

Energy and Sustainability Statement

6a Denmark Terrace

For GHS Joinery
May 2026

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1 Executive Summary

This Energy and Sustainability Statement presents the key measures proposed to meet the London Plan’s carbon reduction targets and the sustainability strategy in support of the planning application for 6a Denmark Terrace, in the London Borough of Haringey.

The proposed development entails the demolition of existing buildings and erection of a lower ground plus three above-ground storey building, comprising office (circa 51m²) at ground floor level and 4no. homes.

The energy and sustainability strategy for the proposal has been developed in accordance with relevant policies within the London Plan, Haringey’s Local Plan and Development Management DPD, and its Sustainable Design and Construction SPD.

1.1 Energy Strategy

The energy strategy for the project has been developed in line with the London Plan (2021) Policies SI2, SI3 and SI4, Haringey’s Policy SP4 and the GLA’s Guidance on Energy Assessments (2022). The CO₂ emissions for the development have been assessed using the Standard Assessment Procedure (SAP) for the dwellings and Simplified Building Energy Model (SBEM) for the office space.

Proposed energy measures for the development includes:

- **Be Lean:** Passive design with a fabric first approach (enhanced u-values, low air tightness target and careful thermal bridging detailing), low energy lighting and installation of Mechanical Ventilation with Heat Recovery (MVHR).
- **Be Clean:** There are no existing or proposed district heat network in proximity to the scheme. The scheme is not of a scale suitable for a communal heating system.
- **Be Green:** . All homes are proposed to be served by individual Air Source Heat Pumps (ASHP). The office space will have its own ASHP or Variable Refrigerant Flow (VRF) system which are similar

technologies. Photovoltaics are proposed to the very limited area on the top flat roof of the development, with considerations for overshadowing and visual impact on the Fortis Green Conservation Area.

Overall, the proposed development is anticipated to achieve 62% reduction in regulated CO₂ emissions over the Part L 2021 baseline. This exceeds both the minimum onsite reduction target of 35% set out by the GLA, as well as the aspirational reduction target of 50% for residential developments stipulated within GLA’s Energy Assessment Guidance (2022).

The scheme will also achieve an 10% and 27% reduction in regulated CO₂ for the residential elements and office element respectively over the baseline at the Be Lean stage with building fabric and system efficiencies measures alone, which exceeds the 10% Be Lean reduction target for residential developments and the 15% Be Lean reduction target for non-residential developments set out by the GLA.

The London Borough of Haringey requires all developments (including minor developments) to achieve 100% reduction in regulated carbon. To achieve ‘zero carbon’ for the scheme, 1.8 tonnes per annum of regulated CO₂, equivalent to 52.9 tonnes over 30 years, should be offset via a financial contribution. Any carbon offset contributions should be subject to viability discussions and detailed design stage calculations.

Should the scheme fall under the Future Homes Standard (FHS) and Part L 2026, which will be subject to timescales for a meaningful start on site, the client and design team will ensure the relevant latest Building Regulations are complied with.

1.2 Sustainability Strategy

Key sustainability considerations for the proposed scheme include the optimisation of land use, health and wellbeing for neighbours and future building users, ecological enhancement, consideration of climate resilience, reduction of waste and sustainable transport.

2 Introduction

2.1 Site

6a Denmark Terrace is located close to the north western boundary between the London Boroughs of Haringey and Barnet, at the junction between Woodside Cottages and Denmark Terrace (Fortis Green). The site currently comprises a part-one/part-two storey building of non-domestic use, with ancillary spaces to the rear.

The proposal is for the demolition of existing buildings and erection of a lower ground plus three above-ground storey building, comprising office (circa 51m²) at ground floor level and 4no. homes. The site location is presented in Figure 1.

The scheme is classed as a minor development under the London Plan and Haringey's Local Plan area thresholds.

2.2 Planning policies

A review of the applicable policies for the proposed development has been undertaken. A full summary of the relevant Greater London Authority (GLA) and London Borough of Haringey policies are presented in Appendices A and B.

The proposed development has been designed to meet and exceed (where feasible) the following main policy drivers.

