HOARE LEA

Hayes Park West.
London Borough of Hillingdon.
Shall Do Hayes Developments Ltd.

SUSTAINABILITY
STAGE 2 REPORT – ENERGY STRATEGY

REVISION 02 – 22 OCTOBER 2025

STAGE 2

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
P01	26/09/2025	Planning Submission	L. Stokes	C. Brierley	J. Drane
P02	22/10/2025	Revised issue.	L. Stokes	C. Brierley	J. Drane

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Contents.

Executive summary.

This Energy Strategy is submitted on behalf of Shall Do Hayes Developments Ltd ('The Applicant') to accompany the application for full planning permission for the redevelopment of the land at Hayes Park West, Hayes Park, Oxbridge UB4 8FE ('the Site').

The Proposed Development.

The application is for the "partial demolition and redevelopment of the existing multi storey car park to provide new homes (Use Class C3), landscaping, car and cycle parking, and other associated works.". The development will consist of 52 new homes (Class C3) comprising a mix of 1-bedroom, 3-bedroom (hereafter referred to as the 'Proposed Development').

Table 1: Area schedule.

Planning Use Class	Floor area (Gross Internal Area (GIA)) m2	Energy modelling type	Area m2
Residential (Class C3)	6698.5m2	Domestic (Part L1)	6394.8 m^2
		Non-domestic (Part L)	303.7 m^2

Applicable policy and regulations.

With respect to energy and carbon performance, the Proposed Development must comply with the following policies and regulations:

The London Plan (2021)

The Proposed Development is referrable for a review by the Greater London Authority (GLA), therefore, the Energy Strategy follows London Plan policies:

- Policy SI 2: Major development should minimise annual and peak energy demand according to the energy hierarchy: Be Lean – Be Clean – Be Green – Be Seen.
- Policy SI 2: Non-residential developments should target 'zero carbon' – i.e. 100% reduction in CO_2 emissions for regulated uses. Of this target, 15% should be from passive measure and a total 35% reduction should be achieved from on-site measures. Any shortfall is expected to be made up by a cash-in-lieu payment.
- Policy SI 3: major development should follow the heating hierarchy when selecting the heat source for the communal heating system:
  - Connect to local existing or planned heat networks
  - Use zero-emission or local secondary heat sources (in conjunction of heat pumps if required)
  - Use low-emission combined heat and power (CHP)
  - Use ultra-low NOx gas boilers
- Policy SI 2 (A) (4): major developments to monitor and report their energy performance post-construction to ensure that the actual carbon performance of the development is aligned with the Mayor's net zero-carbon target

Hillingdon Local Plan (Adopted 2012)

- Policy DMEI 2 – carbon reductions in accordance with London Plan targets
- Policy DMEI 3 – design to connect to a Decentralised Energy Network (DEN)

Hillingdon Sustainability Appraisal (Adopted 2014)

- Obj. 5: Climate Change - To reduce contributions towards, and vulnerability to, the effects of climate
- change

Table 2: Site wide energy performance results summary

Be Lean.	
Target: 10% carbon reduction for residential, 15% carbon reduction for non-residential.	22% carbon reduction. A 'fabric first' approach has been taken in order to reduce the energy demand and CO_2 emissions for the Be Lean stage. Coupled with efficient building services, the scheme registers the required target performance. Appendix A details the system performance parameters.
Be Clean.	
Target: DHN Connection	No further carbon reductions at this stage. There are no existing or planned district energy networks within feasible vicinity of the Site that would enable a connection the Proposed Development.
Be Green.	
Target: 35% carbon reduction	70% cumulative carbon reduction. Air Source Heat Pumps (ASHP) will provide space heating and hot water for the residential units. An ASHP will also provide heating and cooling for the amenity space. Solar photovoltaic array will be provided for the dwellings and amenity.
Be Seen.	
Target: disclosure of the development's energy use	GLA's Be Seen webform will be submitted as part of this planning application. An updated as built Be Seen webform will be submitted during RIBA Stage 6 if required. The development will include the necessary metering, energy monitoring and data processes to facilitate the annual reporting requirements.
Carbon offset payment.	
Target: 100% reduction	Estimated site wide payment of £60,420 offset the remaining site wide emissions.

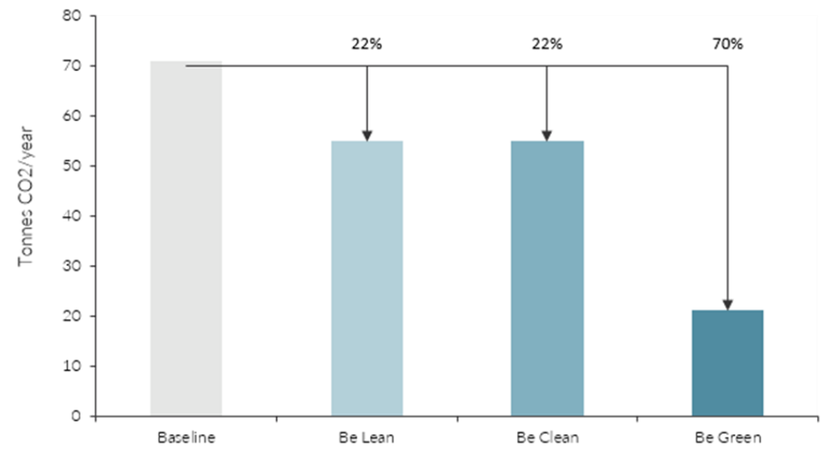


Figure 1: Site wide carbon reduction summary

Table 3: Site wide carbon offset payment calculation- Total offset payment = Residual emissions x local carbon offset price x offset period

	Site-Wide Regulated Carbon Dioxide Emission Savings (tonnes CO_2/yr.)	
	Regulated	Unregulated
Baseline: Part L 2021 Building Regulations	71	204
After energy demand reduction (Be Lean)	56	204
After heat network / CHP (Be Clean)	56	204
After renewable energy (Be Green)	22	204
	Site-Wide Regulated domestic carbon dioxide savings	
	(tonnes CO_2/yr.)	(%)
Savings from energy demand reduction	15	21%
Savings from heat network / CHP	0	0%
Savings from renewable energy	34	48%
Cumulative on-site savings	50	70%
Total target savings	71.2	100.0%
Shortfall	22	30.5%
Total Shortfall	651	
GLA Offset Payment Rate (£/tCO_2)	£95	
Total Offset Payment	£61,845	

Overheating summary.

The Proposed Development has been assessed against criteria stated within Chartered Institution of Building Services Engineers (CIBSE) Technical Memorandum 59 (TM59)**:** Design methodology for the assessment of overheating risk in homes and Part O.

CIBSE TM59 is shown to be satisfied when the following criteria are achieved:

- Criterion A is achieved when the threshold temperature is not exceeded for more than 3% of the occupied hours.
- Criterion B is achieved when the operative temperature in bedrooms (from 10 pm to 7 am) does not exceed 26 °C for more than 1% of annual hours.

Both these criteria were met for the sample selection tested across the development for both the naturally and mechanically ventilated criteria. This has been achieved through the implementation of the following measures:

- Reduction of heat gain from the façade by optimizing glazing ratios and maximizing solar shading.
- Introduction of ventilation louvers and/or openable windows in all spaces to boost natural ventilation.

Accounting for the above façade strategy and the results presented within Section 2 of this report. It can be concluded that the risk of overheating has been minimised for the Proposed Development.

1. Introduction.

This Energy Strategy has been developed on behalf of the Applicant and forms part of an application in support of the Proposed Development.

1.1 The Proposed Development.

Location: Land to at Hayes Park West, Hayes Park, Oxbridge UB4 8FE

Local Authority: London Borough of Hillingdon.

The application is for the "partial demolition and redevelopment of the existing multi storey car park to provide new homes (Use Class C3), landscaping, car and cycle parking, and other associated works". The development will consist of 52 new homes (Class C3) comprising a mix of 1-bedroom, 3-bedroom, and (hereafter referred to as the 'Proposed Development').

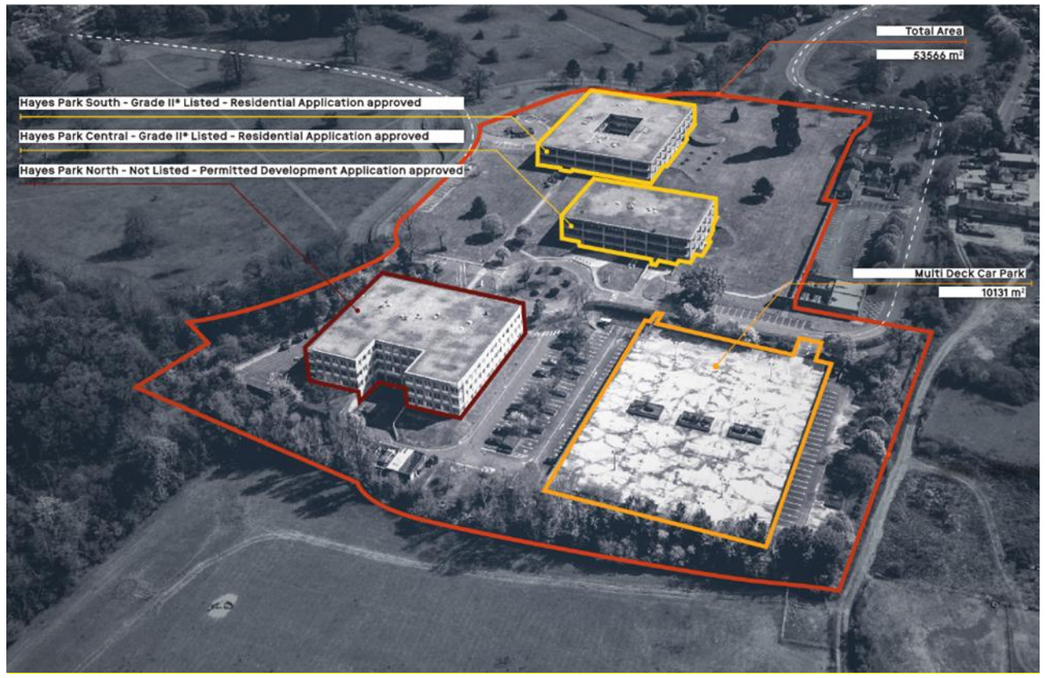


Figure 2: Project site (Credit: SEW)

1.2 Approach to the strategy.

This Energy Strategy proposes recommendations regarding the approach to reducing carbon dioxide (CO_2) emissions and optimising energy efficiency within the Proposed Development. This Energy Strategy summarises the pertinent regulatory and planning policies applicable to the Proposed Development and sets targets commensurate with these policies.

