessing overheating risk in non-domestic developments. Guidance from LB Haringey's Key Overheating Planning Application Requirements was followed as well.

The thermal simulations indicate that the dwellings are predicted to satisfy the overheating risk criteria for the probabilistic Design Summer Year (DSY1 – 2020 High emissions 50 Percentile) for the London Centre weather file through a combination of natural ventilation, solar control strategies and external shading across the scheme.

As confirmed by the acoustic assessment, all bedrooms are expected to experience increased risk of noise, and the proposed solution for these has been to test a scenario where bedroom windows are closed, and the mechanical ventilation from the proposed MVHR with a proportion of pre-tempered intake air is applied as per the specification. This does not amount to full comfort cooling, rather it is a 'trim cooling' provision, expected to be capable to reducing the incoming air temperature by approx. 8°C. A test of the sample units against the 'predominantly mechanically ventilated' criterion confirm that the bedrooms are expected to meet the Part O criteria with the as-designed MVHR running in cooling mode. XCO2 would also recommend that:

- It should be ensured that all residential windows and glazed doors can be fully openable (side hung by 90 degrees) and provide minimum equivalent free areas as described in the 'Ventilation section' within this report;
- It should be ensured that all external windows can be open inwards;
- For solar control, glass of low g-value (0.50) for all residential windows and glazed doors will be specified to avoid solar transmittance during summer, but allow for passive heating in the winter;
- Use of internal shading devices e.g., curtains or blinds of low shading coefficient will be recommended to the future tenants for controlling solar gains. The impact of internal shading devices is not accepted by the Part O methodology, thus, is not included in our assessment;
- On Level 1, provision of external vertical fins on top of full height openable glazing behind will be recommended for controlling solar gains, for protection from falling and for privacy (please refer to window types WT9 and WT12 in the ventilation section), and;
- MVHR with integrated cooling coil is required for all bedrooms' compliance due to noise restrictions stated by the Part O methodology and confirmed by the acoustic analysis. Detailed information can be found in the 'Ventilation section' within this report.
- In case of overheating, residents are encouraged to make use of their private amenities, in the form of balconies, provided to all residential units across the scheme. A communal outdoor space (e.g., play space/communal terrace) has also been provided at level 6 for the residents to cool down during extreme weather conditions.

The proposed non-residential spaces are predicted to satisfy the overheating risk criteria for the probabilistic Design Summer Year (DSY1) 2020's weather data for London Weather Centre through the use of mechanical cooling, after passive design measures have been maximised (energy efficient lighting, insulated pipework, deeper window reveals for shading, and solar control glazing with g-value of 0.5).

The above measures incorporated as part of the proposed scheme are not seen to suffice for compliance with the 2050's weather file. While it is aspired to, but not a requirement that Part O risk criteria is met for future weather files, the below measures are being considered for future retrofit plans.

- For better overheating risk mitigation performance, 800mm deep external shading (to achieve 1m depth in conjunction with the window reveals) to enable compliance in the future due to the rising temperatures. The shading device is proposed as a horizontal feature directly above south and southwest facing glazing and as a vertical for the full height of the glazing (on the southern edge) of all east and west facing window assemblies. This option provides solar shading without relying on occupants to control shading devices and the shading does not interfere with the air flow. It does of course have aesthetic and cost implications however.
- A lower g-value of 0.4 would be recommended to reduce solar gains if this can be accommodated whilst also meeting light transmittance targets for the daylight analysis. It is expected such a reduction would reduce energy and carbon emission reductions slightly due to a loss of beneficial solar gains in winter.
- Due to the acoustics restrictions on the opening of windows at night, higher flow rates from the MVHR with incorporated cooling coil would be required in bedrooms and KLDs. Based on the limits and constraints from the trim cooling provided by the MVHR, apartments with 3 bedrooms may have to consider active cooling to provide sufficiently comfortable conditions in these more extreme weather situations, and comply with the Part O requirements.

The retrofit plan for more onerous weather files such as 2080's period or for more severe weather types such DSY2 and DSY3, or for more resilience to climate change could also include (in addition to the measures outline above for the 2050's retrofit plan):

- Provision of Juliet balconies with railing and replacement of any fixed glazing (e.g., at their end of life) with openable windows throughout the scheme.
- For better integration with architecture, external automated blinds could also be installed in the future to provide additional shading. These could potentially integrate better with the architectural design of the façade but would interfere with the air flow, depending on how and when they are operated.
- Under the 2080 climate scenario the dwellings are expected to require active cooling in order to meet Part O criteria. To reduce the energy consumption, the cooling system is recommended to be limited to providing trim cooling to a reasonable set reduction in temperature, rather than unlimited comfort cooling.

NON-RESIDENTIAL – COMMERCIAL (RETAIL) UNITS

The three commercial units located at ground were tested as a free-running building for the purpose of this report against the TM52 risk criteria. The thermal simulations indicate the following:

- The commercial units are predicted to satisfy the overheating risk criteria using the weather data DSY1 (2020s, high emissions, 50% percentile scenario) for the London Weather Centre through a combination of energy efficient lighting, natural ventilation, reduced g-value and comfort cooling via cooling coils in the MVHR unit to the basement areas to prevent overheating only during the hottest periods. The cooling system is recommended to be limited to providing trim cooling to a reasonable set reduction in temperature, rather than unlimited comfort cooling.

While it is aspired to, but not a requirement that TM52 risk criteria is met for future weather files, the below measures are being considered for future retrofit plans. The assessment indicates:

- Under the 2050 climate scenario the space is demonstrating compliance through the cooling coil system with a higher flow rate through the MVHR unit.
- Under the 2080 climate scenario the space will require a higher flow rate through the MVHR unit however will still be able to utilise the cooling coil rather than requiring future active cooling measures.

Based on the method of assessment adopted, XCO2 recommend the design team consider incorporating the features that allow compliance with the Part O criteria for the London Centre DSY1 2020s weather data.

A future retrofit plan has been outlined and it is recommended that the future building management is made aware of the proposals that should be reviewed in the future to assess if local environmental conditions have changed and new design/technological innovations are available.

It should be noted that the findings of this assessment are related to planning stage design only and are based on a sample of flats, in line with the methodology. Any changes to the design, ventilation strategy, façade opening areas, window specifications, operation and shading elements would impact the performance of the building and would void the results of the current assessment. In that case, it is recommended that additional modelling is undertaken to ensure compliance with the LB Haringey and London Plan Policy requirements and building regulations.

METHODOLOGY

3D thermal models of the proposed scheme, which comprises a mix of residential units, have been developed based on the planning architectural drawings received from Stockwool, dated on 16 September 2022.

The assessment has identified those dwellings that are at higher risk of overheating and a sample of units representing these dwellings have been assessed against the Part O overheating criteria, and in line with the Haringey's key overheating planning application requirements. To give a fair representation of the residential development, 16 residential units (including their 22 Double bedrooms, 4 Single bedrooms and 16 Kitchen/Living/Dining areas (KLD)) were analysed to provide a representative sample of the space and dwelling typologies within the development. These include units with larger glazing area, units-with windows facing all directions, especially those south or south-west aspect, top floor units that receive higher solar gains, units where cross ventilation is not possible, and units where openings cannot be left open at night for acoustic reasons.

Surroundings have been modelled based on the current site layouts. The scheme at 30-36 Clarendon Road is part of a masterplan and future redevelopment of the area that includes taller buildings across the site. This cumulative scenario of the future surroundings has not currently been modelled; however overheating risk results would be expected to perform better once future redevelopment is erected due to the taller buildings providing additional shade to the proposed scheme. This assessment is therefore considered to be a worst-case scenario in terms of surrounding context as far as the overheating risk assessment is concerned.

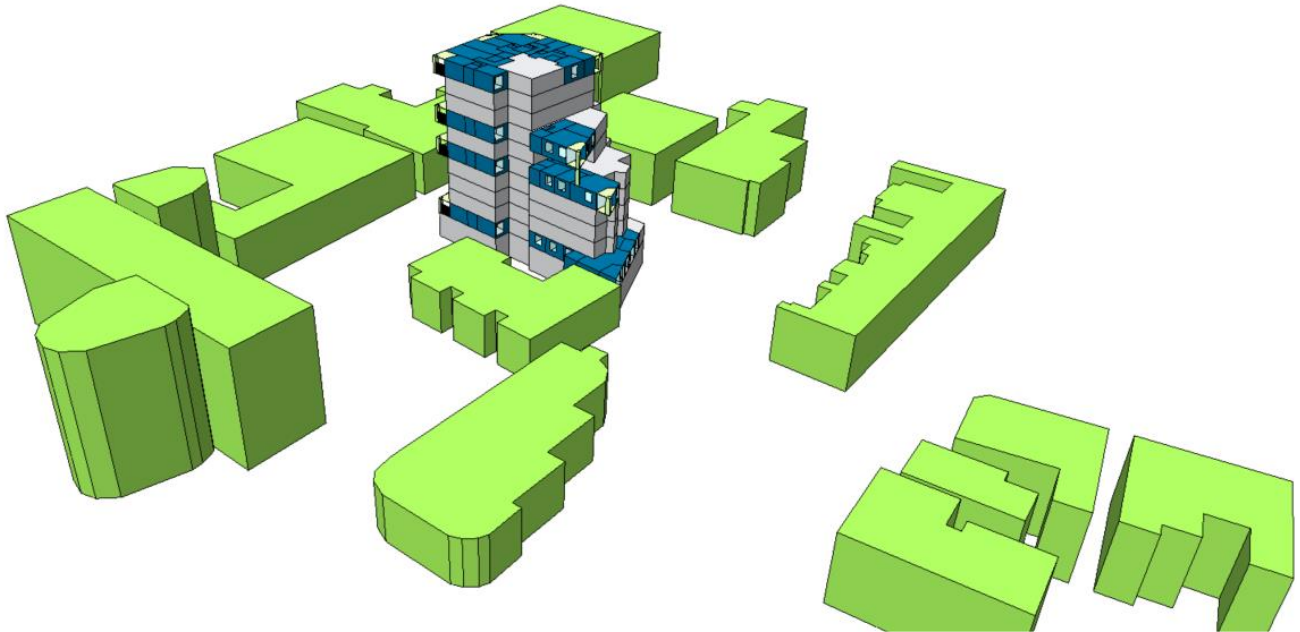


Figure 1: An axonometric view of 30-36 Clarendon Road scheme.

The overheating risks of the spaces were assessed for current and future climate scenarios. Following the methodology set out in CIBSE TM49 Design Summer Years for London, the following three years were selected to form the set of probabilistic design summer years for the future weather scenarios:

- DSY1 (1989) for the 2020s, high emissions, 50% percentile scenario;
- DSY2 (2003) for the 2020s, high emissions, 50% percentile scenario;
- DSY3 (1976) for the 2020s, high emissions, 50% percentile scenario.

These files are climate-change adjusted versions of the current DSY. The first of these years, 1989, is the current DSY and represents a moderately warm summer, as is interpreted in current CIBSE guidance. The years 1976 and 2003 were chosen as more extreme years with different types of summer: the former is a year with a long period of persistent warmth, whereas the latter has a more intense single warm spell. The 2020 period is of particular interest as this relates to the period 2011-2040, which is the period we have now entered. For the 50% percentile changes, which may be viewed as the 'best guess' level of change.

The buildings have been modelled using dynamic thermal simulation software which is fully compliant with CIBSE Applications Manual AM11. The software can compute operative temperatures using CIBSE weather data sets, building fabric specification, window areas and opening, all aspects of solar and internal gains as well as natural ventilation flows within buildings. Compliance of the design with the CIBSE TM59 criteria has been sought and recommendations for future occupancy have been also presented.

NOISE AND OVERHEATING RISK ALIGNMENT

An assessment of noise risk has been undertaken for the development. It is expected that a strategy of using openable windows during the day will be acceptable for the development, however the acoustic/noise assessment has highlighted that there may be a risk of excessive noise overnight. Therefore, the total 42 modelled occupied units (26 bedrooms and 16 KLDs) would not be able to rely solely on openable windows as a means of mitigating high internal temperatures, and therefore this would not be recommended from an acoustic point of view for these dwellings.

The strategy for mitigating overheating risk in bedrooms will therefore differ to the remainder of rooms across the development, and this is set out in this report.

ASSESSMENT CRITERIA

RESIDENTIAL

The performance standards set out within Part O (referenced from CIBSE TM59) have been used to assess the overheating risk within the proposed development.