2.2.1 London Plan (2021)

Energy and carbon:

- For minor schemes, demonstrate that proposed developments have incorporated improvement measures that maximise performance at each stage of the energy hierarchy.
- Major developments to achieve net zero carbon through application of the GLA Energy Hierarchy.
- A minimum of 35% reduction in regulated CO₂ emissions on site compared to Part L 2021 baseline, with an aspiration to meet the 50% reduction benchmark for residential developments.

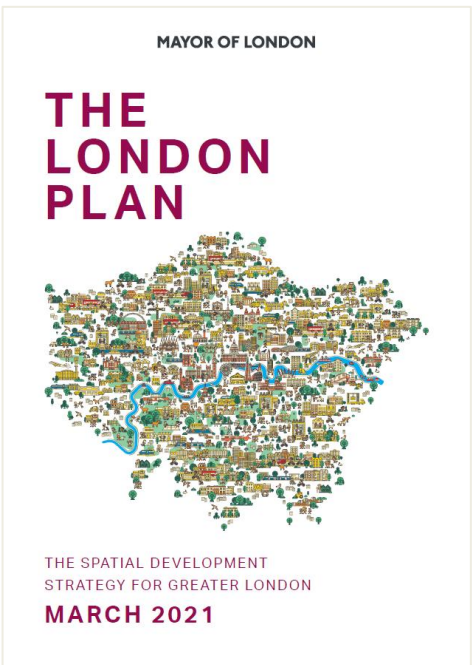
- Reductions in regulated CO₂ emissions at the Be Lean stage of 10% for new residential developments and 15% for new major non-residential developments.
- Where the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided through a cash in lieu contribution to the borough's carbon offset fund.

Sustainability:

- Enhance health and wellbeing provision of high quality buildings and associated amenity spaces, limiting exposure to sources of air and noise pollution.
- Optimise land use and promote higher density development, whilst protecting and enhancing green spaces and the public realm.
- Design in measures to ensure safety, security and resilience (including resilience to flood risk and overheating).
- Contribute to urban greening, biodiversity and access to nature within the city.
- Water efficiency – to meet a maximum water consumption of 105 l/p/d.
- Waste management and reduction.
- Sustainable urban drainage.
- Sustainable transport.



Figure 1. Approximate site location of 6a Denmark Terrace.



2.2.2 *Haringey's Local Plan (2013) and Development Management DPD (2017)*

Energy and carbon:

- Assess the scheme in line with the Energy Hierarchy and against CO₂ emission targets set out within the London Plan.
- All new residential development shall be zero carbon from 2016 onwards.
- All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on-site renewable energy regeneration.

Sustainability:

- Consider sustainable design and construction techniques.
- Minimise impact on health, climate change, natural resources and biodiversity.
- Provide green infrastructure and enhance biodiversity.
- Sustainable transport.

Policy SP4 of Haringey's Local Plan stipulates that BREEAM Very Good should be targeted for all new non-domestic development. The proposed office space at 6a Denmark Terrace is very minor in scale (circa 51m²). It is not deemed feasible or viable to achieve BREEAM compliance for the very minor space, for reasons set out in Section 4.8 of this report.

2.2.3 *Haringey's Sustainable Design and Construction SPD (2013)*

This SPD provides guidance on how development in Haringey should be designed to ensure that it is as sustainable as possible.

Topics covered in the SPD include:

- Energy and carbon
- Changing climate
- Flood risk
- Water
- Pollution
- Waste
- Construction
- Biodiversity
- Transport.

2.2.4 *Haringey's Draft Local Plan (2025, Regulation 18 Consultation documents)*

The regulation 18 consultation for Haringey's Draft Local Plan took place between October and December 2025. Although the Draft Local Plan has not been adopted yet, the client and design team have considered the proposed energy/carbon related policies during development of the scheme as far as feasible.

The proposed Energy and Sustainability strategies for the proposed development are presented in the following chapters.

Table 1 on the following pages summarises where relevant adopted policies and guidance set out by the GLA and Haringey have been responded to within this document.