The Energy Strategy has been developed using a step-by-step approach to energy demand and emissions reduction through the 'Be Lean', 'Be Clean', 'Be Green' energy hierarchy. A 'fabric first' approach has been adopted to ensure energy efficiency is prioritised before the incorporation of low and zero carbon (LZC) energy sources.

Figure 3: The energy hierarchy

Disclaimer

The appraisals within this statement are based on Part L calculation methodology and should not be understood as a predictive assessment of likely future energy requirements or otherwise. Occupants may operate their systems differently, and/or the weather may be different from the assumptions made by Part L approved calculation methods, leading to differing energy requirements.

1.3 National policy.

Building Regulations: Approved Document Part L

Approved Document Part L (2021, England edition), hereafter referred to as Part L 2021, is the Building Regulation relating to the conservation of fuel and power in buildings. Part L 2021 has two parts; Part L1 relates to dwellings and Part L2 relates to buildings other than dwellings.

Part L 2021 is the mechanism by which government is driving reductions in the regulated CO_2 emissions from refurbished, change of use and new buildings. For new buildings Part L 2021 has four performance metrics as follows:

- Primary energy target
- C02 emissions target
- Fabric Energy Efficiency (FEE) target
- Minimum standards for fabric and fixed building services.

Building Regulations: Approved Document Part O

Approved Document Part O (2021, England edition), hereafter referred to as Part O 2021, is the Building Regulation relating to overheating mitigation within new residential buildings. Part O 2021 requires that reasonable provision must be made to limit unwanted solar gains in summer and provide an adequate means to remove heat from the indoor environment. When meeting these requirements, account must be taken of occupant safety and enjoyment of the residence. Mechanical cooling must only be used where necessary.

1.4 Regional Policy.

London Plan (2021)

The Proposed Development is referable to the GLA. The London Plan requires all developments to minimise energy consumption and overheating risk in line with the London Plan energy hierarchy and cooling hierarchy respectively.

Table 4: London Plan policy summary

London Plan (2021)	
Policy SI 2: Minimising Greenhouse Gas Emissions	Major development should be net zero-carbon – reducing greenhouse gas emissions and energy demand in accordance with the 'Be Lean – Be Clean – Be Green – Be Seen' energy hierarchy. A minimum on-site reduction of at least 35% beyond Building Regulations Part L (2013) Target Emissions Rate (TER). Residential development should achieve 10% and non-residential development should achieve 15% through energy efficiency measures. Any shortfall should be provided through a carbon offset payment to the relevant borough.
Policy SI 3: Energy Infrastructure	Major development within Heat Network Priority Areas should have a communal low-temperature heating system where the heat source for the system is selected in accordance with the following heating hierarchy: a. Connect to local existing or planned heat networks. b. Use zero-emission or local secondary heat sources (in conjunction with heat pump if required). c. Use low-emission combined heat and power (CHP). d. Use ultra-low NOx gas boilers.
Policy SI 4: Managing Heat Risk	Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure. 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.

Energy Assessment Guidance (June 2022)

The new Energy Assessment Guidance aligns with the London Plan (2021) and provides further guidance on the methodology required to demonstrate compliance with the London Plan (2021).

Table 5: Key policy summary for new-build developments

Development type	Energy Hierarchy Stage	Target
New Build elements of the Proposed Development	All Major Developments	Zero carbon for regulated emissions against Part L 2021 Baseline (i.e. 100% reduction in carbon emissions)
	Be Green	35% reduction in regulated emissions against Part L 2021 Baseline to be met on-site with remainder to be met via offset payments.
	Be Lean	10% reduction in regulated emissions against Part L 2021 for residential developments and 15% reduction in regulated emissions against the Part L 2021 Baseline for non-residential from energy efficiency measures only (i.e. Be Lean stage reduction)

1.5 Local policy.

The below summarises the key targets and requirements found in the Borough of Hillingdon policy with regards to energy.

Hillingdon Local Plan (Adopted 2012)

- Policy DMEI 2- carbon reductions in accordance with London Plan targets
- Policy DMEI 3 – design to connect to a Decentralised Energy Network (DEN)

Hillingdon Sustainability Appraisal (Adopted 2014)

- Obj. 5: Climate Change - To reduce contributions towards, and vulnerability to, the effects of climate change

2. Cooling and overheating.

In tandem with the energy and CO_2 emissions appraisal, an assessment has been undertaken to determine the risk of summertime overheating and subsequently consider measures for the minimisation of cooling demand and mitigating risk of overheating.

2.1 Cooling hierarchy.

The Policy SI 4: Managing heat risk requests that developments should reduce potential overheating risk and reliance on air conditioning systems. A 'cooling hierarchy' is provided, see Figure 4, and the Proposed Development has sought to follow this hierarchy.

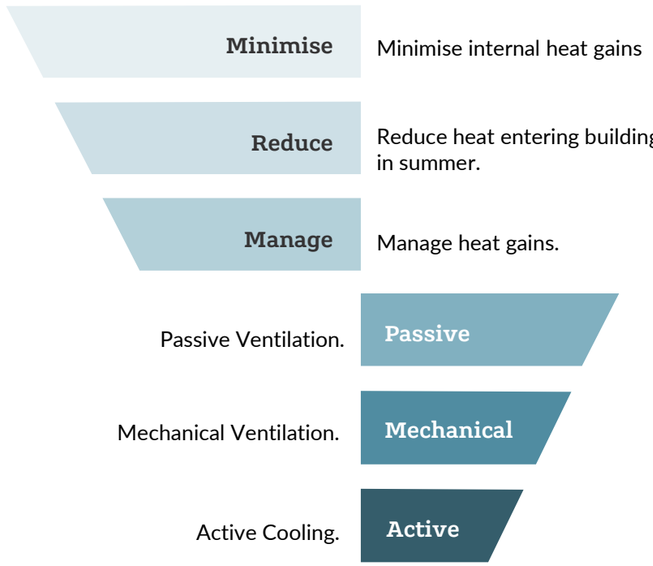


Figure 4: Cooling hierarchy.

2.2 Mitigation strategy.

Minimising Internal Heat Gains
The following mitigation methods will be implemented to minimise the internal heat generation through energy efficient design at the Proposed Development:

- Energy efficient lighting (i.e. LED) with low heat output.
- Insulation to heating and hot water pipework and minimisation of dead-legs to avoid standing heat loss.
- Energy efficient equipment with low heat output to reduce unnecessary heat gain.

Reducing the Amount of Heat Entering the Building in Summer
The following mitigation methods will be implemented to reduce the amount of heat entering the building in summer within the Proposed Development:

- Facades have been developed to balance solar gains and daylighting, with particular focus on south, east and west facing orientations. Figure 5 below illustrates the glazing reductions made to the south and east/west elevations during RIBA Stage 2. Glazing ratios for the development are provided in Appendix A.

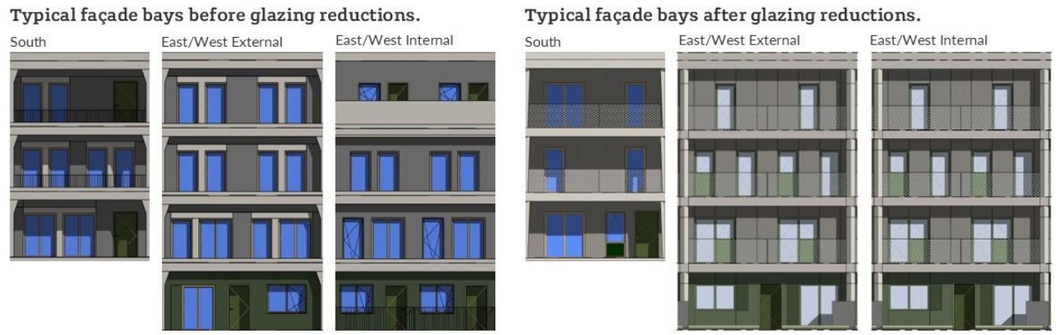


Figure 5: During the RIBA Stage 2 design process, the glazing ratios have been significantly reduced to minimise overheating (Credit: SEW Architects)..Suitable g-values have been specified to further control solar heat gains as required.

- The articulation of the façade has been designed to provide additional shading for the glazing units through the extended slabs around the envelope.

Manage Heat Gains
Opportunities to expose thermal mass to help to further regulate internal temperatures will be explored where possible.

Passive Ventilation
The potential for passive ventilation via openable windows and louvers to facilitate a mixed-mode ventilation strategy has been implemented within the facade design. Natural ventilation through openable windows has been considered during daytime only, since opening them at night would exceed the acoustic limits for noise.

Mechanical Ventilation
Mechanical ventilation is an important element of building services, to maintain good indoor air quality throughout the day by providing fresh air and extracting vitiated air. Providing fresh air minimises the risk of stale and stagnant air and limits the risk of condensation and mould growth as well as benefitting the occupants' physical and mental wellbeing. Mechanical ventilation through heat recovery (MVHR) mechanisms will be provided to save heating energy.

Mechanical ventilation units will be located away from pollution sources i.e. within the service cupboards of the respective apartments. It is anticipated that the design flow rates specified will aid the regulation of internal temperatures in summer months.

Active Cooling
As the final step active cooling is specified, in order to keep internal temperatures within acceptable limits. Although no comfort cooling is proposed, the MVHR unit has the ability to enable an element of cooling via tempering of the air in instances where windows are required to be closed due to acoustic constraints.

2.3 Commercial cooling demand reduction.

The cooling energy demand of the proposed actual building will be compared against a notional building built to Part L2 parameters, indicating a reduction of the cooling demand.

From the work that has been undertaken with the design team on the glazing ratios across the development, the cooling energy demand of the actual building is less than the cooling energy demand of the notional building built to Part L2 parameters, as shown in Table 6 below.

Table 6: Cooling Demand Reduction.

Commercial Area	Notional building	Actual building
Cooling demand (kWh/m2)	0.59	0.28

2.4 Residential assessment methodology.

Part O 2021 states that all new build residential units are within the scope of the approved document, whereby a residential dwelling is defined as both dwelling houses and flats (Part O (2021), Table 0.1).

CIBSE TM59 thermal comfort methodology (in line with Part O 2021) has been used to assess the occupied spaces within a representative sample of 4 dwellings to determine their risk of overheating during the summer period (May to September inclusive). The spaces have been assessed against criteria stated within CIBSE TM59: Design methodology for the assessment of overheating risk in homes, in accordance with the dynamic thermal modelling method.

CIBSE TM59 is shown to be satisfied when the following criteria are achieved:

- Criterion A is achieved when the threshold temperature is not exceeded for more than 3% of the occupied hours.
- Criterion B is achieved when the operative temperature in bedrooms (from 10 pm to 7 am) does not exceed 26 °C for more than 1% of annual hours.

The assessment includes further climate scenarios represented by weather sets DSY2 and DSY3, to potentially assess the overheating risks in excessive future climate scenarios.