Considering the dwellings within the development will use natural ventilation as the primary mechanism to mitigate overheating risk, the following two criteria must be met:

1) For living rooms, kitchens and bedrooms:

The number of hours during which ΔT (the difference between operative and threshold comfort temperatures) is greater than or equal to one degree (K), during the period of May to September inclusive, shall not be more than 3 per cent of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).

2) For bedrooms only:

To evaluate comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26°C will be recorded as a fail).

The first criterion is evaluated in terms of the ΔT , which is the difference between the operative temperature T_{op} and the limiting maximum temperature T_{max} , $\Delta T = T_{op} - T_{max}$ ³. In order to estimate T_{op} , dynamic thermal modelling is carried out to compute the predicted temperature distribution in the different thermal zones of the building. The maximum acceptable temperature is a function of the outdoor temperature and the design limits, which are shown below. The table details the suggested acceptability in terms of the temperature range of naturally ventilated buildings. For the purpose of the assessment, we have used Category II limits, as recommended within CIBSE TM52.

Table 1: CIBSE TM52 – Suggested applicability of the category and the associated acceptable temperature range for a free running building

Category	Explanation	Acceptable Range (°C)
II	Normal expectation (for new buildings and renovations)	±3

CIBSE TM59 also recommends assessment criteria for overheating risk in corridors based on exceeding an operative temperature of 28°C. Whilst there is no mandatory target, corridors should aim to comply with the following criteria:

1) For corridors:

If an operative temperature of 28°C is exceeded for more than 3% of total annual hours, this should be flagged as a significant risk within the report.

NON-RESIDENTIAL

The performance standards set out within CIBSE TM52 have been used to assess the overheating risk within the commercial elements of the scheme. At least two of the following must be met:

1) Hours of exceedance (H_e): $H_e < 3\%$ of occupied hours

² Operative temperature models the combined effect of convective and radiant heat transfer. It accounts for the combined of the temperature of the air, the temperature of the surfaces and air speed.

³ T_{max} is the maximum acceptable temperature and is dependent on the outdoor running mean temperature and the building category with each associated acceptability range.

As per criterion 1 above.

2) Daily weighted exceedance (W_e): $W_e < 6$

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperature rise and duration. This criterion sets a daily limit for acceptability.

3) Upper limit temperature (T_{upp}): $T_{op} - T_{max} < 4^{\circ}\text{C}$

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

Table 2: CIBSE TM52 – Suggested applicability of the category and the associated acceptable temperature range for a free running building.

Category	Explanation	Acceptable Range ($^{\circ}\text{C}$)
II	Normal expectation (for new buildings and renovations)	± 3

MODELLING ASSUMPTIONS

FABRIC PERFORMANCE

The specification of the fabric is aligned with the proposals at planning stage as these are outlined in the Energy Statement for the scheme and summarised in Table 3:

Table 3: Building fabric assumptions.

Element	Specification	
	U-value [$\text{W}/\text{m}^2.\text{K}$]	
External Walls	0.15	
Ground Floor	0.10	
Roof	0.10	
	U-value [$\text{W}/\text{m}^2.\text{K}$]	g-value
Window	1.20	0.50
	Air permeability (@50Pa)	
	3 $\text{m}^3/\text{m}^2.\text{h}$ (residential)	
	4 $\text{m}^3/\text{m}^2.\text{h}$ (non-residential)	

OCCUPANCY

RESIDENTIAL

The TM59 methodology in which Part O is referenced specifies the hours during which spaces are anticipated to be occupied and these have been used within the overheating assessment calculations. Table 4 sets out the predicted occupancy patterns for the assessed rooms within the dwellings in line with the Part O requirements; these are programmed into the dynamic software model to calculate the relative occupancy gains for the designated spaces.

Table 4: Occupancy assumptions for a 3-bedroom dwelling room type assessed.

Area	Part O Predicted occupation pattern
Bedroom	24 hours a day
Open Plan Kitchen/Living/Dining (KLD)	08:00 – 23:00 (3 people, 100% gains)

NON-RESIDENTIAL

CIBSE TM52 does not specify the exact hours the commercial spaces are expected to be occupied, and as a result BRE estimates, inherited from the National Calculation Methodology (NCM), are often used as a basis for a prediction of the occupied hours of different areas. The table below sets out the occupancy times included within the model.

Table 5: Occupancy assumptions for each non-domestic room type assessed.

Area	NCM Predicted Occupation Pattern
Commercial - Retail	09:00 – 18:00

INTERNAL GAINS**RESIDENTIAL**

Similar to the predicted occupancy hours, the internal gains (lighting, equipment, people) for occupied areas are incorporated within the model in line with the guidance set out in Part O.

Table 6 sets out the various internal gains for the assessed rooms within the dwellings. Non-occupied spaces such as circulation, bathrooms and storage were modelled based on the typical internal gains specified within the Part O methodology.

Table 6: Internal Gains modelled for each room type assessed.

Area	Predicted Internal Gains		
	Lighting [W/m ²]	People [peak W]	Equipment [peak W]
Double Bedroom	2.0 W/m ²	150 W sensible, 110 W latent	80 W
Single Bedroom	2.0 W/m ²	75 W sensible, 55 W latent	80 W
1Bed Kitchen/Living area	2.0 W/m ²	75 W sensible, 55 W latent	450 W
2Bed Kitchen/Living area	2.0 W/m ²	150 W sensible, 110 W latent	450 W
3Bed Kitchen/Living area	2.0 W/m ²	225 W sensible, 165 W latent	450 W
HIU cupboards	-	-	31 W

TM59 requires the inclusion of corridors in the overheating risk analysis where community heating pipework runs through them. A sample circulation area has been included in the assessment to verify the compliance with TM59 guidance and to ensure the design is robust and overheating risk is mitigated in all areas of the dwelling. The assessment takes into account heating pipework distribution gains on communal corridors in accordance with CIBSE Guide C. The model accounts for 12.19 W/m heat loss per metre run of pipe.

Table 7: Internal Gains modelled for corridor areas.

Area	Predicted Internal Gains		
	Lighting [W/m ²]	People [peak W]	Equipment [peak W]
Corridor	2.0 W/m ²	-	500 W

NON-RESIDENTIAL

Table 8: Internal gains for commercial spaces.

Area	Predicted Internal Gains		
	Lighting [W/m ²]	People [m ² /person]	Equipment [W/m ²]
Commercial - Retail	31.2	8.5	5.2

VENTILATION

The proposed ventilation strategy for the development will be led by mechanical ventilation to all residential units. The mechanical ventilation system will include heat recovery to achieve ventilation in the most energy efficient way. Therefore, the estimated auxiliary ventilation flow rates have been included in the model in line with Part F requirements for background ventilation. The MVHR will automatically divert outgoing air around the heat recovery cell by a summer bypass.

For the purpose of this assessment natural ventilation was modelled as a baseline using equivalent free areas calculated from the elevations in the architectural drawings received from Stockwool on 16 September 2022. Detailed description of the modelled window types, and their equivalent free areas, can be seen below.

In line with the Part O methodology:

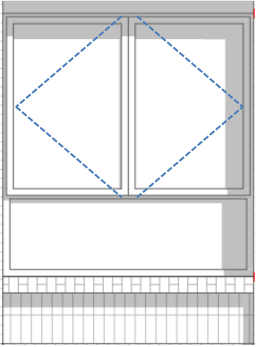
- It is assumed that windows will start to open when internal dry bulb temperature exceeds 22 °C for occupied hours (08:00 to 23:00);
- Be fully open when the internal dry bulb temperature exceeds 26 °C;
- Start to close when the internal dry bulb temperature falls below 26 °C;
- Be fully closed when the internal dry bulb temperature falls below 22 °C;
- For the baseline case, at night (23:00 to 08:00), bedroom openings are assumed fully open if the openings are on the first floor or above and the internal dry bulb temperature exceeds 23 °C. KLD windows are assumed closed overnight.

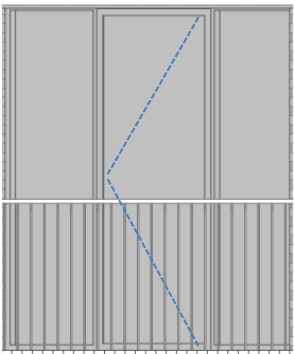
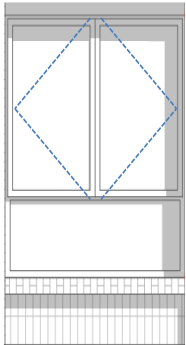
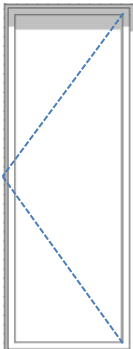
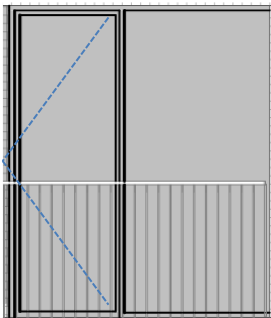
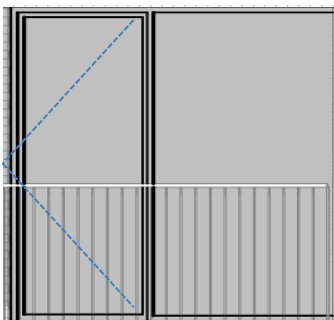
The methodology outlined in Appendix D of Approved Document O was used to calculate the equivalent area of each window types proposed across the scheme. The level of exposure and associated coefficients of discharge are set up in accordance with the relative position of each window in relation to building massing. The table below shows the detail of the minimum equivalent free area and the openable pattern of the windows in order to comply with Part O. Please refer to Appendix A for window types' location.

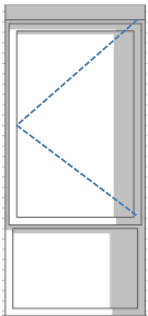
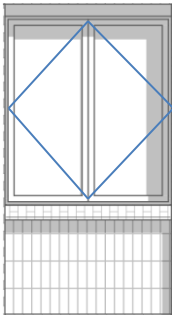
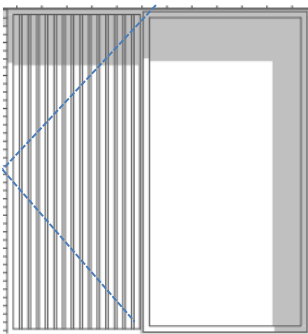
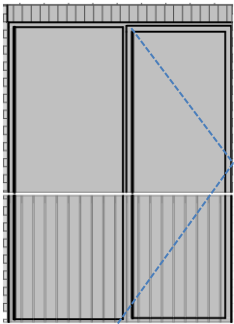
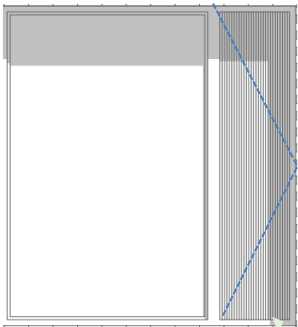
Internal doors in bedrooms and KLD areas have been included and assumed to be open during daytime but closed overnight. Location of the selected window types can be found in the Appendix A.

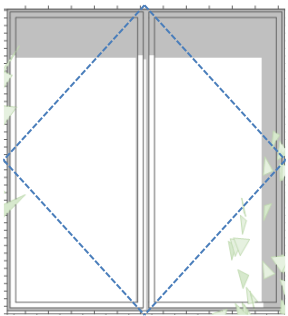
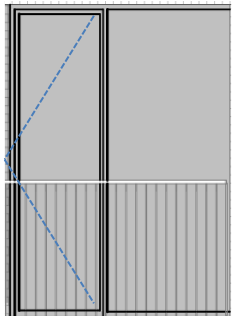
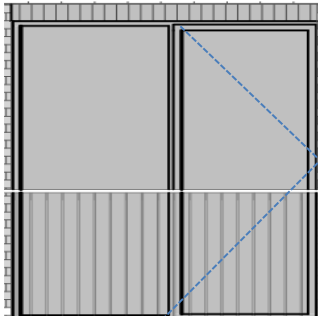
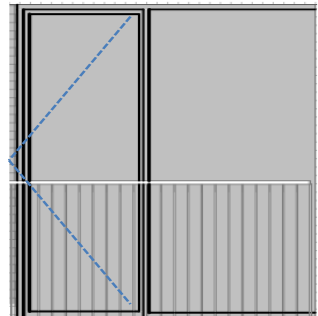
In case of overheating, residents are encouraged to make use of their private amenities, in the form of balconies, provided to all residential units across the scheme. A communal outdoor space (e.g., play space/communal terrace) has also been provided at level 6 for the residents to cool down during extreme weather conditions.