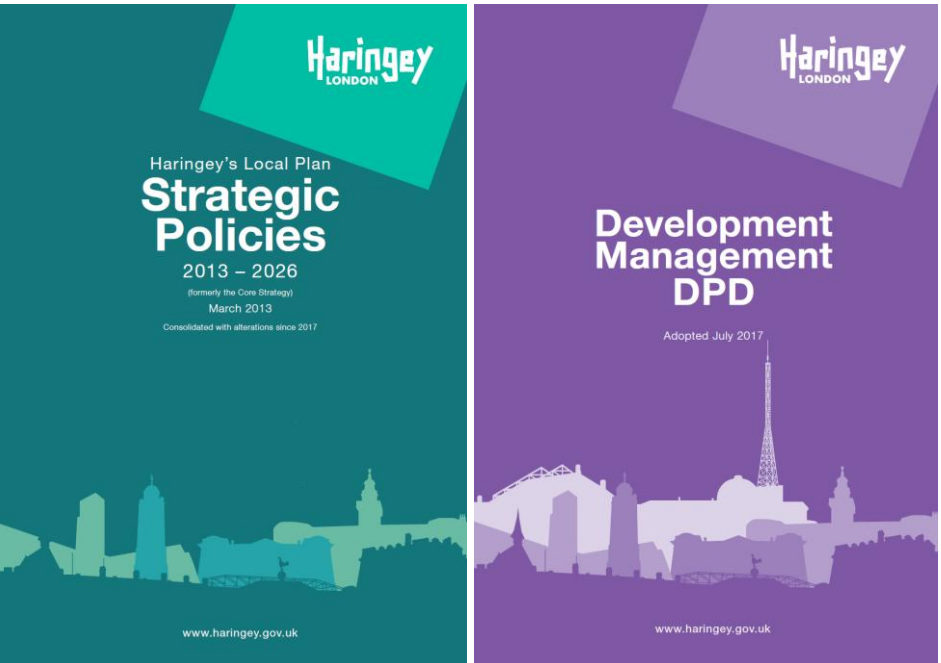


Table 1. Planning policies applicable for the proposed development at 6a Denmark Terrace, and the report sections where they are responded to.

	3 Energy Strategy	4.1 Optimising Land Use	4.2 Health and Wellbeing	4.3 Nature, Landscape and Biodiversity	4.4 Climate Resilience	4.5 Water and Surface Water Runoff	4.6 Materials and Waste	4.7 Sustainable Transport	4.8 BREEAM
The London Plan (2021)									
GG2 Making the best use of land		◆							
GG3 Creating a healthy city	◆		◆						
GG4 Delivering the homes Londoners need, D7 Accessible Housing		◆							
GG5 Growing a good economy		◆							
GG6 Increasing efficiency and resilience	◆				◆				
D2 Infrastructure requirements for sustainable densities		◆						◆	
D11 Safety, security, and resilience to emergency			◆		◆				
D14 Noise			◆						
G1 Green infrastructure, G5 Urban greening, G6 Biodiversity and access to nature				◆					
SI1 Improving air quality			◆						
SI2 Minimising greenhouse gas emissions, Policy SI3 Energy infrastructure	◆								
SI4 Managing heat risk					◆				
SI5 Water infrastructure						◆			
SI7 Reducing waste and supporting the circular economy							◆		
SI12 Flood risk management, SI13 Sustainable Drainage					◆	◆			
T5 Cycling								◆	
Haringey's Local Plan Strategic Policies 2013-2026 (2013)									
SP4 Working towards a Low Carbon Haringey	◆								◆
SP5 Water Management and Flooding					◆	◆			
SP6 Waste and Recycling							◆		
SP7 Transport								◆	
SP11 Design	◆		◆		◆		◆		
SP13 Open Space and Biodiversity				◆					
Haringey's Development Management DPD (2017)									
DM20 Open Space and Green Grid			◆	◆					
DM21 Sustainable Design, Layout and Construction	◆						◆		
DM22 Decentralised Energy	◆								
DM23 Environmental Protection			◆						
DM24 Managing and Reducing Flood Risk					◆	◆			
DM25 Sustainable Drainage Systems						◆			
DM29 On-Site Management of Waste Water and Water Supply						◆			
DM32 Parking								◆	

	3 Energy Strategy	4.1 Optimising Land Use	4.2 Health and Wellbeing	4.3 Nature, Landscape and Biodiversity	4.4 Climate Resilience	4.5 Water and Surface Water Runoff	4.6 Materials and Waste	4.7 Sustainable Transport	4.8 BREEAM
Haringey's Sustainable Design and Construction Guide SPD (2013)									
Energy and carbon	♦								
Changing climate					♦				
Flood risk					♦	♦			
Water						♦			
Pollution			♦						
Waste							♦		
Construction							♦		
Biodiversity				♦					
Transport								♦	

3 Energy Strategy

The Energy Strategy for the proposed development at 6a Denmark Terrace has been developed in line with the Energy Hierarchy set out in Policy SI 2 of the London Plan:

- 1. Be Lean: use less energy.
- 2. Be Clean: supply energy efficiently.
- 3. Be Green: access low or zero carbon (LZC) energy sources.
- 4. Be Seen: monitor and report operational energy.