The variations between each DSY file are briefly summarised below:

- DSY 1: moderately warm summer
- DSY 2: short, intense warm spell
- DSY 3: long, less intense warm spell

The sample dwellings tested for Part O compliance have been carried out against the iterations outlined in Table 7.

Table 7: Overheating modelling iterations

	TM59 Approach	Daytime window strategy	Night-time window strategy	Ventilation Rates
1	Adaptive	Open – unrestricted*	Open - unrestricted	Part F
2	Adaptive	Open – unrestricted*	Part O 2021 Acoustic Guidance	Boost ventilation
3	Adaptive	Open – unrestricted*	Part O 2021 Acoustic Guidance	Boost ventilation with tempering

*Where architecturally feasible to open and in line with the safety requirements as set out in Part O.

2.5 Overheating results.

The results for the overheating assessment are shown below for each occupied space within the sample apartments assessed. Natural ventilation and mechanical ventilation with, and without tempered air scenarios were modelled, the latter due to the acoustic constraints of the development and the potential effect on opening windows to mitigate overheating.

The natural ventilation iteration shows that all bedrooms and living spaces comply with both the daytime criteria (Criterion A) and the nighttime criteria (Criterion B) through May and November.

Table 8: Natural Ventilation CIBSE TM59 results

Sample Dwellings	TM59 Criterion A Pass	TM59 Criterion B Pass	Pass Percentage
12 no. Bedroom zones	12	12	100%
6 no. Living room/kitchen zones	6	N/A	100%

The mechanical ventilation iteration, utilising flow rates of 80 l/s per dwelling and temperatures of between 14-19 degrees, demonstrates that all units comply with the criteria.

Table 9: Mechanical Ventilation CIBSE TM59 results

Sample Dwellings	TM59 Criterion A Pass	TM59 Criterion B Pass	Pass Percentage
12 no. Bedroom zones	12	12	100%
6 no. Living room/kitchen zones	6	N/A	100%

The results of this overheating risk assessment for a sample of dwellings within the Proposed Development indicate that the current architectural design and operational assumptions (as outlined in this report) are able to reduce the risk of overheating in the sample dwellings in line with industry guidance.

Please refer to Appendix B for the detailed overheating results.

3. Be Lean.

Passive design and energy efficiency measures form the basis for the reduction in overall energy demand and carbon emissions for the Proposed Development. This Energy Strategy aims to reduce the energy demand initially by optimising the envelope and building services within the development.

3.1 Passive design and energy efficiency features.

Passive design measures are those which reduce the demand for energy within buildings, without consuming energy in the process. These are the most robust and effective measures for reducing CO_2 emissions as the performance of the solutions, such as wall insulation, is unlikely to deteriorate significantly with time, or be subject to change by future property owners. In this sense, it is possible to have confidence that the benefits of these measures will continue at a similar level for the duration of their installation.

Table 10: Proposed fabric performance

	Target Performance	
Building element	Residential	Non-Residential
Air permeability ($m^3/h.m^2$ at (50Pa))	3.00	3.00
External wall u-value ($W/m^2.K$)	0.15	0.15
Windows ($W/m^2.K$)	1.20 (Double Glazed)	1.20 (Double Glazed)
Roof u-value (W/m^2K)	0.11	0.11
Exposed floor u-value (W/m^2K)	0.11	0.11
Sheltered walls (W/m^2K)	0.18	-
Thermal Bridging	Part L 2021 Notional Values	-
Opaque Doors (W/m^2K)	1.00	1.00
Glazing performance		
Vertical Glazing g-value	0.35	0.35
Frame Factor	20%	20%

Table 11: Proposed system parameters

System parameters	Residential Blocks	Non-Residential
Ventilation	Mechanical ventilation with heat recovery Vent Axia Sentinal Econiq-Cool L Unit Heat recovery efficiency: 93% Specific Fan Power (SFP): – 1 wet room: 0.56 – 2 wet rooms: 0.53 – 3 wet rooms: 0.56	Mechanical ventilation with heat recovery (Air handling unit) Heat recovery efficiency: 80% Specific fan power (SFP): 1.5 W/(l/s) Extract in refuse store SFP 0.2 W/l/s 6 ACH.
Lighting	Low energy LED lighting Efficacy: 90 lm/W	Low energy LED lighting Efficacy: 120 lm/W Lighting Controls: Auto on-off in residential amenity and common corridors.
Wastewater Heat Recovery (WWHR)	WWHR has not been included in the design.	There are no showers within the non-residential spaces and so WWHR has not been included.

Domestic Be Lean summary.

The following is an appraisal of the anticipated energy requirements and resultant CO_2 emissions that could arise because of the Proposed Development, after the inclusion of the passive design and energy efficiency measures described above.

The results presented below are based on Part L 2021. The calculations, carried out in accordance with the Government's Standard Assessment Procedure (SAP) for energy rating of dwellings, are based on a representative sample of 5 dwellings, representing 75% of all dwellings, and assessed under Part L1 2021.

Refer to Appendix C for the sample SAP units.

Target: 10% carbon reduction Achieved: 22% carbon reduction

The table below outlines the anticipated area weighted average Fabric Energy Efficiency performance for the residential element.

Table 12: Domestic fabric energy efficiency results.

	Dwelling fabric energy efficiency (DFEE) kWh/m2/year	Target fabric energy efficiency (TFEE) kWh/year	Percentage variance
Area-weighted average:	35.26	35.06	1.0%

Non-domestic Be Lean summary.

Target: 15% carbon reduction	Achieved: 11% carbon reduction Appendix A details the target fabric and system performance parameters.

It has been noted by the GLA that non-domestic buildings are likely to find the 15% carbon reduction challenging when assessed under Part L 2021, until such time as technology improves. The GLA guidance states that in the intervening period, applicants should continue to aim to maximise carbon reductions from passive measures as far as possible.

4. Be Clean.

This stage of the energy hierarchy includes consideration of connection to available district heat networks, or the use of on-site heat networks and decentralised energy production, such as Combined Heat and Power (CHP), to provide energy, therefore reducing consumption from the national grid and gas networks, through the generation of electricity, heating and cooling on-site.

4.1 Be Clean: network and technologies.

The following sections detail considerations of the infrastructure and low-carbon energy supply measures that have been considered.

Combined Heat and Power (CHP)

Changes to the carbon factor of grid electricity have meant that previously favoured systems such as CHP are becoming much less carbon efficient. In fact, CHP systems are now expected to lead to greater carbon emissions than conventional gas-fired boilers due to their lower efficiency.

Due to the decarbonisation of the electricity grid, alongside air quality concerns, CHP is not proposed.

Decentralised Heat Networks

Heat Network Priority Area (HNPA)

The majority of central London is identified as a Heat Network Priority Area, i.e., areas where heat density is sufficient for heat networks to provide a competitive solution for supplying heat to buildings and consumers.

The Proposed Development is located near an area of high heat density[1].

Existing Heat Networks

The London Heat Map highlights no existing or potential network, as it is understood that the closest potential network is located >2000 m away from the site. This network does not therefore represent a viable connection opportunity at this stage for the project.

Figure 6: Extract from the London Heat Map

Decentralised Heat Networks Summary

Table 13: Heat network summary

Development in a Heat Network Priority Area (HNPA)	Yes, moderate
District Heating Network connection	Not available
Borough energy officer and Heat Network Operator contacted	See Appendix D –
Development future proofed for DHN connection	No
Drawings of communal system provided	N/A

Be Clean summary.

Target: DHN Connection	No further reductions at this stage There are no existing or planned district energy networks within feasible vicinity of the site that would enable a connection to the Proposed Development, nor are there currently any feasible future connections planned.

[1] London Heat Map (http://www.londonheatmap.org.uk)

6. Be Green.

The final step of the energy hierarchy explores the feasibility of LZC technologies to allow for the production of renewable energy onsite in order to deliver further reduction in carbon emissions.

6.1 Low and zero carbon technology assessment.

Renewable or zero carbon technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available; however, not all of these are commercially viable or suitable for city centre locations.

Discounted Technologies

Ground Source Heat Pumps
Ground Source systems would require extensive below ground works to bury and install the system on site. Given the existing car park structure at the site, Ground Source Heat Pumps are not considered a feasible option and are not proposed.

Solar Thermal
Available roof area is to prioritise solar PVs, since the electrical output from PV panels will be more suitable for implementation with the heat-pump led Energy Strategy and building energy usage.

Proposed Technologies

Photovoltaics
Solar irradiance analysis on the site has shown a good opportunity for the deployment of solar photovoltaic technologies for onsite electricity generation.

The Proposed Development currently includes provision for approximately 3 panels per dwelling and 7 panels for the non-domestic space.

Air Source Heat Pumps
The heating and hot water demand for the residential units and amenity areas will be provided by on-site ASHP, located on the terraces for each flat within an acoustic enclosure.
A separate ASHP unit will provide heating and cooling to the residential amenity space.

Table 14: ASHP specification

	Air Source Heat Pumps
Capacity	5kW
SCOP	4.3
SEER	6.4
Heating Flow / Return Temperature °C	N/A
Cooling Flow / Return Temperature °C	N/A
Manufacture's Specification & Efficiencies	See Appendix E

Heat Fraction

Table 15: Heat fraction

	% Heat fraction (space heating and DHW)
ASHP	100%
Direct electric / POU water heaters	0%
District heat network	0%
Gas boiler	0%
Other	0%

Full simulation inputs depicting the Proposed Development at the Be Green stage is provided in Appendix A.

The Proposed Development, in keeping with the energy hierarchy, aims to exhaust all feasible and practical passive and active design measures to maximise carbon reductions on-site, achieving significant carbon reductions.

Domestic Be Green summary.

Residential Target 100% - Minimum target: 35% onsite carbon reduction	22% carbon reduction Air Source Heat Pumps (ASHP) will provide space heating and hot water for the residential units. Solar photovoltaic array will be provided for the dwellings. Cumulative carbon reduction: 70%

Non-domestic Be Green summary.

Non-Residential Target 100% - Minimum target: 35% onsite carbon reduction	11% carbon reduction An ASHP will provide space heating and cooling for the non-domestic space. Solar photovoltaic array will be provided for the and amenity space. Cumulative carbon reduction: 38%

7. Be Seen.

7.1 Monitoring and reporting.

Effective energy metering will be enabled by the provision of suitable infrastructure within the building's services systems.

Sustainability Monitoring and Reporting

The Applicant is committed to reporting sustainability performance, methodology and data every year in a transparent way, following the GRI guidelines. An annual Sustainability Report is published which contains agglomerated data concerning the Energy, Water, Waste and Greenhouse Gases reports of their portfolio.