Table 9: Opening types as modelled in IES VE.

Window Reference (Total width)	Recommended free area for Part O compliance	Proposed openable design and modelled opening pattern	Minimum Equivalent Free Area
WT1 (w=1.81m)		Top panes: Side-hung 90° - Open daytime for all Upper floor KLD windows. - Open all day for Upper Floor Bedroom windows.	67%

Window Reference (Total width)	Recommended free area for Part O compliance	Proposed openable design and modelled opening pattern	Minimum Equivalent Free Area
WT2 (w=2.3m) (window to balcony)		Central pane: Side-hung 90° - Open daytime for all Upper floor KLD windows. - Open all day for Upper Floor Bedroom windows.	40%
WT3 (w=1.36m)		Top panes: Side-hung 90° - Open daytime for all Upper floor KLD windows. - Open all day for Upper Floor Bedroom windows.	67%
WT4 (w=0.91m) (window to balcony)		Side-hung 90° - Open daytime for all Upper floor KLD windows.	96%
WT5 (w=2.3m) (window to balcony)		Left pane: Side-hung 90° - Open daytime for all Upper floor KLD windows. - Open all day for Upper Floor Bedroom windows.	40%
WT6 (w=2.9m) (window to balcony)		Left pane: Side-hung 90° - Open daytime for all Upper floor KLD windows.	30%

Window Reference (Total width)	Recommended free area for Part O compliance	Proposed openable design and modelled opening pattern	Minimum Equivalent Free Area
WT7 (w=0.91m)		Top pane: Side-hung 90° - Open daytime for all Upper floor KLD windows. - Open all day for Upper Floor Bedroom windows.	67%
WT8 (w=1.36m)		Top panes: Side-hung 90° - Open daytime for all Upper floor KLD windows. - Open all day for Upper Floor Bedroom windows.	96%
WT9 (w=2.47m)		Left pane: Side-hung 90° - Open daytime for Upper floor KLD windows at Level 1. - External fins in front of glass openable window pane.	90% glazed element (Equivalent area to be reduced to 45% due to external fins)
WT10 (w=1.9m) (window to balcony)		Right pane: Side-hung 90° - Open all day for Upper Floor Bedroom windows.	45%
WT12 (w=2.47m)		Right pane: Side-hung 90° - Open daytime for Upper floor KLD windows at Level 1. - External fins in front of glass openable window pane.	90% glazed element (Equivalent area to be reduced to 45% due to external fins)

Window Reference (Total width)	Recommended free area for Part O compliance	Proposed openable design and modelled opening pattern	Minimum Equivalent Free Area
WT13 (w=2.47m) Winter Garden external windows		External windows in winter gardens at Level 1 Both panes: Side-hung 90° - Open daytime for windows to KLD only. - Open all day for windows to Bedroom.	96% (For protection and security reasons these windows require Juliet balconies or provision for external elements)
WT14 (w=1.8m) (internal window to winter garden)		Left pane: Side-hung 90° - Open daytime for Level 1 KLD window to winter garden.	57%
WT15 (w=2.5m) (internal window to winter garden)		Right pane: Side-hung 90° - Open daytime for Level 1 KLD window to winter garden.	57%
WT16 (w=2.5m) (internal window to winter garden)		Left pane: Side-hung 90° - Open all day for Level 1 Bedroom window to winter garden.	57%

The impact of using internal shading devices on reducing the risk of overheating has not been assessed, in line with GLA's guidance. Tenants will be advised to install curtains or blinds of low shading coefficient to allow for manual control of solar gains during summer, thus reducing the risk of overheating further. Venetian blinds in particular are highly recommended as they provide internal shading without interfering with natural ventilation.

In order to ensure the overheating mitigation strategy is usable, in addition to the restrictions on the opening of panes outlined previously, Part O includes further restrictions related to protection from pollution, noise and entrapment. A summary of the requirements and how compliance can be demonstrated for the proposed development, at this stage, has been provided below.

Noise

Part O notes that in locations where external noise may be an issue in accordance with the noise limits specified, the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am). Due to the high noise levels on the 30-36 Clarendon Road site, additional modelling was completed where passive ventilation through windows is not suitable. For these units, XCO2 recommend the design team to consider providing MVHR with incorporated cooling coil for all bedrooms. These rooms are initially above the required targets by Part O in terms of the number of hours during which overheating can be exceeded.

Pollution

Buildings located near to significant local pollution sources should be designed to minimise the intake of external air pollutants. **An Air Quality Assessment has been undertaken for the proposed development and has not identified any pollution risk for the future residents.**

Protection from Falling

Part O outlines specific requirements to minimise the risk of falling associated with the use of a natural ventilation strategy. Requirements are based on the degree of opening possible and guarding heights when windows open outwards. Windows above ground floor level with a change in floor level between inside and outside of more than 600 mm have a guarding height of 1.1 m or greater.

It is recommended that for the 30-36 Clarendon Road design all external openings across the scheme to open inwards.

Protection from Entrapment

Where louvred shutters, window rails and ventilation grilles are specified in line with security and noise requirements, these must comply with criteria to protect from entrapment related to the size of the openings and the presence of child safety devices in line with the following criteria.

- Not allow the passage of a 100mm diameter sphere
- Any hole which allows the passage of an 8mm diameter rod should also allow the passage of a 25mm diameter rod. Such holes should not taper in a way that allows finger entrapment.
- Any looped cords must be fitted with child safety devices.

RESULTS

This section presents the results summary for each of the tests carried out for the proposed development. In total 42no. habitable spaces were included in the assessment (22no. double bedroom, 4no. single bedroom, 7no. 1-bed KLDs, 8no. 2-bed KLDs and 1no. 3-bed KLDs). Non-habitable spaces such as bathrooms, storage rooms and circulation areas have also been included in the assessment; and their internal gains have been accounted for in the model.

Table 10 shows the modelling undertaken under for London Centre Weather DSY1 2020s weather data and the number of rooms that were not found to meet the Part O criteria for each of the modelling iterations. The purpose of the improvement measures proposed is to minimise the number of rooms that fail the Part O criteria to the extent possible, taking into consideration viability, feasibility and other design constraints.

Table 10: Overheating assessment results for London Centre Weather DSY1 2020s weather file.

ID	Design change	Bedrooms	Other rooms	Corridors	Bedrooms TM59 night-time 26°C criterion	Bedrooms TM52 Criterion 1	Other rooms (KLDs) TM52 Criterion 1	Corridors TM59 hours above 28°C criterion
		Window opening area and profile			No. of rooms not meeting criteria			
N1	All windows open as per proposed design. g-value=0.5	(See Table 9). windows to open all day.	(See Table 9) Windows to open day time only.	10 L/s mechanical exhaust fan in AOV and	0/26	0/26	0/16	0/1

				openable windows.				
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The following observations can be made from the results, and are recommended to comply with the overheating criteria:

- All of the assessed habitable rooms at the proposed development at 30-36 Clarendon Road were found to meet the Part O overheating risk criteria when assessed with openable windows as the main means of mitigating high internal temperatures (iteration N1);
- It should be ensured a minimum opening equivalent area of the windows as describes in Table 9;
- For solar control, glass of low g-value (0.50) for all residential windows and glazed doors will be specified to avoid solar transmittance during summer but allow for passive heating in the winter;
- Use of internal shading devices e.g., curtains or blinds of low shading coefficient will be recommended to the future tenants for controlling solar gains. The impact of internal shading devices is not accepted by the Part O methodology, thus, is not included in our assessment;
- Provision of external fins at level 1 have been included within the architectural design for controlling solar gains and it will be required to comply with the overheating criteria;
- The corridors were modelled with a continuous mechanical extract fan in the AOV riser which was found to be sufficient in allowing them to meet Part O criteria and therefore they are not considered to be a risk for overheating.

As described above, bedrooms are expected to experience increased risk of noise, and the proposed solution for these has been to test a scenario where windows are closed, and the mechanical ventilation is applied. Two options have been tested, with and without an additional cooling capacity incorporated. This cooling capacity is available for the proposed MVHR in all apartments. This does not amount to full comfort cooling, rather it is a 'trim cooling' provision, expected to be capable of reducing the incoming air temperature by approx. 8°C. All tested flats against the 'predominantly mechanically ventilated' criterion confirms that all bedrooms are expected to meet Part O criteria with the MVHR running in trim cooling mode.

Table 11: Overheating assessment results for the mechanical ventilation scenario under DSY1.

ID	Design change	Bedrooms	Kitchen / Living / Dining rooms	TM59 'predominantly mechanically ventilated' 26°C criterion
		Ventilation profile		No. of bedrooms not meeting criteria
M1	Frozen scheme design	All bedroom windows closed due to noise restrictions. Mechanical ventilation, no cooling capacity.		26/26
M2	With cooling coil capacity	All bedroom windows closed due to noise restrictions. Cooling coil capacity in ventilation air aligned to running the MVHR in cooling mode, reducing the incoming air temperature by approx. 6°C.		0/26

MVHR with integrated cooling coil is required for all bedrooms' compliance due to noise restrictions stated by the Part O methodology and confirmed by the acoustic analysis.

Furthermore, the last iterations (combined N1 & M2) were applied with DSY2 and DSY3 weather files, which are more severe weather types. The results for these years are shown in the table below.

Table 12: Overheating assessment results for the London Centre Weather, 1976 and 2003 for 2020 weather data.

Future Weather File – London Centre Weather Data				
Iteration	Glazing g-value	Glazing percentage	No. of rooms not meeting criteria	
			2003 (DSY2)	1976 (DSY3)
Based on iteration M2 above (DSY2 & DSY3 weather files)	0.5	As per proposed design (see Table 9)	42/42	42/42

M3 based on iteration above, plus: - Reducing g-value	0.4	As per proposed design (see Table 9)	42/42	42/42
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The nature of the DSY2 and DSY3 weather files are such that it becomes particularly difficult to fully mitigate overheating risk in accordance with Part O criteria owing to their onerous conditions. In essence, they are representative of a period where overheating is an intrinsic risk within the environment itself, rather than a risk imposed by inappropriate design.

Following assessment of the model with the DSY2 and DSY3 weather files, it can be observed in Table 12 that the criteria cannot be met, and the overheating risk cannot be mitigated through the currently implemented passive measures alone given the onerous nature of the more severe weather.

It can also be seen from the results that reducing g-values can have a minor beneficial impact on mitigating overheating risks when the proposed scheme incorporates a g-value of 0.4. Further reductions to g-value are not recommended as they would compromise Be Lean Stage savings, the proposed scheme's daylight levels as well as would increase the heating demand and fuel costs for residents. Low g-values are also not deemed the optimum design solution for residential buildings but were incorporated as part of the scheme with a view of adding external shading in the future based on the design team's preference and feedback.

Please note that the results for DSY2 and DSY3 for 2020's period are for informative purpose only. The scheme has sought to comply with DSY1 as per GLA's policy by including solar control glazing with g-value of 0.5 throughout as well as generous Free Areas and has sought to go as far as feasible in terms of performance with 2020's DSY2 and DSY3 weather files. Design discussions have taken place with the team on increasing the Free Areas of the windows further and openable panes have been maximised where glazed doors provide access to balconies while the remaining window assemblies have sought to incorporate side-hung windows which can provide sufficient Free Area for compliance with DSY1 2020's. A future retrofit plan for overheating mitigation with more onerous weather files could include the incorporation of Juliet balconies and installation of openable windows throughout the development.

Future Weather Scenario and Retrofit Plan – 2050's weather data

Based on the results from the DSY1 2020's weather file, worst case scenario rooms were tested using the London Weather Centre DSY1 2050's weather file, this included 21 rooms across on level 1 and top floor of the residential building (13no. bedrooms and 8no. KLDs). The results, the sequential improvement measures that are proposed to be incorporated for each iteration and recommendations are shown below.

Table 13: Overheating assessment results for dwellings for London Weather Centre DSY1 2050's.

Iteration	Glazing Equivalent Free Area %	g-value	External shading	Bedrooms TM59 night-time 26°C criterion	Bedrooms TM52 Criterion 1	Other rooms (KLDs) TM52 Criterion 1	Total rooms Part O Compliance
				No. of rooms not meeting criteria			
1 (Based on M2 iteration)	(See Table 9)	0.5	As per original design	0 of 13	8 of 8	13 of 13	21 of 21
2	(See Table 9)	0.5	E/W facing glazing with a vertical fin 800mm deep (+200mm window reveals). S and SW facing glazing 800mm deep overhang (+200mm window reveal).	0 of 13	7 of 8	13 of 13	20 of 21

3	(See Table 9)	0.4	As per iteration above	0 of 13	7 of 8	12 of 13	19 of 21
4 Increasing the MVHR flow rate with inc. cooling coil	(See Table 9)	0.4	As per iteration above	0 of 13	0 of 8	0 of 13	0 of 21

The results indicate that in order for the development to pass the future weather scenario of DSY1 2050, external shading devices and a reduction in the g-value of the windows are required as stated above and illustrated in the image below. The provision of MVHR with incorporated cooling coil is kept from the original design, however, a booster in the delivered flow rate is required to meet compliance with Part O.