The CO₂ emissions at each stage of the Hierarchy are compared to a Building Regulations Part L1 2021 (adopted June 2022) compliant baseline.

It should be noted that the estimations presented within this statement are based on the Part L calculation methodology and the associated standard assumptions regarding occupancy, space/system usage and climatic conditions; and should not be considered as a predictive assessment of the likely in-use energy requirements for the development.

The Future Homes Standard (FHS) and the associated Part L 2026 was recently published in March 2026. Part L 2026 will take effect on 24 March 2027 for building work that is not in connection with higher-risk buildings.

Should the scheme fall under the FHS and Part L 2026, which will be subject to timescales for a meaningful start on site, the client and design team will ensure the relevant latest Building Regulations are complied with.

The following sections present the measures adopted at each stage of the Energy Hierarchy at the proposed development.



3.1 Be Lean

A range of energy efficiency measures has been applied to the design of the building fabric and building services systems to minimise energy demand and CO₂ emissions at the Be Lean stage.

3.1.1 Passive Design

Building orientations have been optimised as far as feasible within the constraints of the site. Three out of the four homes will be dual aspect, with access to at least one south/west facing window, which enables some passive solar heating to reduce space heating energy demand from active systems.

Low-e and solar control glazing will be specified, which promotes heat retention within the dwellings in the cooler months whilst limiting excessive solar gains during the summer.

All glazed elements will have good extents of openable areas to enable air flow and passive cooling potential.

Please see Figure 2 for illustrations of these design principles incorporated into the scheme.

3.1.2 Fabric Performance

A fabric first approach has been adopted to minimise unwanted heat loss through the building fabric and reduce heating energy demand over the cooler months. The proposed building fabric specification will go beyond the notional building standards set out within Building Regulations Part L 2021 and the FHS (Table 2).

Further details regarding targeted u-values, air permeability and thermal bridging are presented in Appendix C.

3.1.3 Efficient lighting

All light fittings within the proposed development will be specified as low energy lighting, and will only incorporate LEDs with an average efficacy of more than 120 lm/W.

3.1.4 Heat Recovery Ventilation

Mechanical Ventilation with Heat Recovery (MVHR) is proposed for all homes to provide good levels of fresh air supply whilst reducing ventilation heat loss during the cooler months.

3.1.5 Controls and Energy Monitoring

Time and temperature zone control will be provided for space heating for all homes. Hot water will be independently controlled from space heating. Where feasible, smart meters will also be installed at an accessible location at each home to enable occupants to monitor their energy consumption.