Development Monitoring and Reporting Plan

The developed strategy will allow for an exhaustive metering of all the various energy usage in the facility. This will enable Energy Intensity and Carbon Emissions to be monitored, and the data included within the Annual Sustainability Reports.

Electrical meters will be provided on each individual Air Source Heat Pump to dwellings, providing data on energy consumption throughout the year.

Each area of high energy load will be sub-metered in order to monitor energy consumption in greater granularity and facilitate reporting. All the main sub-systems (i.e. small power, lighting etc) will be separately monitored and their energy usage separately accounted. Energy intensity and carbon emissions will be monitored and reported annually.

The Applicant will also complete the planning stage of the GLA's Be Seen spreadsheet and at future stages will update the spreadsheet and follow the GLA's suggested Be Seen energy reporting protocols via the appropriate webs portals once these are available, at the appropriate stage.

7.2 Operational cost.

Operational costs for end users are an important consideration when appraising Energy Strategy options. Focussing solely on carbon emissions can lead to unintended consequences in the form of higher-than-expected occupant energy bills if capital and operational expenditure of the energy systems and networks are passed on to end users.

The Proposed Development is anticipated to achieve significant reduction in CO_2 emissions beyond the baseline, prior to the consideration of any LZC technologies, i.e. via passive design and energy efficiency measures. The savings achieved through the Be Lean stage demonstrate an energy demand reduction that will result in savings for future occupants.

The savings achieved through the Be Lean stage demonstrate an energy demand reduction that will result in savings for future occupants.

Additionally, the following measures have been implemented or followed to protect occupants from rising energy costs:

- Following quality standards to ensure optimum design such as CIBSE Code of Practice.
- Minimizing energy demand.
- Inclusion of solar PV to reduce dependence in grid electricity.

The Be Seen spreadsheet will be updated at each stage of the design, construction and operation in line with GLA guidance.

Unregulated Energy

Unregulated energy includes small power electricity use (computers, plug in devices, washing machines, refrigeration) and catering energy consumption.

It is anticipated that the proportion of unregulated energy would gain in significance when compared to regulated energy as each revision of Building Regulations Part L comes into force and regulated energy is reduced.

It is therefore foreseeable that energy efficiency and the rising cost of energy would play an increasing role when future building users are deciding which appliances to purchase and the frequency of their use. However, it is not possible at present to quantify the extent of this potential reduction.

Given the uncertainty, measures to educate the future building users on how they can reduce their equipment energy use would be encouraged. This can be provided in the form of building user guides fit-out guides. The guidance measures detailed within these types of documents would consider:

- Use of A / A+ rated white goods
- Energy star rated computers and flat screen monitors, and voltage optimization and power factor correction.

Figure 7 Regulated Energy and Unregulated Emissions Summary.

Be Seen summary.

Target: disclosure of the development's energy use	GLA's Be Seen webform will be submitted as part of this planning application. An updated "as built" Be Seen webform is to be submitted during RIBA Stage 6. The development will include the necessary metering, energy monitoring and data processes to facilitate the annual reporting requirements.

8. Summary.

This Energy Strategy has been prepared to demonstrate that at the planning stage, the Applicant and design team have given due consideration to the principles of energy and sustainability to ensure that the Proposed Development will result in a highly efficient, low-carbon scheme.

Optimized building fabric and high-efficiency servicing equipment will minimise the energy usage of the building. Using the energy hierarchy, reduction in energy demand via passive measures has been prioritized before the incorporation of low and zero-carbon strategies ensuring that the Proposed Development is highly efficient as well as economical.

The carbon emissions from regulated energy uses at the Proposed Development have been compared with the London Plan emissions targets.

8.1 The residential energy strategy.

The strategy has been developed using the 'Be Lean, Clean and Green' energy hierarchy which utilises a fabric first approach to maximise reduction in energy through passive design measures.

Be Lean.

Target: 10% carbon reduction	22% carbon reduction. A 'fabric first' approach has been taken in order to reduce the energy demand and CO_2 emissions for the Be Lean stage. Coupled with efficient building services, the scheme registers the required target performance. Appendix A details the target fabric and system performance parameters.

Be Clean.

Target: DHN Connection	No further reductions at this stage. There are no existing or planned district energy networks within feasible vicinity of the site that would enable a connection the Proposed Development.

Be Green.

Target: 100% - minimum 35% onsite carbon reduction	Cumulative 70% carbon reduction. ASHP will provide space heating, cooling, and hot water for the residential areas. Solar photovoltaic array will be provided for each dwelling.

Be Seen.

Target: disclosure of the development's energy use	GLA's Be Seen webform will be submitted as part of this planning application. An updated "as built" Be Seen webform is to be submitted during RIBA Stage 6. The development will include the necessary metering, energy monitoring and data processes to facilitate the annual reporting requirements.

Carbon offset payment.

Target: 100% reduction	£59,850 Any shortfall in demonstrating targeted performance is met with a cash in lieu contribution to the Council's carbon offset fund.

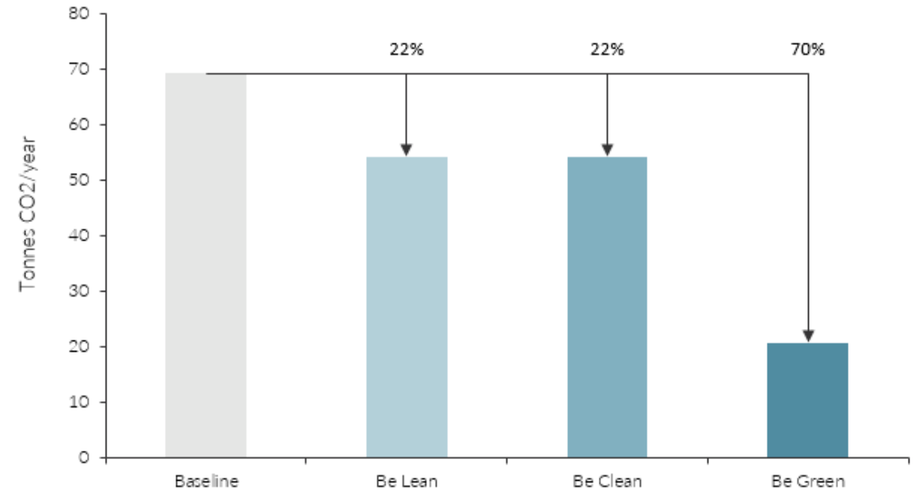


Figure 8: Residential carbon reduction summary

8.2 Residential carbon offset payment.

Table 16: Residential carbon offset payment calculation

`	Site-Wide Regulated Carbon Dioxide Emission Savings (tonnes CO_2/yr.)	
	Regulated	Unregulated
Baseline: Part L 2013 Building Regulations (SAP 10 carbon factors)	70	
After energy demand reduction (Be Lean)	55	
After heat network / CHP (Be Clean)	55	
After renewable energy (Be Green)	21	
	Site-Wide Regulated domestic carbon dioxide savings	
	(tonnes CO_2/yr.)	(%)
Savings from energy demand reduction	15	21.4%
Savings from heat network / CHP	0	0.0%
Savings from renewable energy	34	48.6%
Cumulative on-site savings	**49**	**70.0%**
Total target savings	70	100.0%
Shortfall	**21**	**30.0%**
Local carbon offset price (£/tCO_2)	£95	
Offset period (years)	30	
Total Offset Payment	**£59,850**	

8.3 Residential energy use intensity and space heating demand.

In the absence of a dedicated appointment for bespoke operational energy modelling, the unregulated energy will be derived from the compliance calculations, as per the following assumptions:

1. Heating demand will be derived from the regulated energy calculation for SAP.
2. Energy Use Intensity will be derived from SAP Appendix L for an unregulated energy estimate of cooking and appliances for the residential elements.

Table 17: EUI and space heating demand results: Residential

Building type	EUI *(kWh/m²/yr)* Excluding renewables	Space heating demand *(kWh/m²/yr)* Excluding renewables	Methodology
Target	40	15	As derived from GLA energy guidance.
Calculated	26.3	7.7	EUI: SAP plus Appendix L estimates. Space Heating: SAP calculation.

8.4 The non-residential energy strategy summary.

The strategy has been developed using the 'Be Lean, Clean and Green' energy hierarchy which utilises a fabric first approach to maximise reduction in energy through passive design measures.

Be Lean.

Target: 15% carbon reduction	11% carbon reduction. A 'fabric first' approach has been taken in order to reduce the energy demand and CO_2 emissions for the Be Lean stage. Coupled with efficient building services, the scheme registers the required target performance. Appendix A details the target fabric and system performance parameters.

Be Clean.

Target: DHN Connection	No further reductions at this stage. There are no existing or planned district energy networks within feasible vicinity of the site that would enable a connection the Proposed Development.

Be Green.

Target: 35% carbon reduction	38% cumulative carbon reduction. ASHP will provide space heating, cooling for the residential amenity areas. Solar photovoltaic array will be proposed subject to availability of roof space.

Be Seen.

Target: disclosure of the development's energy use	GLA's Be Seen webform will be submitted as part of this planning application. An updated "as built" Be Seen webform is to be submitted during RIBA Stage 6. The development will include the necessary metering, energy monitoring and data processes to facilitate the annual reporting requirements.

Carbon offset payment.

Target: 100% reduction	£1,351 Any shortfall in demonstrating targeted performance is met with a cash in lieu contribution to the Council's carbon offset fund.

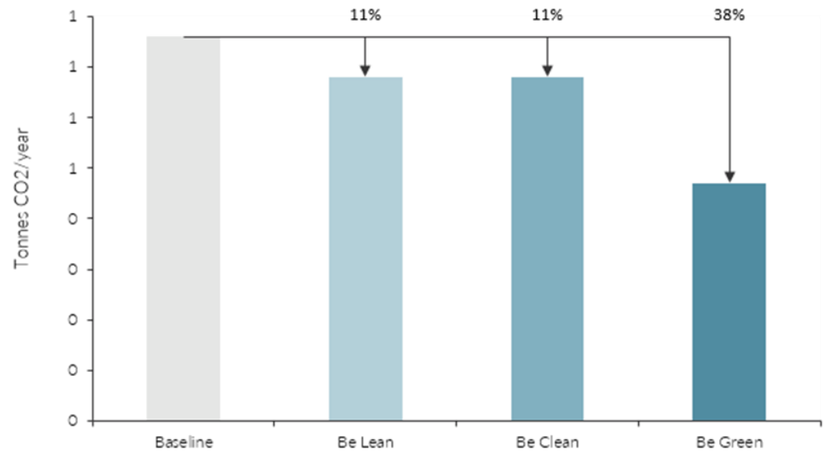


Figure 9: Non-residential carbon reduction summary

8.5 Non-residential carbon offset payment.

Table 18: Non-residential carbon offset payment calculation

	Site-Wide Regulated Carbon Dioxide Emission Savings (tonnes CO_2/yr.)	
	Regulated	Unregulated
Baseline: Part L 2021 Building Regulations	0.8	108
After energy demand reduction (Be Lean)	0.7	108
After heat network / CHP (Be Clean)	0.7	108
After renewable energy (Be Green)	0.5	108
	Site-Wide Regulated domestic carbon dioxide savings	
	(tonnes CO_2/yr.)	(%)
Savings from energy demand reduction	0	11%
Savings from heat network / CHP	0	0%
Savings from renewable energy	0	27%
Cumulative on-site savings	**0**	**15%**
Total target savings	0.76	100.0%
Shortfall	**0**	**85.0%**
	14	
GLA Offset Payment Rate (£/tCO_2)	£95	
Total Offset Payment	**£1,351**	

8.6 Non-residential energy use intensity and space heating demand.

The unregulated energy will be derived from the compliance calculations in line with the CIBSE TM54 guidance, as per the following assumptions:

1. Heating estimates will be derived from Simplified Building Energy Model (SBEM) calculations i.e. the government's method for calculating the energy performance of non-dwellings.
2. Energy Use Intensity will be derived from the SBEM calculation results i.e. Building Regulations UK Part L (BRUKL) report, along with the equipment loads from the TM54 calculation for the commercial spaces.
3. Lifts and electric vehicles are omitted from this estimate.