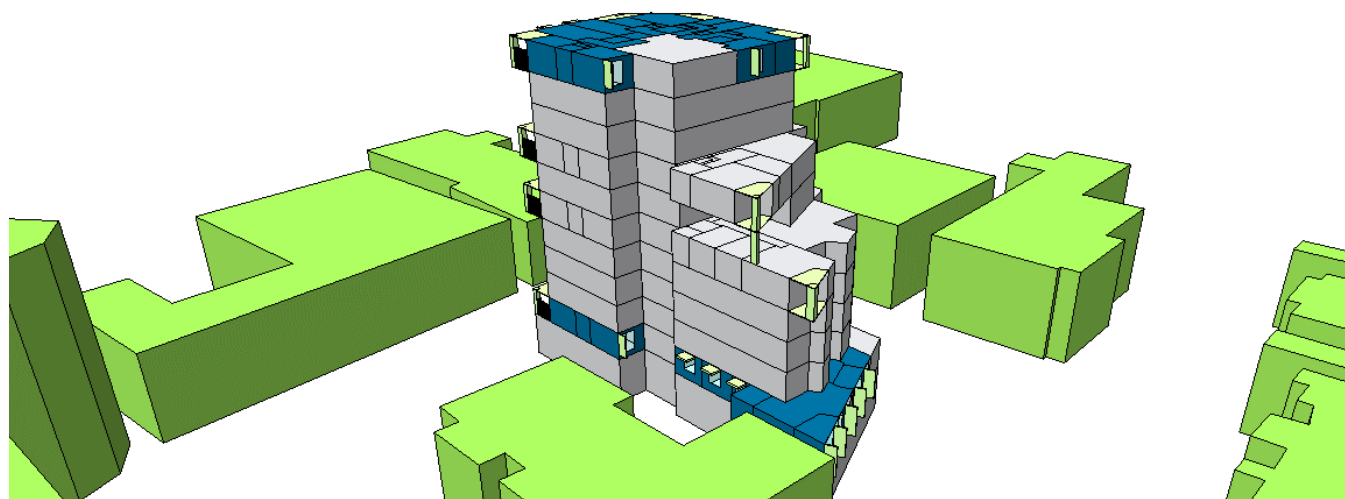


Figure 2: External shading devices required for compliance with 2050's DSY1 weather file – Axonometric view from SE.

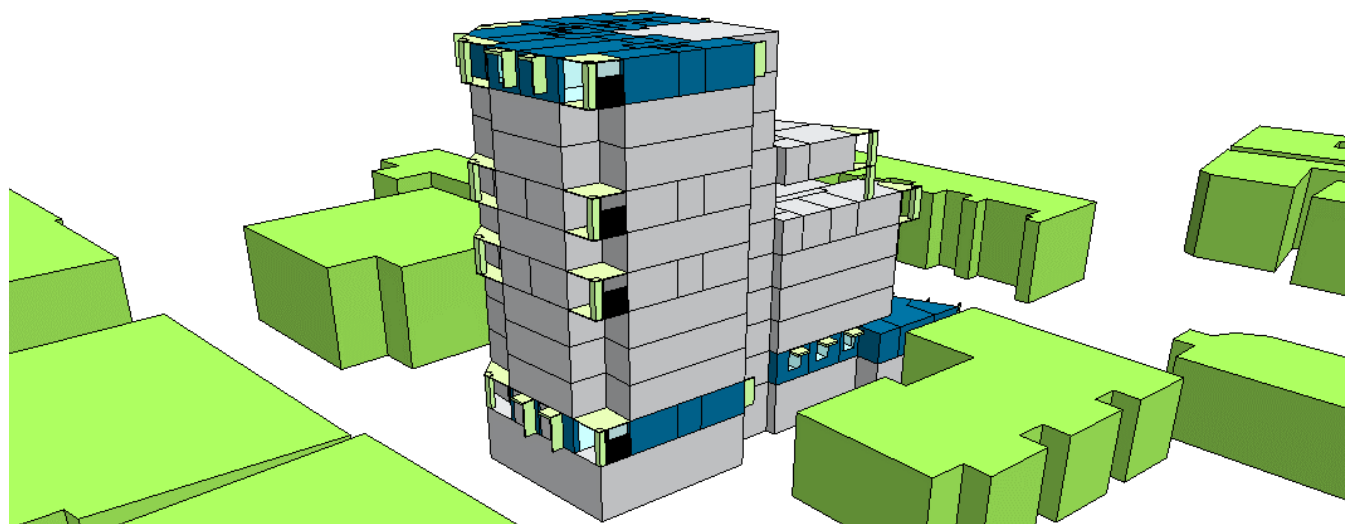


Figure 3: External shading devices required for compliance with 2050's DSY1 weather file – Axonometric view from SW.

2080's weather data

The selected units were also tested against the London Weather Centre DSY1 2080's weather file using iteration 4 from Table 13 in the previous page as a baseline. The following table shows the iterations undertaken to gain an understanding of the measures that can be incorporated into the building design to prevent overheating against the 2080 London Weather Centre DSY1 weather file.

Table 14: Overheating assessment results for dwellings for London Weather Centre DSY1 2080's weather file.

Iteration	Glazing Equivalent Free Area %	g-value	External shading	Bedrooms TM59 night-time 26°C criterion	Bedrooms TM52 Criterion 1	Other rooms (KLDs) TM52 Criterion 1	Total rooms Part O Compliance
				No. of rooms not meeting criteria			
1 (Based on 2050's weather data iteration 4) Includes MVHR with inc. cooling coil	(See Table 9)	0.4	E/W facing glazing with a vertical fin 800mm deep (+200mm window reveals). S and SW facing glazing 800mm deep overhang (+200mm window reveal).	5 of 13	7 of 8	13 of 13	20 of 21
2	(See Table 9)	0.4	Providing external automated blinds (50% opaque element / 50% clear ventilated area)	0 of 13	7 of 8	13 of 13	20 of 21
3 Providing Active Cooling limited to 1kW capacity	(See Table 9)	0.4	As per iteration above	0 of 13	0 of 8	0 of 13	0 of 21

The results show that the above passive measures incorporated as part of the proposed scheme and of the 2050's weather file are not seen to suffice for compliance with 2080's weather file. The provision of external automated blinds delivers significant reductions in the number of overheating hours, however, most of the rooms do not comply with the Part O methodology. As a result, under the 2080 climate scenario the dwellings will require active cooling in order to meet Part O risk criteria. To reduce the energy consumption, the cooling system is recommended to be limited to 1kW cooling unit.

As it would be readily appreciated, DSY2 and DSY3 weather types for the 2050's period as well as weather types DSY2 and DSY3 for the 2080's period are more onerous scenarios to achieve full compliance with natural ventilation performance. Therefore, the proposed building will require of the provision of active cooling to mitigate the risk of overheating under these stricter weather' data. The future retrofit plan could also include the replacement of any fixed glazing (e.g., at their end of life) across the scheme with openable windows (that could be achieved with the incorporation of Juliet balconies) to maximise free areas for ventilation in the future. The design of the building could also consider the incorporation of ceiling fans to improve air movement.

NON-RESIDENTIAL

2020's weather data

The results for the non-domestic elements of the scheme are presented in the tables below using London DSY1 2020's weather data, the sequential improvement measures that are proposed to be incorporated for each iteration and the number of spaces that were not found to meet the CIBSE TM52 criteria.

Table 15: Overheating assessment results for dwellings for London Weather Centre DSY1 2020's weather file.

It No	Design change	Weather file	Occupied Spaces					Mechanical Cooling	Thermal mass	No. of Retail spaces not meeting 2/3 criteria TM52
			F.A.	Window g-value	Lighting density	Mechanical ventilation	Solar shading			
1	Opening windows (Natural ventilation)	London DSY1: 2020 High Emissions 50 percentile	95% F.A. All panes to open side hung by 90 degrees (open daytime)	0.5	15 W/m ²	10l/s/p	-	-	Lightweight	6 of 6
2	Reducing g-value to 0.4	London DSY1: 2020 High Emissions 50 percentile	as per above	0.4	15 W/m ²	10l/s/p	-	-	Lightweight	6 of 6
3	Increase mechanical flow rate to 20 l/s/p	London DSY1: 2020 High Emissions 50 percentile	as per above	0.4	15 W/m ²	20l/s/p	-	-	Lightweight	5 of 6
4	Reducing g-value to 0.3	London DSY1: 2020 High Emissions 50 percentile	as per above	0.3	15 W/m ²	20l/s/p	-	-	Lightweight	3 of 6
5	Trim cooling MVHR with cooling coil to Basement	London DSY1: 2020 High Emissions 50 percentile	as per above	0.3	15 W/m ²	20l/s/p	-	Cooling capacity limited to 1.5kW	Lightweight	0 of 6

The following observations can be made from the results:

- The use of natural ventilation (maximising Free area for windows as proposed by the architectural design) as well as reducing the g-value across the commercial units to 0.3 and increase the MVHR flow rate to 20 l/s/p were found to allow the areas of the retail units at ground to meet the criteria;
- The three commercial units have additional areas at basement level with not enough direct access to natural ventilation to allow these lower areas to meet the TM52 criteria. The provision of trim cooling from the MVHR system with incorporated cooling coils is recommended to meet the overheating criteria. Passive measures including low energy lighting, solar control glazing with g-value of 0.3 and insulated pipework will be maximised for these spaces specifically in order to reduce the demand for cooling whilst maintaining the desirable internal environment in line with industry guidelines and the MEP brief for the project.

The final iteration based on a naturally ventilated scenario has been applied with DSY2 and DSY3 weather types. The results for these weather files are presented in the table below for the London Centre DSY2 and DSY3 for 2020's period. This is mainly for information purposes only for more onerous weather types as explained in the residential results section of the report.

Table 16: Overheating assessment results for dwellings for London Weather Centre DSY2 and DSY3 for the 2020's weather file.

It No	Design change	Weather file	Occupied Spaces					Mechanical Cooling	Thermal mass	No. of Retail spaces not meeting TM52 (DSY2 and DSY3)
			F.A.	Window g-value	Lighting density	Mechanical ventilation	Solar shading			
1 Based on Table 15 it-4	Reducing g-value to 0.3	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per architect s' design	0.3	15 W/m2	20l/s/p	-	-	Lightweight	6 of 6
2	Heavyweight thermal mass	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per above	0.3	15 W/m2	20l/s/p	-	-	Heavyweight	6 of 6
3	Reducing g-value to 0.25	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per above	0.25	15 W/m2	20l/s/p	-	-	Heavyweight	6 of 6
4	Adding solar shading	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per above	0.25	15 W/m2	20l/s/p	Adding horizontal shading on S facing windows and vertical shading on E facing windows	-	Heavyweight	6 of 6
5	Trim cooling MVHR with cooling coil	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per above	0.25	15 W/m ²	20l/s/p	Adding horizontal shading on S facing windows and vertical shading on E facing windows	Cooling capacity limited to 1.5kW	Heavyweight	0 of 6

The following observations can be made from the results:

- The results for DSY 2 and 3 show that none of the spaces meet TM52 criteria using mitigation techniques that suffice for the moderately warm summer in the 2020's as presented in iteration 4 of the Table 15.
- Additional passive measures such as lower g-values and external shading elements are recommended to reduce solar gains.
- Trim cooling for the three commercial units at ground and basement is required to mitigate overheating in the more severe weather files, due to their extreme nature.

2050's weather data

For the future weather scenarios, the final iteration of the proposed scheme using the DSY 1 2020's weather data (iteration 5 of Table 15), has been applied against the 2050 and 2080 London Weather Centre DSY1 weather files in the non-residential areas of the building.

The table below present the analysis for DSY1 for 2050's period to evaluate the measures required to be incorporated as part of the retrofit plan for spaces proposed to be naturally ventilated.

Table 17: Overheating assessment results for London Weather Centre DSY1 2050's weather data.