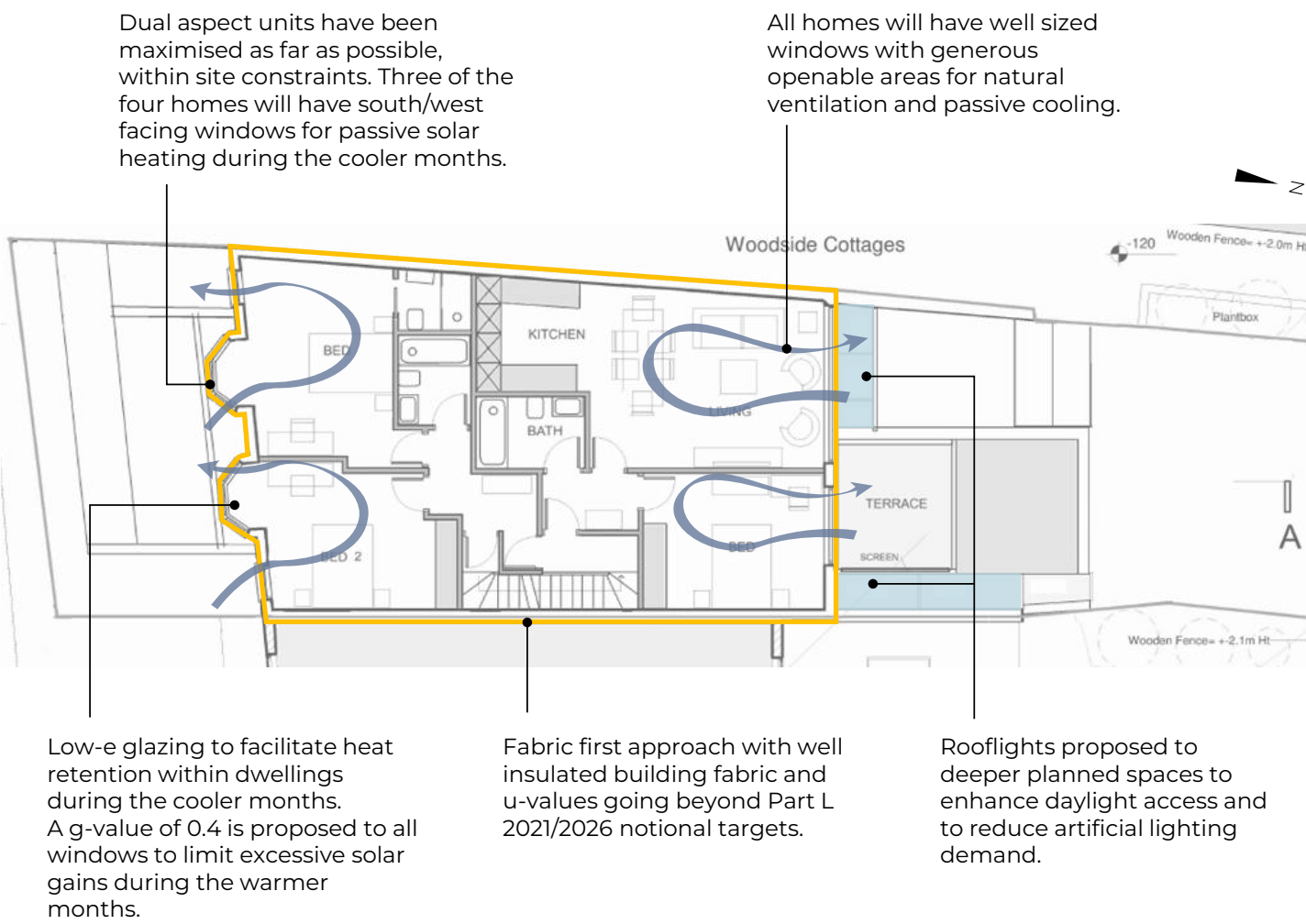


Figure 2. Passive design measures considered for the proposed development (1F plan shown). Similar design principles have been adopted for all levels.

Element	Part L 2021 limiting values	Part L 2021/FHS Part L 2026 Notional Building values	Proposed specification
External Wall u-value (W/m².K)	0.26	0.18	0.15
Roof u-value (W/m².K)	0.16	0.11	0.1
Floor u-value (W/m².K)	0.18	0.13	0.1
Window u-value (W/m².K)	1.6	1.2	1.2
Air permeability	8	<5 (Part L 2021) <4 (FHS, Part L 2026)	<3.5
Thermal bridging	n/a	Notional building psi values	Psi values better than Notional building through use of reference junctions or thermal modelling.

3.2 Be Clean

Policy SI 3 of the London Plan and Policy DM22 of the Haringey Development Management DPD stipulate that major development proposals within Heat Network Priority Areas should have a communal heating system connected to local existing or planned heat networks, or to low/zero emission local heat sources.

A review of the London Heat Map (Figure 3) shows that there are no existing or proposed district heating networks in proximity to the site.

Individual Air Source Heat Pumps (ASHPs) are proposed for the scheme. ASHP or VRF systems will also be utilised to serve the ground floor office space.

The energy and carbon savings from the ASHP systems are considered under the Be Green stage of the Energy Hierarchy.