Table 19: EUI and space heating demand results: non-residential

Building type	EUI *(kWh/m²/yr)* Excluding renewables	Space heating demand *(kWh/m²/yr)* Excluding renewables	Methodology
Target: Retail (High Street)	70	15	As derived from the UKNZCB Standard.
Calculated	74.33	3.25	EUI: Part L2 calculation. Heating: SBEM calculation.

8.7 Site wide flexibility and peak energy demand.

An energy demand calculation has been completed in line with the GLA energy assessment guidance and is summarised in Table 20 below.

Table 20: Summary of peak demand, capacity and flexibility potential

	Electrical	Comments
Estimated peak demand (MW)	2.5	*Estimate of peak demand from initial load calculations. This will be further refined throughout the detailed design.*
Available capacity (MW)	Unknown at present	*Discussions currently ongoing with DNO on available electrical capacity in the area. Confirmed with DNO there is available capacity for required load with 20% additional load*
Flexibility* potential (MW)	N/A	*Flexible potential provided by PV place on roof spaces and reserved load spare capacity.*
Revised peak demand (MW)	N/A	*Maximum demand minus PV array peak power generation.*
Predicted flexibility (%)	N/A	*To be determined at next stage.*
Storage capacity kWh	N/A	*To be determined at next stage.*
Heating energy ASHP (kVA)	1.88 (power input 6kW heating capacity)	
Cooling energy ASHP	N/A	
*Demand side flexibility refers to the ability of a system to reduce or increase energy consumption for a period of time in response.		

The methods for achieving flexibility in the energy demand are outlined in Table 21 below.

Table 21: Summary of interventions for achieving flexibility.

Flexibility achieved through:	Yes/No	Details
Electrical energy storage (kWh) capacity	No	-
Heat energy storage (kWh) capacity	No	
Renewable energy generation (load matching)	No	-
Gateway to enabled automated demand response	No	-
Smart systems integration (e.g. smart charge points for EV, gateway etc)	No	-
Other initiative	No	-

Appendix A: Modelling inputs.

Table 22: Glazing ratios

Room name	Window to wall ratio %
Unit 01-L00-4B7P-Kitchen	18.42
Unit 01-L00-4B7P-Living Room	13.53
Unit 01-L01-4B7P-Bedroom 01	12.81
Unit 01-L01-4B7P-Bedroom 02	16.74
Unit 01-L02-4B7P-Bedroom 03	8.76
Unit 01-LG-4B7P-Single bedroom	8.65
Unit 02-LG-1BD-Bedroom	27.95
Unit 02-LG-1BD-Living Room/Kitchen	40.84
Unit 03-L00-3BD-Living Room/Kitchen	29.5
Unit 03-L01-3BD-Bedroom 01	26.61
Unit 03-L01-3BD-Bedroom 02	16.47
Unit 03-L02-3BD-Bedroom 03	17.84
Unit 04-L00-4B7P- Kitchen	18.35
Unit 04-L00-4B7P-Living Room	13.53
Unit 04-L01-4B7P-Bedroom 01	16.66
Unit 04-L01-4B7P-Bedroom 02	12.82
Unit 04-L02-4B7P-Bedroom 03	8.78
Unit 04-LG-4B7P-Single bedroom	8.7

Table 23: Proposed system parameters

System parameters	Residential	Non-Residential
Ventilation	Mechanical ventilation with heat recovery Vent Axia unit Specific fan power (SFP): 0.56W/l/s	Mechanical ventilation with heat recovery Heat recovery efficiency: 80%. Specific fan power (SFP): 1.50W/l/s
Hot Water	Supplied from ASHP HIU: Loss (kWh/day): 1.46	Point of Use water heaters for amenity areas
Heating	ASHP to each individual dwelling	ASHP to amenity areas SCOP: 4.3
Cooling	No cooling specified	ASHP: - SEER: 6.4
Lighting	Low energy LED lighting Efficacy: 90 lm/W	Low energy LED lighting Efficacy: 120 lm/W Lighting Controls: Auto on-off in residential amenity and common corridors.

Appendix B: Part O results and GHA checklist.

B.1 – Iteration 1: DSY1.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 1 (DSY 1)	
			Day	Night		Criterion 1	Criterion 2
						3%	32 hours
						ALL ROOMS	BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	1.60%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	1.70%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	O	O	0.90%	21
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	O	O	1.00%	20
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	O	O	0.70%	25
	Unit 01-LG-4B7P-Single bedroom	E+N	O	O	O	1.00%	21
U02	Unit 02-LG-1BD-Bedroom	W	O	O	O	1.50%	22
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	O	2.70%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	O	1.90%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	O	O	0.80%	22
	Unit 03-L01-3BD-Bedroom 02	S+W	O	O	O	1.10%	17
	Unit 03-L02-3BD-Bedroom 03	S	O	O	O	0.80%	17
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	2.20%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	2.10%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	O	O	1.80%	20
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	O	O	1.60%	20
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	O	O	0.80%	28
	Unit 04-LG-4B7P-Single bedroom	W+N	O	O	O	1.30%	22

B.1 – Iteration 1: DSY2

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 1 (DSY 2)	
			Day	Night		Criterion 1	Criterion 2
						3%	32 hours
						ALL ROOMS	BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	3.00%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	3.10%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	O	O	1.70%	37
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	O	O	1.70%	30
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	O	O	1.60%	52
	Unit 01-LG-4B7P-Single bedroom	E+N	O	O	O	1.80%	31
U02	Unit 02-LG-1BD-Bedroom	W	O	O	O	2.10%	31
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	O	3.80%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	O	3.40%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	O	O	1.60%	39
	Unit 03-L01-3BD-Bedroom 02	S+W	O	O	O	1.90%	31
	Unit 03-L02-3BD-Bedroom 03	S	O	O	O	1.60%	33
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	3.60%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	3.30%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	O	O	2.40%	27
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	O	O	2.20%	28
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	O	O	1.60%	51
	Unit 04-LG-4B7P-Single bedroom	W+N	O	O	O	2.00%	32

B.1 – Iteration 1: DSY3.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 1 (DSY 3)	
			Day	Night		Criterion 1	Criterion 2
						3%	32 hours
						ALL ROOMS	BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	4.60%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	4.60%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	O	O	2.50%	53
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	O	O	2.60%	48
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	O	O	2.40%	72
	Unit 01-LG-4B7P-Single bedroom	E+N	O	O	O	2.70%	50
U02	Unit 02-LG-1BD-Bedroom	W	O	O	O	3.40%	49
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	O	5.90%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	O	4.90%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	O	O	2.60%	56
	Unit 03-L01-3BD-Bedroom 02	S+W	O	O	O	2.80%	45
	Unit 03-L02-3BD-Bedroom 03	S	O	O	O	2.60%	51
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	5.30%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	5.00%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	O	O	3.60%	42
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	O	O	3.30%	44
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	O	O	2.40%	67
	Unit 04-LG-4B7P-Single bedroom	W+N	O	O	O	3.00%	50

B.2 – Iteration 2: DSY1.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 2 (DSY 1)	
			Day	Night		Criterion 1	Criterion 2
						3%	32 hours
						ALL ROOMS	BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	1.80%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	1.80%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	C	O	0.90%	65
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	C	O	1.20%	64
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	C	O	0.90%	70
	Unit 01-LG-4B7P-Single bedroom	E+N	O	C	C	1.30%	69
U02	Unit 02-LG-1BD-Bedroom	W	O	C	C	1.70%	54
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	C	2.80%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	C	2.30%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	C	O	1.10%	52
	Unit 03-L01-3BD-Bedroom 02	S+W	O	C	O	1.30%	57
	Unit 03-L02-3BD-Bedroom 03	S	O	C	O	1.10%	63
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	2.50%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	2.20%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	C	O	2.10%	53
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	C	O	1.80%	58
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	C	O	1.00%	74
	Unit 04-LG-4B7P-Single bedroom	W+N	O	C	C	1.10%	70

B.2 – Iteration 2: DSY2.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 2 (DSY 2)	
			Day	Night		Criterion 1 3% ALL ROOMS	Criterion 2 32 hours BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	3.20%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	3.30%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	C	O	2.00%	99
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	C	O	1.90%	99
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	C	O	1.90%	105
	Unit 01-LG-4B7P-Single bedroom	E+N	O	C	C	2.10%	107
U02	Unit 02-LG-1BD-Bedroom	W	O	C	C	2.40%	91
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	C	3.80%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	C	3.60%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	C	O	2.00%	92
	Unit 03-L01-3BD-Bedroom 02	S+W	O	C	O	2.20%	92
	Unit 03-L02-3BD-Bedroom 03	S	O	C	O	2.00%	95
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	3.80%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	3.50%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	C	O	2.50%	85
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	C	O	2.50%	92
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	C	O	2.00%	105
	Unit 04-LG-4B7P-Single bedroom	W+N	O	C	C	2.10%	106

B.2 - Iteration 2: DSY 3.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 2 (DSY 3)	
			Day	Night		Criterion 1 3% ALL ROOMS	Criterion 2 32 hours BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	4.70%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	4.70%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	C	O	2.90%	149
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	C	O	3.10%	145
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	C	O	3.00%	156
	Unit 01-LG-4B7P-Single bedroom	E+N	O	C	C	3.30%	154
U02	Unit 02-LG-1BD-Bedroom	W	O	C	C	3.80%	125
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	C	6.00%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	C	4.90%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	C	O	3.10%	122
	Unit 03-L01-3BD-Bedroom 02	S+W	O	C	O	3.30%	130
	Unit 03-L02-3BD-Bedroom 03	S	O	C	O	3.20%	138
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	5.50%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	5.00%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	C	O	4.10%	114
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	C	O	3.80%	120
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	C	O	3.20%	158
	Unit 04-LG-4B7P-Single bedroom	W+N	O	C	C	3.20%	155