It No	Design change	Weather file	Occupied Spaces					Mechanical Cooling	Thermal mass	No. of Retail spaces not meeting TM52
			F.A.	Window g-value	Lighting density	Mechanical ventilation	Solar shading			
1 Based on Table 15 it-5	Adding solar shading	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per architect's design	0.3	15 W/m ²	20l/s/p	Adding horizontal shading on S facing windows and vertical shading on E facing windows	-	Heavyweight	6 of 6
2	Trim cooling MVHR with cooling coil	London DSY2/DSY 3: 2020 High Emissions 50 percentile	as per above	0.25	15 W/m ²	20l/s/p	Adding horizontal shading on S facing windows and vertical shading on E facing windows	Cooling capacity limited to 1.5kW	Heavyweight	0 of 6

The results indicated that in order for the commercial units of the development to pass the future weather scenario of DSY1 2050, external shading is required. Vertical shading of 800mm deep (+200mm reveal) is proposed to the east facing windows and horizontal canopies of similar depth to those facing south.

Trim cooling is proposed to be installed for these areas of the scheme currently (in line with Haringey's requirements to provide cooling where required from the outset of the project) and after passive measures have been maximised as far as possible in line with Haringey's and GLA's guidance. For these spaces, energy efficient lighting, insulated pipework and solar control glazing are incorporated as part of the proposed scheme to reduce the demand for cooling.

It was deemed appropriate to consider active cooling in order to prevent overheating under the 2080 scenario in the most effective way. An active cooling system may be more beneficial than a MVHR cooling coil module due to the high levels of efficacy and noise produced by the MVHR under very high flow rates.

CONCLUSIONS AND RECOMMENDATIONS

The results show that all selected flats and commercial units achieve compliance with Part O overheating risk criteria for London Centre DSY1 2020s weather data, provided that adequate design considerations are taken into account.

The results detailed on the previous section demonstrate that a combination of window opening types for natural ventilation and solar control strategies are essential for compliance with the overheating risk criteria.

Generally, a g-value of 0.50 should be the preferred specification to not overly compromise the energy performance and compliance with CO₂ emissions targets.

Table 18 summarises the design recommendations that contribute to reducing overheating risk.

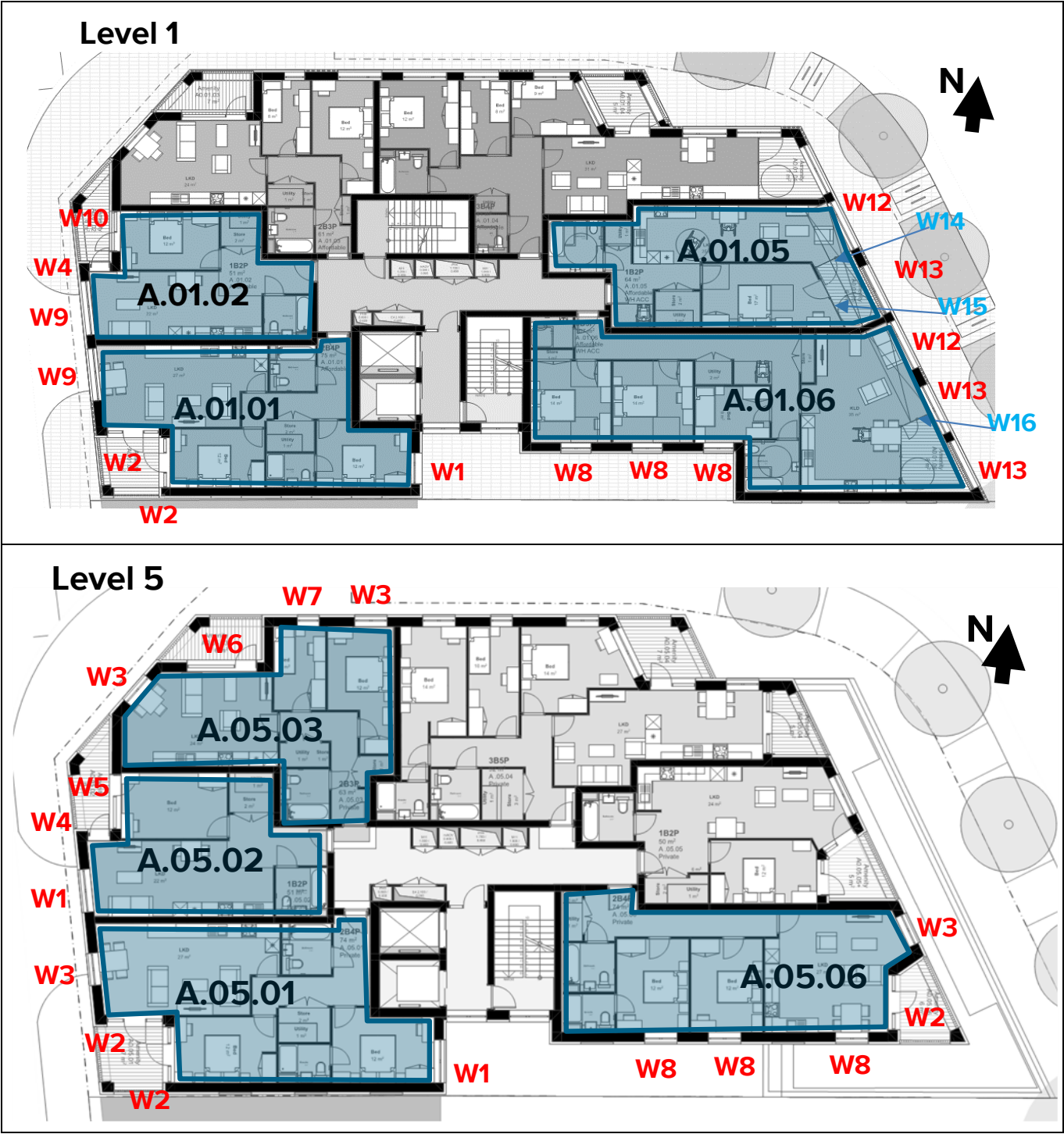
Table 18: Summary of recommendations for the proposed development.

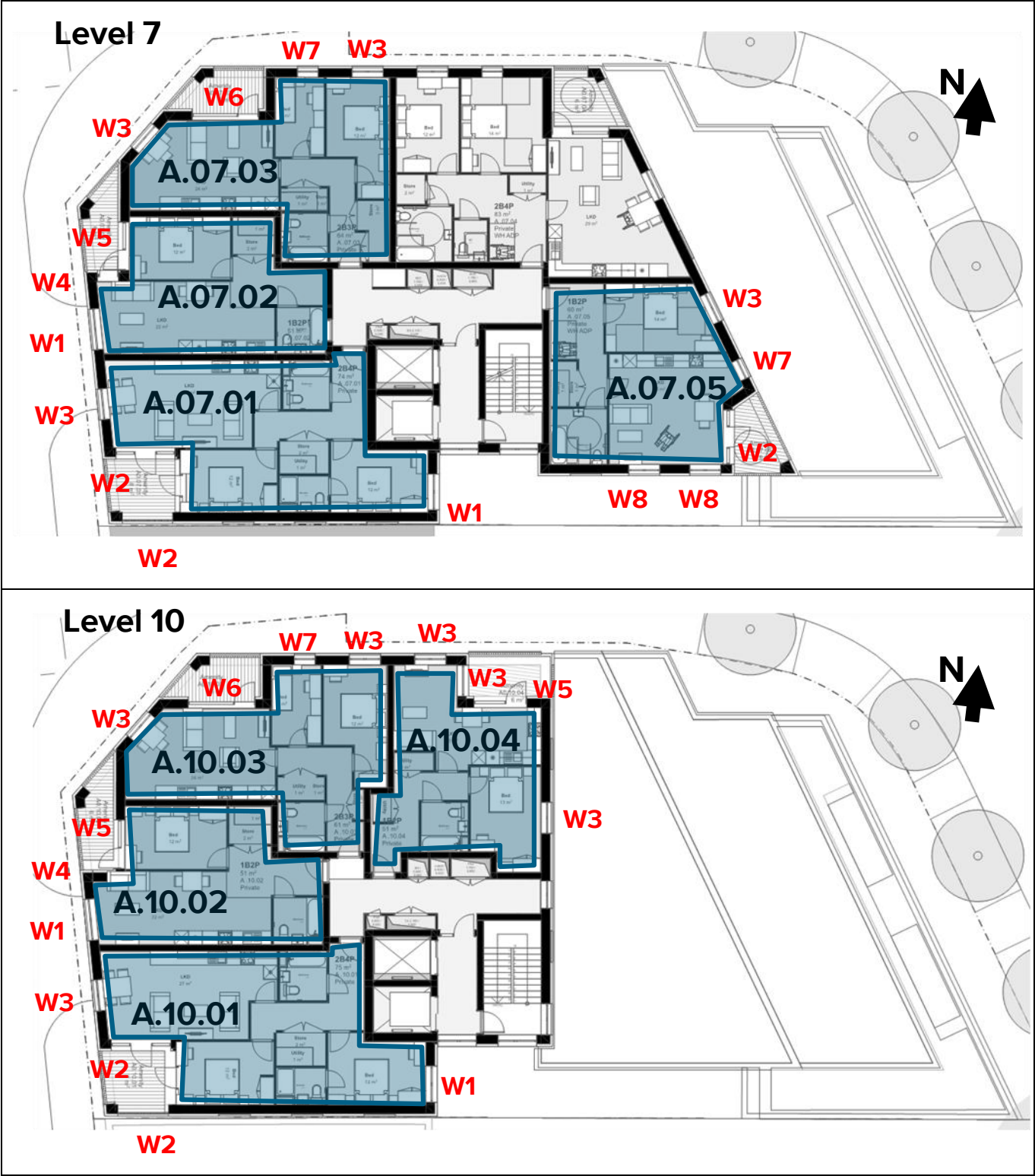
Measure	Implementation
Minimise internal heat generation through energy efficient design	
High efficiency lighting installations (LED)	All spaces: All fixed building elements such as ceiling lights and white goods will be very energy efficient. It is recommended that the occupants also use energy efficient equipment, for example, energy efficient light fittings of LED types and A+ rated electrical appliances such as TVs that consume less energy and promoted to reduce internal heat gains.
Low temperature hot water (LTHW) pipework design and installations (location, configuration and insulation) to minimise heat losses.	LTHW pipework running in corridors and circulation areas to be highly insulated across the whole length; including jackets for valves and junctions. Primary distribution will be vertical rather than horizontal to reduce pipe lengths.
Reduce the amount of heat entering the building	
External shade from balconies and overhangs	Slight recesses included within windows across site and balconies where present. Extensive detailed balcony incorporated and modelled. External fins at Level 1 for safety, privacy and to reduce solar gains in KLDs.
Internal shading via opaque blinds	For lounges and bedrooms: The overheating strategy does not rely on blinds, however, the use of internal shading devices is recommended on sunny and warm days to prevent direct solar gains been transmitted into the rooms. These should be left closed when the rooms are not occupied. When using the curtains/blinds, occupants should make sure that these do not cover the openable area of the windows completely so that the air movement is not blocked.
Solar control glazing (g value <=0.63)	Solar control glazing on all windows to achieve g-value = 0.50.
Future retrofit plan	Installation of 800mm vertical fins on all east and west facing windows (which are to have 200mm reveals) Installation of 800mm horizontal shading directly above unshaded south facing windows (which are to have 200mm reveals)
Use of thermal mass to manage heat within the building	
Concrete slab providing thermal mass	Not offering a significant beneficial impact and incompatible with other required strategies (e.g., MVHR)
Passive ventilation	
Natural ventilation opening	Openable windows as per proposed equivalent free area for natural ventilation. Occupants should be advised to leave their windows securely open during the night on warm summer days to take advantage of the low external temperatures during the night for cooling down their rooms and remove the excessive heat that builds up throughout the day.

Future retrofit plan	Replacement of any fixed glazing (e.g., at their end of life) across the co-living and dwellings parts of the scheme with openable glazing which can be achieved with the installation of Juliet balconies (with railing does not influence attainable free areas)
Mechanical ventilation	
Mechanical extract	Communal corridors will require minimum mechanical extract ventilation with a flow rate of 10 L/s per floor to mitigate overheating risk with DSY1 2020's weather.
MVHR with summer boost mode and cooling coils	Recommended for current weather file and with increase flow rates for future retrofit.
Future retrofit plan	Although unlikely to offer significant improvement, ceiling fans on the dwellings can be incorporated to facilitate air movement.
Mechanical cooling	
Cooling	Active mechanical cooling to be specified in the non-residential spaces and future weather scenarios for 2050's and 2080's weather files.