B.3 – Iteration 3: DSY1.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 3 (DSY 1)	
			Day	Night		Criterion 1 3% ALL ROOMS	Criterion 2 32 hours BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	1.20%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	1.20%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	C	O	0.60%	25
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	C	O	0.70%	14
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	C	O	0.40%	31
	Unit 01-LG-4B7P-Single bedroom	E+N	O	C	C	0.60%	22
U02	Unit 02-LG-1BD-Bedroom	W	O	C	C	0.80%	7
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	C	1.10%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	C	1.60%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	C	O	0.30%	6
	Unit 03-L01-3BD-Bedroom 02	S+W	O	C	O	0.70%	9
	Unit 03-L02-3BD-Bedroom 03	S	O	C	O	0.40%	10
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	1.60%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	1.30%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	C	O	1.30%	12
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	C	O	1.10%	14
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	C	O	0.50%	29
	Unit 04-LG-4B7P-Single bedroom	W+N	O	C	C	0.50%	24

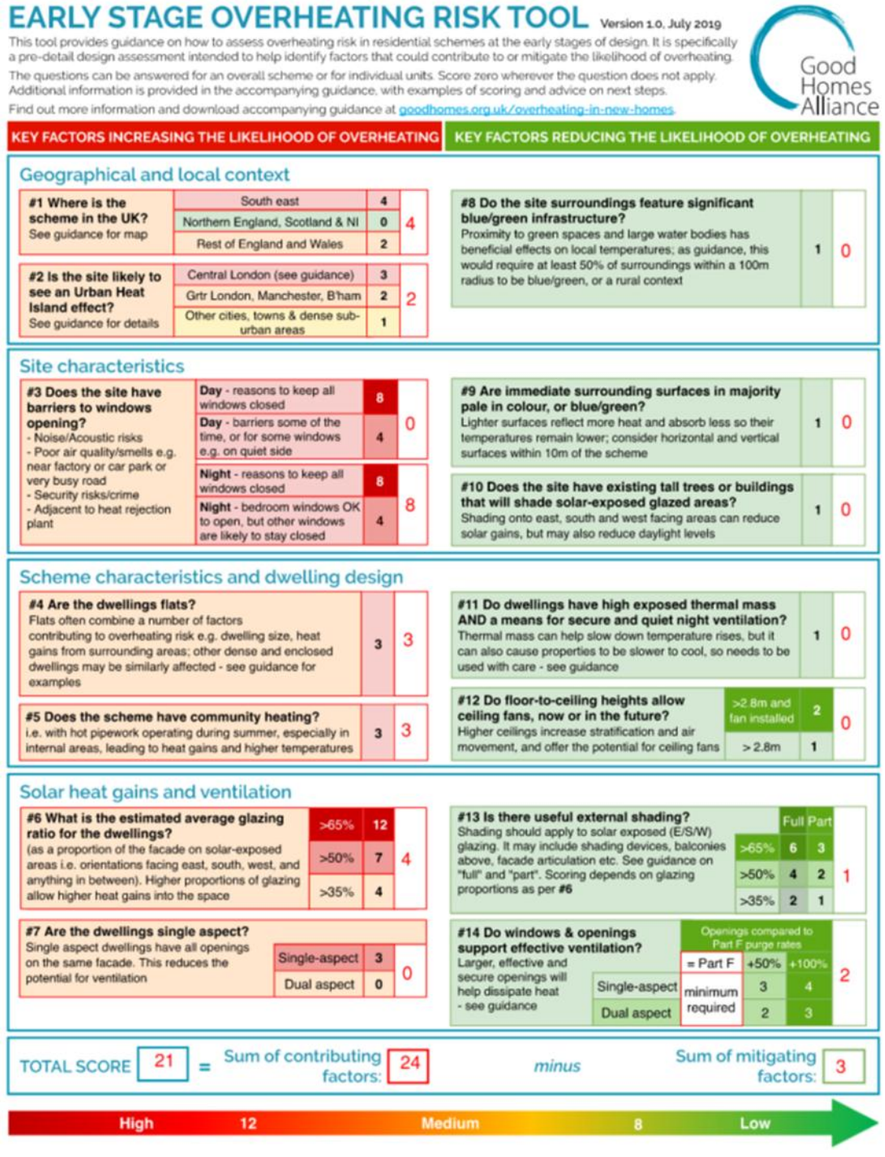
B.3 – Iteration 3: DSY2.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 3 (DSY 2)	
			Day	Night		Criterion 1 3% ALL ROOMS	Criterion 2 32 hours BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	2.60%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	2.50%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	C	O	1.30%	56
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	C	O	1.50%	44
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	C	O	1.30%	67
	Unit 01-LG-4B7P-Single bedroom	E+N	O	C	C	1.40%	55
U02	Unit 02-LG-1BD-Bedroom	W	O	C	C	1.30%	16
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	C	2.20%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	C	2.90%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	C	O	1.10%	17
	Unit 03-L01-3BD-Bedroom 02	S+W	O	C	O	1.40%	25
	Unit 03-L02-3BD-Bedroom 03	S	O	C	O	1.30%	28
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	2.70%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	2.70%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	C	O	2.10%	23
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	C	O	1.70%	31
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	C	O	1.40%	65
	Unit 04-LG-4B7P-Single bedroom	W+N	O	C	C	1.40%	53

B.3 – Iteration 3: DSY3.

Unit	Room Reference	Elevation	Acoustic Consideration		Security	ITERATION 3 (DSY 3)	
			Day	Night		Criterion 1 3% ALL ROOMS	Criterion 2 32 hours BEDROOMS
U01	Unit 01-L00-4B7P-Kitchen	E+N	O	O	O	3.70%	N/A
	Unit 01-L00-4B7P-Living Room	W+N	O	O	O	3.50%	N/A
	Unit 01-L01-4B7P-Bedroom 01	W+N	O	C	O	1.90%	83
	Unit 01-L01-4B7P-Bedroom 02	E+N	O	C	O	2.30%	64
	Unit 01-L02-4B7P-Bedroom 03	W+N	O	C	O	1.80%	109
	Unit 01-LG-4B7P-Single bedroom	E+N	O	C	C	2.20%	82
U02	Unit 02-LG-1BD-Bedroom	W	O	C	C	2.20%	23
	Unit 02-LG-1BD-Living Room/Kitchen	W	O	O	C	3.40%	N/A
U03	Unit 03-L00-3BD-Living Room/Kitchen	W+S	O	O	C	3.90%	N/A
	Unit 03-L01-3BD-Bedroom 01	S	O	C	O	1.40%	21
	Unit 03-L01-3BD-Bedroom 02	S+W	O	C	O	2.00%	31
	Unit 03-L02-3BD-Bedroom 03	S	O	C	O	2.00%	34
U04	Unit 04-L00-4B7P-Kitchen	N+W	O	O	O	4.20%	N/A
	Unit 04-L00-4B7P-Living Room	E+N	O	O	O	4.00%	N/A
	Unit 04-L01-4B7P-Bedroom 01	W+N	O	C	O	3.10%	32
	Unit 04-L01-4B7P-Bedroom 02	E+N	O	C	O	2.90%	50
	Unit 04-L02-4B7P-Bedroom 03	E+N	O	C	O	2.00%	104
	Unit 04-LG-4B7P-Single bedroom	W+N	O	C	C	2.10%	83

B.4 – GHA Checklist.



Appendix C: BRUKL and SAP reports.

C.1 – Part L1 (SAP) Be Lean results.

Unit	Level	Dwelling Type Reference	GIA	Multiplier	Total area	CO2 emissions			Primary Energy			Fabric energy efficiency			SAP Rating
						Target Emissions Rate (TER)	Dwelling Emission Rate (DER)	Variance	Target Primary Energy Rate (TPER)	Dwelling Primary Energy Rate (DPER)	Variance	Target Fabric Energy Efficiency (TFEE)	Dwelling Fabric Energy Efficiency (DFEE)	Variance	
-	-	-	m^2	-	m^2	$kgCO_2/m^2/yr.$	$kgCO_2/m^2/yr.$	%	$kWh/m^2/yr$	$kWh/m^2/yr$	%	$kWh/m^2/yr$	$kWh/m^2/yr$	%	
Unit 1		4-storey unit	167.17	12	2006.04	10.35	8.89	14.11%	55.11	52.19	5.30%	35.96	35.86	0.28%	87
Unit 2		1-storey unit	55.14	6	330.84	13.86	13.06	5.77%	74.07	75.56	-2.01%	31.04	29.7	4.32%	84
Unit 3		3-storey unit	118.83	2	237.66	10.89	11.37	-4.41%	56.94	65.68	-15.35%	38.83	39.32	-1.26%	85
Unit 4		4-storey unit	167.17	12	2006.04	10.35	8.89	14.11%	55.11	52.19	5.30%	35.96	35.86	0.28%	87
Unit 5		1-storey unit	55.14	6	330.84	13.38	12.77	4.56%	71.5	74.03	-3.54%	28.48	27.62	3.02%	85
Block compliance				38	4911.42	10.82	9.55	11.69%	57.58	55.89	2.94%	35.26	35.06	0.58%	

C.2 – Part L1 (SAP) Be Green results.

Unit	Level	Dwelling Type Reference	GIA	Multiplier	Total area	CO2 emissions			Primary Energy			Fabric energy efficiency			SAP Rating
						Target Emissions Rate (TER)	Dwelling Emission Rate (DER)	Variance	Target Primary Energy Rate (TPER)	Dwelling Primary Energy Rate (DPER)	Variance	Target Fabric Energy Efficiency (TFEE)	Dwelling Fabric Energy Efficiency (DFEE)	Variance	
-	-	-	m^2	-	m^2	$kgCO_2/m^2/yr.$	$kgCO_2/m^2/yr.$	%	$kWh/m^2/yr$	$kWh/m^2/yr$	%	$kWh/m^2/yr$	$kWh/m^2/yr$	%	
Unit 1		4-storey unit	167.17	12	2006.04	10.45	2.86	72.63%	55.65	30.93	44.42%	35.96	35.86	0.28%	85
Unit 2		1-storey unit	55.14	6	330.84	14.04	5.49	60.90%	75.04	58.59	21.92%	31.04	29.7	4.32%	80
Unit 3		3-storey unit	118.83	2	237.66	11.21	3.5	68.78%	58.71	38.07	35.16%	39.61	39.88	-0.68%	83
Unit 4		4-storey unit	167.17	12	2006.04	10.45	2.86	72.63%	55.65	30.93	44.42%	35.96	35.86	0.28%	85
Unit 5		1-storey unit	55.14	6	330.84	14.04	5.49	60.90%	75.04	58.59	21.92%	31.04	29.7	4.32%	80
Block compliance				38	4911.42	10.97	3.25	70.42%	58.41	35.00	40.08%	35.47	35.22	0.70%	

C.2 – Part L2 (Be Lean) BRUKL.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Hayes Park West (Be Lean) — As designed

Date: Mon Sep 15 12:32:18 2025

Administrative information

Building Details
Address: Address 1, City, Postcode

Certifier details
Name: Hoare Lea
Telephone number: +44 1454201020
Address: 155 Aztec West Almondsbury, Bristol, BS32 4UB

Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.26
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.26
BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 51.95

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.53	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.24	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	27.3	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	24.28	
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	LG000000:Surf[3]
Floors	0.18	0.11	0.11	LG000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	LG000000:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	LG000001:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.15	1.6	LG000007:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)] — $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K
NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

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

Page 1 of 5

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	303.7	303.7
External area [m²]	651.6	651.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	102	185.42
Average U-value [W/m^2K]	0.16	0.28
Alpha value* [%]	25	10

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

Building Use

% Area	Building Type
21	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
79	**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/m^2]

	Actual	Notional
Heating	1.26	2.42
Cooling	0.28	0.59
Auxiliary	3.22	3.16
Lighting	9.23	10.17
Hot water	2.18	2.07
Equipment*	58.65	58.65
TOTAL**	**16.16**	**18.41**

* 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/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	16.5	34.13
Primary energy [kWh_{PE}/m^2]	24.28	27.3
Total emissions [kg/m^2]	2.24	2.53

C.3 – Part L2 (Be Green) BRUKL.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Hayes Park West (Be Green) + PV — As designed

Date: Thu Sep 25 19:27:38 2025

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache
Calculation engine version: 7.0.26
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.26
BRUKL compliance module version: v6.1.e.1

Certifier details

Name: Hoare Lea
Telephone number: +44 1454201020
Address: 155 Aztec West Almondsbury, Bristol, BS32 4UB

Foundation area [m²]: 51.95

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	2.53	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	1.56	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	27.3	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	16.43	
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	LG000000:Surf[3]
Floors	0.18	0.11	0.11	LG000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.11	0.11	LG000000:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	LG000001:Surf[2]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.15	1.6	LG000007:Surf[1]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

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

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.
** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K

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

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	303.7	303.7
External area [m²]	651.6	651.6
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	102	185.42
Average U-value [W/m²K]	0.16	0.28
Alpha value* [%]	25	10

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

Building Use

% Area	Building Type
21	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
79	**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	0.77	2.42
Cooling	0.28	0.59
Auxiliary	3.22	3.16
Lighting	9.23	10.17
Hot water	2.18	2.07
Equipment*	58.65	58.65
TOTAL**	**15.68**	**18.41**

* 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	4.86	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*4.86*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	16.5	34.13
Primary energy [kWh_{PE}/m^2]	16.43	27.3
Total emissions [kg/m²]	1.56	2.53

Appendix E: Heat Pump system datasheets and efficiency calculation.

Heating Product Information

MITSUBISHI ELECTRIC

FTC7 Packaged Cylinder

For Ecodan Monobloc Units

Key Features:	Key Benefits:
A+ hot water efficiency (Range A+ to F)	Minimised energy consumption
Stylish and modern aesthetics	Flexible product placement
Packaged hot water, heating and controls	Plug and play simple installation
Colour touch screen control	Intuitive user friendly operation
MELCloud enabled	Remote control, monitoring, maintenance and technical support

Manufactured in the UK

MELCloud

ecodan.co.uk

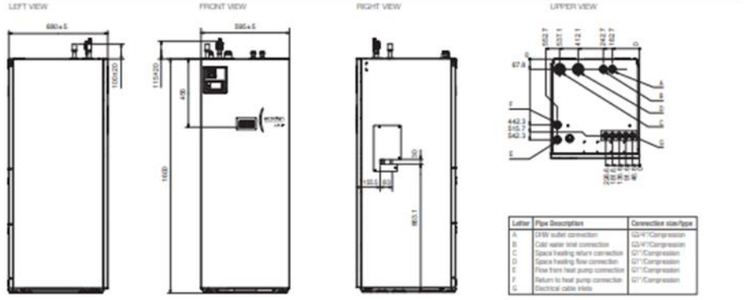
Heating Product Information

FTC7 Packaged Cylinder
For Ecodan Monobloc Units

CYLINDER			EHPT20X-MEHEW
NOMINAL HOT WATER VOLUME (LITRES)			200
HEAT PUMP COMBINATION HEATER - Large Profile (Average Climate)		ErP Rating	A+ (Range A+ to F)
OPERATING AMBIENT TEMPERATURE (°C DB)			0 – +35°C (RH<80%)
SOUND PRESSURE LEVEL AT 1M (dBA)			28
WATER DATA		Flow Rate (l/min) - Head (m)	14/17/23/24/32/40
		Primary Circuit Pump	Grundfos UPM3 15-75 130
		Sanitary Hot Water Pump	Grundfos UPSO 15-80 130
		Connection Size (inch) Heating / DHW	G1 / G3/4
WATER SAFETY DEVICES	Heating Water Circuit	Control Thermistor (°C)	80
		Flow Sensor (minimum flow 5L/min)	Supplied
	DHW Cylinder	Control Thermistor (°C)	75
		Temp and Pressure Relief Valve (°C)/ (MPa (Bar))	90 / 0.7 (7)
DIMENSIONS (m m)		Width	595
		Depth	680
		Height	1800
WEIGHT EMPTY / FULL (kg)			81 / 287
ELECTRICAL DATA	Control Board - optionally powered by outdoor unit	Electrical Supply	220-240v, 50Hz
		Phase	Single
		Fuse Rating - MCB Sizes (A)*1	10
	Immersion Heater	Electrical Supply	220-240v, 50Hz
		Phase	Single
		Capacity (kW)	3
		Max Running Current (A)	13
		Fuse Rating - MCB Sizes (A)*1	16
MECHANICAL ZONES			DHW and 1 Heating Zone*2
OPTIONAL SIMPLIFIED WIRELESS ROOM THERMOSTAT AND WIRELESS RECEIVER			PAR-WT60R-E and PAR-WR61R-E Receiver

*1 MCB Sizes BS EN60898-2 & BS EN60947-2 *2 Optional 2 zone accessory pack available
Notes: Cylinder includes: Flow Temperature Controller (FTC7) with Main Controller and Temperature Sensors, Pumps & Valves for Zone 1 and DHW use, Flow Sensor, Plate Heat Exchanger, Scale Trap, 3kW Immersion Heater.

EHPT20X-MEHEW DIMENSIONS



MITSUBISHI ELECTRIC
Changes for the Better

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ecodan.co.uk

@Ecodanheating | Mitsubishi Electric Heating UK | Mitsubishi Electric Heating UK | Mitsubishi Electric Ecodan | Mitsubishi Electric Heating UK | BLOG thehub.mitsubishielectric.co.uk

UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R410A (GWP:2021), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No 626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of January 2025

Green Gateway greengateway.mitsubishielectric.co.uk

Heating Product Information

MITSUBISHI ELECTRIC

Ecodan R32

Monobloc Air Source Heat Pump

R32

Key Features:	Key Benefits:
■ A+++ heating efficiency (Range A+++ to D)	■ Ultra low running cost
■ Ultra quiet noise levels	■ Flexible product placement
■ Maintains full heating capacity at low temperatures	■ Confident and quick product selection
■ Zero carbon solution	■ Help to tackle the climate crisis
■ MELCloud enabled	■ Remote control, monitoring, maintenance and technical support

MELCloud

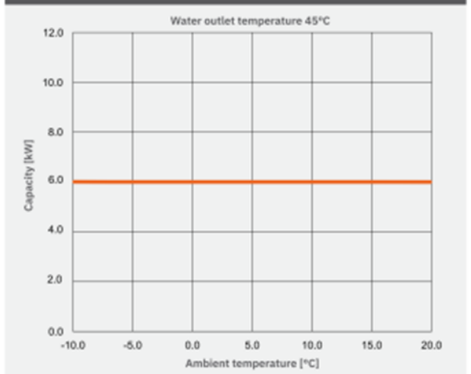
ecodan.co.uk

Heating Product Information

Ecodan R32
Monobloc Air Source Heat Pump

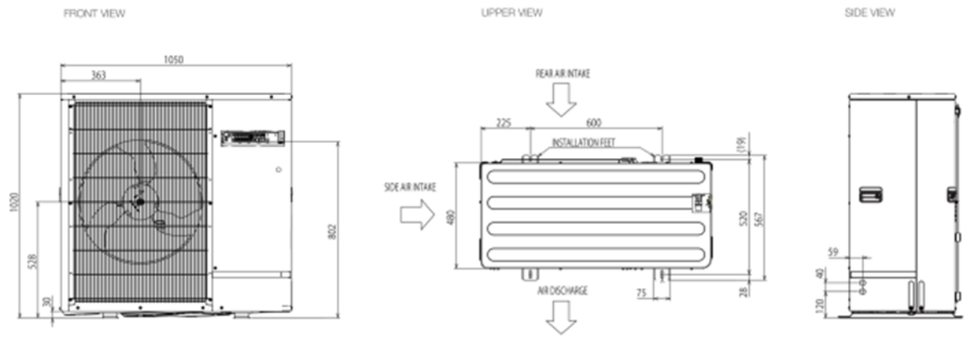
OUTDOOR UNIT		PUZ-WM60VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++ (Range A+++ to D)
	η_s	142%
	SCOP (MCS)	3.57
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++ (Range A+++ to D)
	η_s	190%
	SCOP (MCS)	4.81
HEAT PUMP COMBINATION HEATER - Large Profile[*1]	ErP Rating	A+ (Range A+ to F)
	η_{wh}	145%
HEATING[*2] (A-7/W35)	Capacity (kW)	6.0
	Power Input (kW)	1.88
	COP	3.20
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA[*3]	Pressure Level at 1m (dBA)	45
	Power Level (dBA)[*4]	58
WATER DATA	Pipework Size (mm)	22
	Flow Rate (l/min)	17
	Water Pressure Drop (kPa)	8.0
DIMENSIONS (mm)	Width	1050
	Depth	480
	Height	1020
WEIGHT (kg)		98
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A)[*5]	5.68 [13]
	Fuse Rating - MCB Sizes (A)[*6]	16
REFRIGERANT CHARGE (kg) / CO_2 EQUIVALENT (t)	R32 (GWP 675)	2.2 / 1.49