APPENDIX A – WINDOW LAYOUT

The following table shows the window types (and their respective numbering that was assumed) throughout the scheme for the purposes of the overheating preliminary assessment.





APPENDIX B – DETAILED RESULTS: CIBSE 2020S DSY1 WEATHER FILE

The following table presents results in detail for each of the residential assessed rooms in terms of percentage of occupied hours when the internal operative resultant temperature is within the comfort range given by both Part O criteria.

Compliance for bedrooms requires passing both of the following two criteria, whereas compliance for living rooms requires compliance with the first criterion.

Room	CIBSE 2020s DSY1		Part O Compliance
	Criterion 1	Criterion 2	
	≤ 3%	≤ 32hrs	
A.01.01_2B4P_DB1	0.7	26	Pass
A.01.01_2B4P_DB2	0.7	26	Pass
A.01.01_2B4P_KLD	2.2	N/A	Pass
A.01.02_1B2P_DB	0.9	25	Pass
A.01.02_1B2P_KLD	2.5	N/A	Pass
A.01.05_1B2P_DB	0.3	30	Pass
A.01.05_1B2P_KLD	1.2	N/A	Pass
A.01.06_3B5P_DB1	0.5	22	Pass
A.01.06_3B5P_DB2	0.5	21	Pass
A.01.06_3B5P_KLD	1.9	N/A	Pass
A.01.06_3B5P_SB	0.5	11	Pass
A.05.01_2B4P_DB1	0.7	26	Pass
A.05.01_2B4P_DB2	0.7	26	Pass
A.05.01_2B4P_KLD	1.8	N/A	Pass
A.05.02_1B2P_DB	1.1	29	Pass
A.05.02_1B2P_KLD	2.1	N/A	Pass
A.05.03_2B3P_DB	0.4	14	Pass
A.05.03_2B3P_KLD	1.6	N/A	Pass
A.05.03_2B3P_SB	0.4	9	Pass
A.05.06_2B4P_DB1	0.5	19	Pass
A.05.06_2B4P_DB2	0.6	22	Pass
A.05.06_2B4P_KLD	2.0	N/A	Pass
A.07.01_2B4P_DB1	0.7	28	Pass
A.07.01_2B4P_DB2	0.8	26	Pass
A.07.01_2B4P_KLD	1.8	N/A	Pass
A.07.02_1B2P_DB	1.1	28	Pass
A.07.02_1B2P_KLD	2.1	N/A	Pass
A.07.03_2B3P_DB	0.4	14	Pass
A.07.03_2B3P_KLD	1.6	N/A	Pass

A.07.03_2B3P_SB		0.4	9	Pass
A.07.05_1B2P_DB		0.6	27	Pass
A.07.05_1B2P_KLD		2.0	N/A	Pass
A.10.01_2B4P_DB1		0.7	31	Pass
A.10.01_2B4P_DB2		0.8	27	Pass
A.10.01_2B4P_KLD		1.7	N/A	Pass
A.10.02_1B2P_DB		1.1	29	Pass
A.10.02_1B2P_KLD		2.0	N/A	Pass
A.10.03_2B3P_DB		0.5	20	Pass
A.10.03_2B3P_KLD		1.6	N/A	Pass
A.10.03_2B3P_SB		0.4	10	Pass
A.10.04_1B2P_DB		0.7	27	Pass
A.10.04_1B2P_KLD		1.7	N/A	Pass
Total No. Pass	Double Bedrooms	22 / 22	22 / 22	22 / 22
	Single Bedrooms	4 / 4	4 / 4	4 / 4
	Living rooms (KLD)	16 / 16	N/A	16 / 16
Overall compliance				42 / 42
% Pass				100%

APPENDIX B – DETAILED RESULTS: CIBSE 2020S DSY2 AND DSY3 WEATHER FILES

In line with the Part O methodology, the proposed development is required to be assessed against and pass using the CIBSE 2020s DSY1 weather file. Results Section of the report demonstrates that all assessed units comply with both TM59 criteria.

Both TM59 and GLA guidance recommend that in addition to DSY1 the following two additional TM49 design weather years for 2020s should be used to further test the design, even though, a pass against these is not mandatory:

- 1976: a year with a prolonged period of sustained warmth (DSY3);
- 2003: a year with a very intense single warm spell (DSY2).

The final iteration based on a natural ventilated scenario (before trim cooling provision) has been assessed against the more extreme DSY2 and DSY3 weather files for 2020s and results are presented below.

Room	CIBSE 2020s DSY2		Part O Compliance	CIBSE 2020s DSY3		Part O Compliance
	Criterion 1	Criterion 2		Criterion 1	Criterion 2	
	≤ 3%	≤ 32hrs		≤ 3%	≤ 32hrs	
A.01.01_2B4P_DB1	1.6	72	Fail	2.3	79	Fail
A.01.01_2B4P_DB2	1.9	70	Fail	2.6	82	Fail
A.01.01_2B4P_KLD	5.2	N/A	Fail	5.6	N/A	Fail
A.01.02_1B2P_DB	2.2	70	Fail	2.7	74	Fail
A.01.02_1B2P_KLD	4.9	N/A	Fail	5.5	N/A	Fail
A.01.05_1B2P_DB	1	75	Fail	1.4	106	Fail
A.01.05_1B2P_KLD	3.7	N/A	Fail	4.6	N/A	Fail
A.01.06_3B5P_DB1	1.6	71	Fail	2.0	74	Fail
A.01.06_3B5P_DB2	1.6	69	Fail	2.1	71	Fail
A.01.06_3B5P_KLD	4.2	N/A	Fail	5.3	N/A	Fail
A.01.06_3B5P_SB	1.7	52	Fail	2.3	48	Fail
A.05.01_2B4P_DB1	1.6	72	Fail	2.4	86	Fail
A.05.01_2B4P_DB2	1.9	70	Fail	2.3	82	Fail
A.05.01_2B4P_KLD	4.9	N/A	Fail	5.4	N/A	Fail
A.05.02_1B2P_DB	2.3	72	Fail	2.9	89	Fail
A.05.02_1B2P_KLD	4.6	N/A	Fail	5.4	N/A	Fail
A.05.03_2B3P_DB	1.2	53	Fail	1.8	56	Fail
A.05.03_2B3P_KLD	4.6	N/A	Fail	5.4	N/A	Fail
A.05.03_2B3P_SB	1.1	39	Fail	1.6	42	Fail
A.05.06_2B4P_DB1	1.6	66	Fail	2.0	67	Fail
A.05.06_2B4P_DB2	1.7	70	Fail	2.3	74	Fail
A.05.06_2B4P_KLD	4.3	N/A	Fail	5.5	N/A	Fail
A.07.01_2B4P_DB1	1.6	74	Fail	2.5	94	Fail
A.07.01_2B4P_DB2	1.9	70	Fail	2.4	82	Fail
A.07.01_2B4P_KLD	4.8	N/A	Fail	5.4	N/A	Fail

A.07.02_1B2P_DB		2.3	71	Fail	2.9	89	Fail
A.07.02_1B2P_KLD		4.7	N/A	Fail	5.4	N/A	Fail
A.07.03_2B3P_DB		1.3	53	Fail	1.9	56	Fail
A.07.03_2B3P_KLD		4.6	N/A	Fail	5.4	N/A	Fail
A.07.03_2B3P_SB		1.2	38	Fail	1.6	42	Fail
A.07.05_1B2P_DB		1.5	79	Fail	2.3	96	Fail
A.07.05_1B2P_KLD		4.5	N/A	Fail	5.7	N/A	Fail
A.10.01_2B4P_DB1		1.6	78	Fail	2.6	103	Fail
A.10.01_2B4P_DB2		1.9	71	Fail	2.5	84	Fail
A.10.01_2B4P_KLD		4.7	N/A	Fail	5.4	N/A	Fail
A.10.02_1B2P_DB		2.3	73	Fail	2.9	93	Fail
A.10.02_1B2P_KLD		4.5	N/A	Fail	5.3	N/A	Fail
A.10.03_2B3P_DB		1.4	68	Fail	2.0	76	Fail
A.10.03_2B3P_KLD		4.5	N/A	Fail	5.3	N/A	Fail
A.10.03_2B3P_SB		1.2	43	Fail	1.7	43	Fail
A.10.04_1B2P_DB		1.6	72	Fail	2.4	93	Fail
A.10.04_1B2P_KLD		3.9	N/A	Fail	5.1	N/A	Fail
Total No. Pass	Double Bedrooms	22 / 22	0 / 22	0 / 22	22 / 22	0 / 22	0 / 22
	Single Bedrooms	4 / 4	0 / 4	0 / 4	4 / 4	0 / 4	0 / 4
	Living rooms / Kitchens	0 / 16	N/A	0 / 16	0 / 16	N/A	0 / 16
Overall compliance				0 / 42			0 / 42
% Pass				0%			0%

APPENDIX B – SAP RESULTS

The table below lists a sample of the typical flats that were modelled using SAP methodology, the TER and DER outputs and the % CO₂ reduction achieved after the Be Lean, Be Clean and Be Green measures have been applied.

The results from these 6 flats were extrapolated over the entire development, in order to predict the energy consumption and carbon dioxide emissions for the domestic spaces of the Development.

The following pages show the DER/TER FSAP2012 worksheets for a sample flat at the Be Lean and Be Green stages. The SAP outputs for all sample flats are available on request.

SAP Ref No.	TER (kgCO ₂ /m ² /yr)	Be Lean		Be Clean		Be Green	
		DER (kgCO ₂ /m ² /yr)	% CO ₂ reduction	DER (kgCO ₂ /m ² /yr)	% CO ₂ reduction	DER (kgCO ₂ /m ² /yr)	% CO ₂ reduction
Floor 1 Flat 3 - 2B	22.55	19.85	12.0%	19.85	0.0%	23.99	-6.4%
Floor 1 Flat 6 - 3B	19.57	17.01	13.1%	17.01	0.0%	20.50	-4.8%
Floor 5 Flat 2 - 1B	17.32	15.26	11.9%	15.26	0.0%	18.18	-5.0%
Floor 5 Flat 3 - 2B	18.59	16.34	12.1%	16.34	0.0%	19.57	-5.3%
Floor 5 Flat 4 - 3B	16.97	15.63	7.9%	15.63	0.0%	18.72	-10.3%
Floor 10 Flat 3 - 2B	20.29	18.01	11.2%	18.01	0.0%	21.68	-6.8%

APPENDIX C – SBEM RESULTS

Project name

9-30 Clarendon Rd

As designed

Date: Mon Sep 26 17:25:41 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	38.7
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	38.7
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	18.5
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	"GF000000_W1"
Floor	0.25	0.1	0.1	"GF000000_F"
Roof	0.25	0.1	0.1	"GF000004_C"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"GF000000_W1_O0"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs. ** 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. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	2.5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

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- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	6	-	-	-
Standard value	2.5*	2.6	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. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- SYST0001-DHW

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

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1		
GF Commercial 1	-	-	-	0.3	-	-	-	-	-	0.8	0.5
GF Commercial 2	-	-	-	0.3	-	-	-	-	-	0.8	0.5
GF Commercial 3	-	-	-	0.3	-	-	-	-	-	0.8	0.5
Basement Commercial 1	-	-	-	0.3	-	-	-	-	-	0.8	0.5
Basement Commercial 2	-	-	-	0.3	-	-	-	-	-	0.8	0.5
Basement Commercial 3	-	-	-	0.3	-	-	-	-	-	0.8	0.5

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
GF Commercial 1	-	120	120	510
GF Circulation	-	120	-	41
GF Commercial 2	-	120	120	725
GF Commercial 3	-	120	120	709
Basement Commercial 1	-	120	120	702

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Basement Circulation		-	120	-	51
Basement Commercial 2		-	120	120	784
Basement Commercial 3		-	120	120	760

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF Commercial 1	NO (-59.9%)	NO
GF Circulation	NO (-51.1%)	NO
GF Commercial 2	NO (-17.9%)	NO
GF Commercial 3	NO (-57.4%)	NO
Basement Commercial 1	N/A	N/A
Basement Circulation	N/A	N/A
Basement Commercial 2	N/A	N/A
Basement Commercial 3	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m ²]	552.6	552.6
External area [m ²]	767.1	767.1
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	177.78	419.09
Average U-value [W/m ² K]	0.23	0.55
Alpha value* [%]	20.42	18.34