NOMINAL HEATING CAPACITY



Notes:
*1 Combination with E*PT20X Cylinder
*2 Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.
*3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.
*4 Sound power level tested to BS EN12102.
*5 Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.
*6 MCB Sizes BS EN60898-2 & BS EN60947-2.
η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

PUZ-WM60VAA(-BS) DIMENSIONS



All dimensions (mm)

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Heating | Product Information

MITSUBISHI ELECTRIC

FTC7 Pre-Plumbed Cylinder **Standard**
For Ecodan Monobloc Heat Pumps

Key Features:	Key Benefits:
Pre-Plumbed and Pre-Wired	Plug and play simple installation
DHW Plate Heat Exchanger combined with scale trap	Excellent hot water recovery times
Low Loss Header	Automatic heat pump flow rate regulation
Colour touch screen control	Intuitive user friendly operation
MELCloud enabled	Remote control, monitoring, maintenance and technical support

Manufactured in the UK

MELCloud

ecodan.co.uk

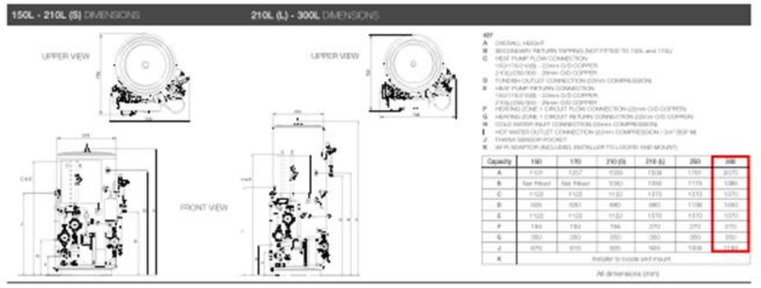
Heating | Product Information

FTC7 Pre-Plumbed Cylinder **Standard**
For Ecodan Monobloc Heat Pumps

CYLINDER			EHPT15X-UKHDW	EHPT17X-UKHDW	EHPT21X-UKHDW	EHPT21X-UKHDWL	EHPT25X-UKHDWL	EHPT30X-UKHDWL
NOMINAL HOT WATER VOLUME (LITRES)			150	170	210	210	250	300
ErP RATING			B	B	C	C	C	C
HEAT LOSS (kWh/24hrs)			1.15	1.25	1.53	1.53	1.80	2.09
HEAT LOSS (W)			48	51	64	63	75	88
WATER		Flow Rate (l/min) - with FSC Heat Pump 5 / 6 / 8.5 / 11.2 / 14kW	14 / 17 / 24 / - / -	14 / 17 / 24 / - / -	14 / 17 / 24 / - / -	- / 17 / 24 / 32 / 40	- / 17 / 24 / 32 / 40	- / - / 24 / 32 / 40
		- with R290 Heat Pump 5 / 6 / 8kW	14 / 17 / 23	14 / 17 / 23	14 / 17 / 23	- / 17 / 23	- / 17 / 23	- / - / 23
		Primary Circuit Pump	Grundfos UPWML 25-75 130AZA					
		Heating Circuit Pump	Grundfos UPMO AUTO 25-70 130					
		Sanitary Hot Water Pump	Grundfos UP20 15-60 CBJ2					
		Connection Size (mm) Heating / DHW	22 / 22	22 / 22	22 / 22	28 / 22	28 / 22	28 / 22
		Charge Pressure (MPa (Bar))	0.35 (3.5)	0.35 (3.5)	0.35 (3.5)	0.35 (3.5)	0.35 (3.5)	0.35 (3.5)
WATER SAFETY	Water Circuit	Control Thermistor (°C)	80	80	80	80	80	80
	DHW Cylinder	DHW Expansion Vessel (Litres)	12	18	18	18	24	24
		Control Thermistor (°C)	75	75	75	75	75	75
		Over Temperature Cut-Out (°C)	80 +/- 5	80 +/- 5	80 +/- 5	80 +/- 5	80 +/- 5	80 +/- 5
		Temp and Pressure Relief Valve (°C) / (MPa (Bar))	90 / 1.0 (10)	90 / 1.0 (10)	90 / 1.0 (10)	90 / 1.0 (10)	90 / 1.0 (10)	90 / 1.0 (10)
		Expansion Relief Valve (Cold) (MPa (Bar))	0.8 (8)	0.8 (8)	0.8 (8)	0.8 (8)	0.8 (8)	0.8 (8)
DIMENSIONS (mm)		Width	730	730	730	748	748	748
		Depth	756	756	756	755	755	755
		Height	1131	1257	1559	1559	1761	2075
WEIGHT EMPTY / FULL (kg)			55/205	58/228	64/274	69/278	74/324	82/382
CYLINDER MATERIAL		Cylinder Material	Duplex stainless steel					
		Insulation Type	CFC / HCFC-free flame-retardant expanded Polyurethane					
		Insulation Thickness (mm)	60	60	60	60	60	60
		GWP of Insulation	3.1	3.1	3.1	3.1	3.1	3.1
		ODP of Insulation	0	0	0	0	0	0
ELECTRICAL DATA	Control Board - (optionally powered by outdoor unit)	Electrical Supply	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz
		Phase	Single	Single	Single	Single	Single	Single
		Fuse Rating - MCB Sizes (A) [1]	16	16	16	16	16	16
	Immersion Heater	Electrical Supply	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz
		Phase	Single	Single	Single	Single	Single	Single
		Capacity (kW)	3	3	3	3	3	3
		Max Running Current (A)	13	13	13	13	13	13
		Fuse Rating - MCB Sizes (A) [1]	16	16	16	16	16	16
MECHANICAL ZONES			DHW and 1 Heating Zone [2]					
OPTIONAL WIRELESS ROOM THERMOSTAT AND WIRELESS RECEIVER			PAR-WT60R-E Controller and PAR-WR01R-E Receiver					

[1] MCB Sizes BS EN60898-2 & BS EN60947-2 [2] Optional 2 zone accessory pack available.
Notes: Cylinder includes: Flow Temperature Controller (FTC7) with Main Controller and Temperature Sensors, Heat Pump Filter, Pumps and Valves for Primary Circuit and Zone 1 and DHW use, Flow Sensor, Plate Heat Exchanger, Scale Trap, 3kW Immersion Heater, Expansion Vessel, Diverter Valve and Low Loss Header.

150L - 210L (S) DIMENSIONS **210L (L) - 300L** DIMENSIONS



Capacity	150	170	210 (S)	210 (L)	250	300
A	1129	1257	1559	1559	1761	2075
B	Not Fitted	Not Fitted	1080	1080	1115	1380
C	1122	1122	1122	1372	1372	1372
D	585	585	885	885	1138	1380
E	1122	1122	1122	1372	1372	1372
F	184	184	184	270	270	270
G	350	350	350	350	350	350
J	675	815	825	825	1078	1340
K	Installer to locate and mount					

All dimensions (mm)

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Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R290 (GWP3) R410A(GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R123/xze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No 626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of September 2024

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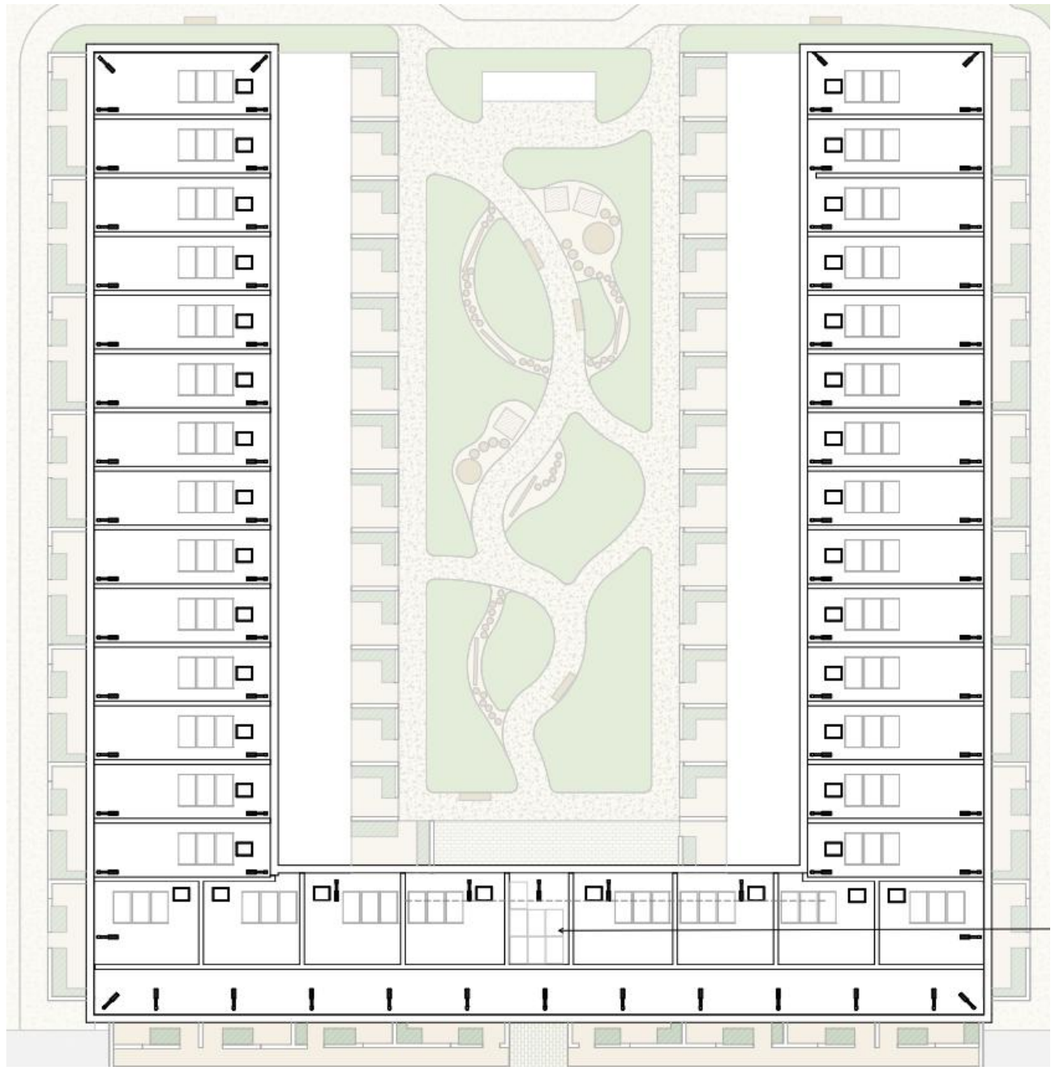
Appendix F: Solar photovoltaic layout.



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