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

Building Use

% Area	Building Type
100	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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	1.12	3.28
Cooling	9.3	18.26
Auxiliary	1.28	3.44
Lighting	23.29	50.3
Hot water	1.54	1.79
Equipment*	19.18	19.18
TOTAL **	36.54	77.08

* 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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	160.66	265.37
Primary energy* [kWh/m ²]	109.39	227.33
Total emissions [kg/m ²]	18.5	38.7

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	10.5	150.2	1.1	9.3	1.3	2.59	4.48	2.64	6
	Notional	28.7	236.6	3.3	18.3	3.4	2.43	3.6	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	"GF000000_W1"
Floor	0.2	0.1	"GF000000_F"
Roof	0.15	0.1	"GF000004_C"
Windows, roof windows, and rooflights	1.5	1.2	"GF000000_W1_O0"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	2.5

Project name

9-30 Clarendon Rd

As designed

Date: Mon Sep 26 17:31:02 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	38.7
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	38.7
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	16.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.15	0.15	"GF000000_W1"
Floor	0.25	0.1	0.1	"GF000000_F"
Roof	0.25	0.1	0.1	"GF000004_C"
Windows***, roof windows, and rooflights	2.2	1.2	1.2	"GF000000_W1_O0"
Personnel doors	2.2	-	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
U _a -Limit = Limiting area-weighted average U-values [W/(m ² K)] U _a -Calc = Calculated area-weighted average U-values [W/(m ² K)] U _i -Calc = Calculated maximum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the maximum U-value occurs. ** 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. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	2.5

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

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- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	6	-	-	-
Standard value	2.5*	2.6	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. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- SYST0001-DHW

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

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
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 supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

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	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
GF Commercial 1	-	-	-	0.3	-	-	-	-	-	0.8	0.5
GF Commercial 2	-	-	-	0.3	-	-	-	-	-	0.8	0.5
GF Commercial 3	-	-	-	0.3	-	-	-	-	-	0.8	0.5
Basement Commercial 1	-	-	-	0.3	-	-	-	-	-	0.8	0.5
Basement Commercial 2	-	-	-	0.3	-	-	-	-	-	0.8	0.5
Basement Commercial 3	-	-	-	0.3	-	-	-	-	-	0.8	0.5

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
	Standard value	60	60	22
GF Commercial 1	-	120	120	510
GF Circulation	-	120	-	41
GF Commercial 2	-	120	120	725
GF Commercial 3	-	120	120	709
Basement Commercial 1	-	120	120	702

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Basement Circulation		-	120	-	51
Basement Commercial 2		-	120	120	784
Basement Commercial 3		-	120	120	760

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
GF Commercial 1	NO (-59.9%)	NO
GF Circulation	NO (-51.1%)	NO
GF Commercial 2	NO (-17.9%)	NO
GF Commercial 3	NO (-57.4%)	NO
Basement Commercial 1	N/A	N/A
Basement Circulation	N/A	N/A
Basement Commercial 2	N/A	N/A
Basement Commercial 3	N/A	N/A

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of 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
Area [m ²]	552.6	552.6
External area [m ²]	767.1	767.1
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	177.78	419.09
Average U-value [W/m ² K]	0.23	0.55
Alpha value* [%]	20.42	18.34

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

Building Use

% Area	Building Type
100	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 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	0.93	3.28
Cooling	9.3	18.26
Auxiliary	1.28	3.44
Lighting	23.29	50.3
Hot water	1.54	1.79
Equipment*	19.18	19.18
TOTAL **	36.35	77.08

* 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	3.67	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	160.66	265.37
Primary energy* [kWh/m ²]	108.8	227.33
Total emissions [kg/m ²]	16.5	38.7

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

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] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	10.5	150.2	0.9	9.3	1.3	3.14	4.48	3.2	6
	Notional	28.7	236.6	3.3	18.3	3.4	2.43	3.6	----	----

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	"GF000000_W1"
Floor	0.2	0.1	"GF000000_F"
Roof	0.15	0.1	"GF000004_C"
Windows, roof windows, and rooflights	1.5	1.2	"GF000000_W1_O0"
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-Min} = Minimum individual element U-values [W/(m²K)]	
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	2.5

Project name

9-30 Clarendon Rd

As designed

Date: Mon Sep 26 17:24:32 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

BRUKL compliance check version: v6.1.b.0

Foundation area [m²]: 546.73The 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	4.11
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	3.22
Target primary energy rate (TPER), kWh/m ² annum	44.67
Building primary energy rate (BPER), kWh/m ² annum	35.36
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	GF000000_W1
Floors	0.18	0.1	0.1	GF000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.1	0.1	GF000004_C
Windows** and roof windows	1.6	1.2	1.2	GF000000_W1_O0
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

N.B.: 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	2.5

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- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	6	-	-	-
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- SYST0001-DHW

	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		
GF Commercial 1		-	-	-	-	0.3	-	-	-	-	0.8	N/A
GF Commercial 2		-	-	-	-	0.3	-	-	-	-	0.8	N/A
GF Commercial 3		-	-	-	-	0.3	-	-	-	-	0.8	N/A
Basement Commercial 1		-	-	-	-	0.3	-	-	-	-	0.8	N/A
Basement Commercial 2		-	-	-	-	0.3	-	-	-	-	0.8	N/A
Basement Commercial 3		-	-	-	-	0.3	-	-	-	-	0.8	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
GF Commercial 1		120	120	1.25
GF Circulation		120	-	-
GF Commercial 2		120	120	1.25
GF Commercial 3		120	120	1.25

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
Basement Commercial 1		120	120	1.25
Basement Circulation		120	-	-
Basement Commercial 2		120	120	1.25
Basement Commercial 3		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?
GF Commercial 1	NO (-43.1%)	NO
GF Circulation	NO (-29%)	NO
GF Commercial 2	YES (+16.4%)	NO
GF Commercial 3	NO (-39.2%)	NO
Basement Commercial 1	N/A	N/A
Basement Circulation	N/A	N/A
Basement Commercial 2	N/A	N/A
Basement Commercial 3	N/A	N/A

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]	552.6	552.6
External area [m ²]	767.1	767.1
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	177.78	340.02
Average U-value [W/m ² K]	0.23	0.44
Alpha value* [%]	27.35	27.28

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

Building Use

% Area Building Type

% 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	1.85	4.73
Cooling	6.88	7.18
Auxiliary	1.28	3.14
Lighting	12.52	13.65
Hot water	1.54	1.54
Equipment*	19.18	19.18
TOTAL**	24.08	30.24

* 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]	128.32	158.68
Primary energy [kWh/m ²]	35.36	44.67
Total emissions [kg/m ²]	3.22	4.11

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	17.2	111.1	1.9	6.9	1.3	2.59	4.48	2.64	6
	Notional	44.9	113.8	4.7	7.2	3.1	2.64	4.4	----	----

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

9-30 Clarendon Rd

As designed

Date: Mon Sep 26 17:29:01 2022

Administrative information

Building Details

Address: Address 1, Address 2, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.b.0

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.15

BRUKL compliance check version: v6.1.b.0

Foundation area [m²]: 546.73The 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	4.11
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.66
Target primary energy rate (TPER), kWh/m ² annum	44.67
Building primary energy rate (BPER), kWh/m ² annum	29.03
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	GF000000_W1
Floors	0.18	0.1	0.1	GF000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.1	0.1	GF000004_C
Windows** and roof windows	1.6	1.2	1.2	GF000000_W1_O0
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

N.B.: 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	2.5

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- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.2	6	-	-	-
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- SYST0001-DHW

	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		
GF Commercial 1		-	-	-	-	0.3	-	-	-	-	0.8	N/A
GF Commercial 2		-	-	-	-	0.3	-	-	-	-	0.8	N/A
GF Commercial 3		-	-	-	-	0.3	-	-	-	-	0.8	N/A
Basement Commercial 1		-	-	-	-	0.3	-	-	-	-	0.8	N/A
Basement Commercial 2		-	-	-	-	0.3	-	-	-	-	0.8	N/A
Basement Commercial 3		-	-	-	-	0.3	-	-	-	-	0.8	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
GF Commercial 1		120	120	1.25
GF Circulation		120	-	-
GF Commercial 2		120	120	1.25
GF Commercial 3		120	120	1.25

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
Basement Commercial 1		120	120	1.25
Basement Circulation		120	-	-
Basement Commercial 2		120	120	1.25
Basement Commercial 3		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?
GF Commercial 1	NO (-43.1%)	NO
GF Circulation	NO (-29%)	NO
GF Commercial 2	YES (+16.4%)	NO
GF Commercial 3	NO (-39.2%)	NO
Basement Commercial 1	N/A	N/A
Basement Circulation	N/A	N/A
Basement Commercial 2	N/A	N/A
Basement Commercial 3	N/A	N/A

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]	552.6	552.6
External area [m ²]	767.1	767.1
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	177.78	340.02
Average U-value [W/m ² K]	0.23	0.44
Alpha value* [%]	27.35	27.28

* 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	1.53	4.73
Cooling	6.88	7.18
Auxiliary	1.28	3.14
Lighting	12.52	13.65
Hot water	1.54	1.54
Equipment*	19.18	19.18
TOTAL**	23.76	30.24

* 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	3.98	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>3.98</i>	<i>0</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	128.32	158.68
Primary energy [kWh/m ²]	29.03	44.67
Total emissions [kg/m ²]	2.66	4.11

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	17.2	111.1	1.5	6.9	1.3	3.14	4.48	3.2	6
	Notional	44.9	113.8	4.7	7.2	3.1	2.64	4.4	----	----

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 D – SAP AND SBEM MODELLING INPUTS

30/09/2022

The figures listed below are assumptions only, based on a combination of best judgement at design stage and information from the design team where appropriate. Throughout the design stage the systems and size of renewable systems are likely to change whilst the building designs are being finalised. All information detailed in this design note is a basic recommendation at the Planning Stage Part L pre-assessment. It should be noted that this document is not exhaustive and the contractor should allow for flexibility on site where necessary.

Opaque Elements		
U-Values new elements		
Floors		
Ground and exposed floors	0.1 W/m ² .K	Based on best judgement on Planning Stage
Floor to unheated stores	0.1 W/m ² .K	Based on best judgement on Planning Stage
Floor to commercial	0.2 W/m ² .K	Based on best judgement on Planning Stage
	0.1 input into SAP, as per SAP conventions ^	
Walls		
External walls	0.15 W/m ² .K	Based on best judgement on Planning Stage
Walls to unheated corridors, stairs & lifts	0.26 W/m ² .K	Based on best judgement on Planning Stage
Party walls - unit to unit	Zero heat loss - Fully filled cavity	Based on best judgement on Planning Stage
Roofs / Ceilings		
Flat roofs	0.1 W/m ² .K	Based on best judgement on Planning Stage
Ceiling to balconies and terraces where present	0.1 W/m ² .K	Based on best judgement on Planning Stage
Y-value (Thermal bridging)		
	0.04-0.08	All junctions to meet Accredited Construction Details, otherwise will require thermal bridging modelling at detailed design stage.
Openings		
Flat doors to external or corridors		
	1.3 W/m ² .K	Based on best judgement on Planning Stage
New windows and glazed doors (pane and frame)		
Transmittance Factor (g value)	1.2 W/m ² .K	Based on best judgement on Planning Stage
Frame Factor	50 %	Based on best judgement on Planning Stage
Glazing type	0.7	Based on best judgement on Planning Stage
Air gap	double-glazed low-e with argon filled	Based on best judgement on Planning Stage
	16mm	Based on best judgement on Planning Stage
Ventilation		
Ventilation		
MVHR to be confirmed	Mechanical ventilation	Based on best judgement on Planning Stage
Balanced with heat recovery	Yes	Based on best judgement on Planning Stage
No. of wet rooms (excluding kitchen)	Varies	Based on best judgement on Planning Stage
Insulated ridged ductwork	Yes	Dependant on dwelling layout
Product name modelled	aire MRXBOXAB-ECO4 input in calculations	Based on best judgement on Planning Stage
Air permeability		
Design air permeability rate (max) for new build	3 m ³ /hm ³	Based on best judgement on Planning Stage
Heating <and cooling>		
Connection to 1 Energy Centre for supply of space heating and hot water		
Primary Heating - Energy centre with communal ASHP		
Efficiency	170 %	Based on best judgement on Planning Stage
Heat fraction	1	Based on best judgement on Planning Stage
Charging system linked to use of community heating	Yes	Based on best judgement on Planning Stage
TRVs	Yes	Based on best judgement on Planning Stage
Programmer	Yes	Based on best judgement on Planning Stage
Heating fuel	Electricity	Based on best judgement on Planning Stage
HIU water capacity (in water heating section)	2.5 litres	Based on best judgement on Planning Stage
HIU insulation thickness (in water heating section)	25 mm	Based on best judgement on Planning Stage
Renewable Technologies		
Total PV output	15 kWp	
PV efficiency	15 %	
Tilt of Collector/ orientation	Horizontal	Based on best judgement on Planning Stage
Overshading	None or very little	Based on best judgement on Planning Stage
Orientation	South	Based on best judgement on Planning Stage
Lighting		
Low energy lights	100 %	Based on best judgement on Planning Stage
Domestic water consumption		
	Yes	London Plan compliance requirement
Water consumption in dwellings to be less than 105litres/person/day		

The figures listed below are assumptions only, based on a combination of best judgement at design stage and information from the design team where appropriate. Throughout the design stage the systems and size of renewable systems are likely to change whilst the building designs are being finalised. All information detailed in this design note is a basic recommendation at the BREEAM and Planning Stage Part L pre-assessment. It should be noted that this document is not exhaustive and the contractor should allow for flexibility on site where necessary.

Opaque Elements		
U-Values		
Ground floor	0.1 W/m ² .K	Based on best judgement on Planning Stage
External walls	0.15 W/m ² .K	Based on best judgement on Planning Stage
Roofs	0.1 W/m ² .K	Based on best judgement on Planning Stage
Openings		
Doors		
U-Value	1.2 W/m ² .K	Based on best judgement on Planning Stage
Windows		
U-Value	1.2 W/m ² .K	Based on best judgement on Planning Stage
Transmittance Factor (g value)	40 %	Based on best judgement on Planning Stage
Frame Factor	0.9	Based on best judgement on Planning Stage
Ventilation		
<u>Supply and extract</u>		
MVHR assumed	Yes	Based on best judgement on Planning Stage
Specific Fan Power	0.8 W/l/s	Based on best judgement on Planning Stage
<u>Extract only (WC, kitchens, etc)</u>		
MVHR assumed	No	
Specific Fan Power	0.3 W/l/s	Based on best judgement on Planning Stage
Heat Recovery		
Heat Recovery assumed	Yes	Based on best judgement on Planning Stage
Type	Plate heat exchanger	Based on best judgement on Planning Stage
Efficiency	0.8	Based on best judgement on Planning Stage
Air permeability		
Design air permeability rate	2.5 m ³ /hm ²	Based on best judgement on Planning Stage
Heating/ DHW		
Electric ASHP		
HVAC system type	Split or multi-split system	
Seasonal efficiency		non dom Service Compliance Guide 2013 figures
Seasonal EER in cooling mode	6.0	
Seasonal COP in heating mode	3.2	
System Controls (proposed)		
Central time control	no	Based on best judgement on Planning Stage
Optimum start/stop control	no	Based on best judgement on Planning Stage
Local time control (i.e. room by room)	yes	Based on best judgement on Planning Stage
Local temperature control (i.e. room by room)	yes	Based on best judgement on Planning Stage
Weather compensation control	no	Based on best judgement on Planning Stage
Hot Water		
<u>Electric</u>		
DHW Generator type	Instantaneous hot water	Based on best judgement on Planning Stage
Generator efficiency	1.0	Based on best judgement on Planning Stage
Fuel type	Electricity	Based on best judgement on Planning Stage
Storage losses (if storage present)	0.001 kWh/(l.day)	Based on best judgement on Planning Stage
<u>PV</u>		
Total PV output	2.8 kWp	To meet planning targets
PV efficiency	15 %	To meet planning targets
Tilt of Collector/ orientation	Horizontal	Based on best judgement on Planning Stage
Overshading	None or very little	Based on best judgement on Planning Stage
Orientation	South	Based on best judgement on Planning Stage
Ductwork and metering (proposed)		
Ductwork and AHU leakage		
Ductwork leakage tested?	Yes	Based on best judgement on Planning Stage
CEN classification	Class D	Based on best judgement on Planning Stage
AHU meets CEN leakage standards?		
CEN classification	Yes Class L1	Based on best judgement on Planning Stage Based on best judgement on Planning Stage
Metering provision		
The system has provision for metering	Yes	Based on best judgement on Planning Stage

The metering warns "out of range" values	Yes	Based on best judgement on Planning Stage
Lighting and lighting controls		
Proposed		
Lamp efficacy	120 lm/cW	Based on best judgement on Planning Stage
Light Output Ratio LED Lighting	1.00	Based on best judgement on Planning Stage
Light Output Ratio Other Lighting	0.85	Based on best judgement on Planning Stage
Display Lighting Efficiency	120 lm/W	Based on best judgement on Planning Stage
Photoelectric lighting control	Yes, where feasible	Based on best judgement on Planning Stage
Occupancy Sensing	Yes, where feasible	Based on best judgement on Planning Stage

APPENDIX E – GLA SPREADSHEET

Part L 2021 Performance	
Residential	Non-residential

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Cumulative on site savings	0.0	0%
Annual savings from off-set payment	0.0	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	0	-
Cash in-lieu contribution (£)	0	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	2.3	1.4
After energy demand reduction (be lean)	1.8	1.4
After heat network connection (be clean)	1.8	1.4
After renewable energy (be green)	1.5	1.4

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.5	22%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.3	14%
Total Cumulative Savings	0.8	35%
Annual savings from off-set payment	1.5	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	44	-
Cash in-lieu contribution (£)	4,189	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

SITE-WIDE	
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
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92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	2.3		
Be lean	1.8	0.5	22%
Be clean	1.8	0.0	0%
Be green	1.5	0.3	14%
Total Savings	-	0.8	35%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	44.1	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	0.00	0.00	

	Area weighted non-residential cooling demand (MJ/m ²)	Total area weighted non-residential cooling demand (MJ/year)
Actual	111.1	61393.86
Notional	113.8	62885.88

EUI & space heating demand (predicted energy use)

Building type	EUI (kWh/m ² /year) (excluding renewable energy)	Space heating demand (kWh/m ² /year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m ² /ye ar) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
Residential						
All other non-residential	23.76	4.79	55	15	Part L2 - SBEM & none	

APPENDIX F – BE SEEN SPREADSHEET

MAYOR OF LONDON

OVERALL PROGRESS

100%

CURRENT REPORTING STAGE

----->>

Planning

*

CONTEXTUAL DATA

Progress: 100%

+ ORGANISATION & CONTACT DETAILS

ORGANISATION DETAILS

Organisation Name

Paul Simon Magic Homes

*

Organisation Address

ouse, First Floor, 5-11 Green Lanes,, Palmers Green

*

CONTACT DETAILS

Contact Name

Carly Tan

*

Email

carly@paulsimonhomes.com

*

Additional Email(s)

Telephone No.

020 8826 4346

*

Mobile No.

+ DEVELOPMENT INFORMATION

OVERALL DEVELOPMENT DETAILS

Planning Reference Number

N/A

*

Name of Whole Development

Jessica Buttons Factory Site

*

DEVELOPMENT LOCATION

Development Address

Address Line 1

Jessica Buttons Factory

*

Address Line 2

30-36 Clarendon Road

Address Line 3

London

Address Line 4

London Borough

Haringey

*

Postcode

N8 0DJ

*

Ordnance Survey Reference

Development UPRN (if available)

N/A

Geo-Location Coordinates

Latitude (to 6 decimal places)

51.590

Longitude (to 6 decimal places, +ve or -ve)

-0.112

DEVELOPMENT TOTAL AREA BREAKDOWN

Residential

Total Residential Floor Area

GIA m2

3,253

*

Dwelling Counts

Flats

number

51

*

House

number

0

*

Non-Residential

Non-Residential Floor Area Breakdown

Please include complete non-resi details below

Landlord Circulation (in Residential Blocks)

GIA m2

*

General office (A2, B1, B8, D1 planning classes)

GIA m2

*

High street agency (A2 planning classes)

GIA m2

*

General retail (A1, SG planning classes)

GIA m2

553

*

Large non-food shop (A1 planning classes)

GIA m2

*

Small food store

GIA m2

*

Large food store

GIA m2

*

Restaurant (A3, A5 planning classes)

GIA m2

*

Bar, pub or licensed club (A4 planning classes)

GIA m2

*

Hotel (C1 planning classes)

GIA m2

*

Cultural Activities

GIA m2

*

Entertainment halls (D2 planning classes)

GIA m2

*

Swimming pool centre

GIA m2

*

Fitness and health centre

GIA m2

*

Dry sports and leisure facility (D2 planning classes)

GIA m2

*

Covered car park

GIA m2

*

Public buildings with light usage (D1, SG planning classe

GIA m2

*

Schools and seasonal public buildings (D1, D2 planning

GIA m2

*

University campus

GIA m2

*

Clinic (D1 planning classes)

GIA m2

*

Hospital (clinical and research)

GIA m2

*

Long term residential (C1, C2, C2A planning classes)

GIA m2

*

General accommodation (C1, C2, C3 planning classes)

GIA m2

*

Emergency services (SG planning classes)

GIA m2

*

Laboratory or operating theatre

GIA m2

*

Public waiting or circulation (SG planning classes)

GIA m2

*

Terminal (B8 planning classes)

GIA m2

*

Workshop (B1, B2 planning classes)

GIA m2

*

Storage Facility (B8 planning classes)	GIA m2	
Cold Storage (B8 planning classes)	GIA m2	
Overall Development Summary		
Total Development Floor Area		
Residential	GIA m2	3,253
Non-Residential	GIA m2	553
Total	GIA m2	3,806
Total Non-Residential Uses		General retail

+ SUPPLEMENTARY FILES AND UPCOMING REPORTING STAGES

SUPPLEMENTARY FILES

Site Plan			
Does the development have a site plan?		No	*
Best Practice Documents			
Does the development have a predicted DEC?		No	*

ANTICIPATED DATES FOR UPCOMING REPORTING STAGES

As-Built Stage		N/A	*
Operational Year 1 End		N/A	*

DEVELOPMENT PERFORMANCE AND EMISSIONS

Progress: 100%



+ DEVELOPMENT PERFORMANCE

DEVELOPMENT OVERALL PREDICTED PERFORMANCE

Predicted Performance Calculation Details			
Fuel Carbon Intensity Source (aligned with planning energy statement)		SAP 10.0	*
Residential Elements of the development			
Predicted Annual Energy Use		Fill in all applicable fuels below	
Annual Electricity Use	kWh/yr	199,660	*
Annual Gas Use	kWh/yr	0	*
Annual Oil Use (if applicable)	kWh/yr	0	*
Annual Biomass Use (if applicable)	kWh/yr	0	*
Annual District Htg Use (if applicable)	kWh/yr	0	*
Annual District Clg Use (if applicable)	kWh/yr	0	*
Elec Generation, Gross (if applicable)	kWh/yr	0	*
Solar Thermal Generation (if applicable)	kWh/yr	0	*
Predicted Annual Carbon Emissions	tCO2/yr	15,346	*
Non-Residential Elements of the development (Part L Calculation)			
Predicted Annual Energy Use		Fill in all applicable fuels below	
Annual Electricity Use	kWh/yr	18,050	*
Annual Gas Use	kWh/yr	0	*
Annual Oil Use (if applicable)	kWh/yr	0	*
Annual Biomass Use (if applicable)	kWh/yr	0	*
Annual District Htg Use (if applicable)	kWh/yr	0	*
Annual District Clg Use (if applicable)	kWh/yr	0	*
Elec Generation, Gross (if applicable)	kWh/yr	0	*
Solar Thermal Generation (if applicable)	kWh/yr	0	*
Predicted Annual Carbon Emissions	tCO2/yr	2,387	*
Non-Residential Elements of the development (TM54 Calculation)			
Predicted Annual Energy Use		Fill in all applicable fuels below	
Annual Electricity Use	kWh/yr	0	*
Annual Gas Use	kWh/yr	0	*
Annual Oil Use (if applicable)	kWh/yr	0	*
Annual Biomass Use (if applicable)	kWh/yr	0	*
Annual District Htg Use (if applicable)	kWh/yr	0	*
Annual District Clg Use (if applicable)	kWh/yr	0	*
Elec Generation, Gross (if applicable)	kWh/yr	0	*
Solar Thermal Generation (if applicable)	kWh/yr	0	*
Predicted Annual Carbon Emissions	tCO2/yr	0	*

CARBON OFFSETTING

Predicted Carbon Shortfall (aligned with planning energy statement)		532	*
Total Committed Carbon Offset	£	50,539	*

END

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