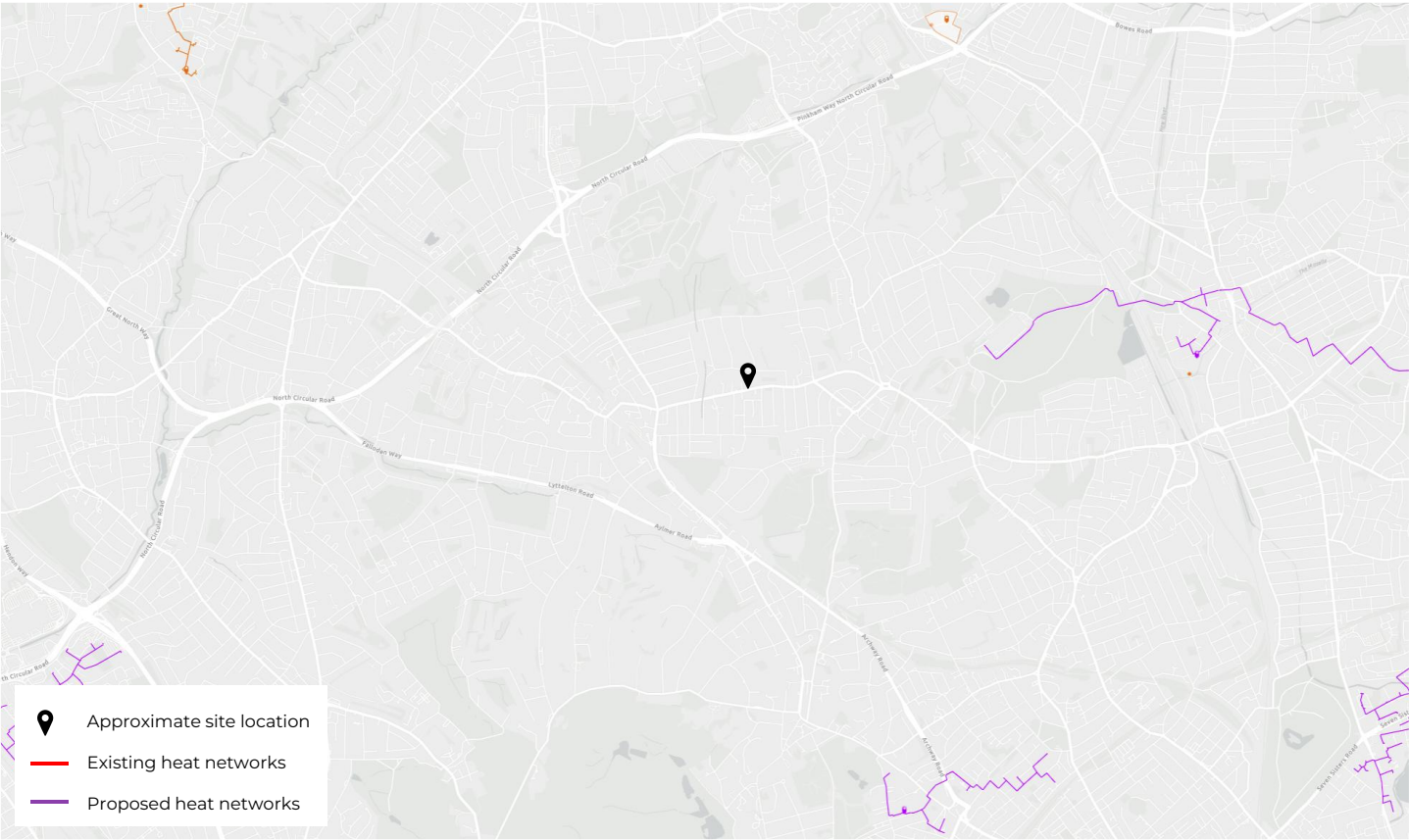


Figure 3. London Heat Map for site and surroundings (accessed: April 2026).

3.3 Be Green

The opportunity for producing and utilising renewable energy onsite will be maximised for the proposed development, in line with Policy SI2 of the London Plan.

An outline feasibility study has been undertaken (see Table 3). which identified ASHPs and photovoltaics as the most suitable low/zero carbon technologies for the scheme.

Individual ASHP systems will supply space heating and hot water to all dwellings. The external units of the ASHPs will be located at the private garden/terrace to each home as shown in the submitted architectural drawings for the planning application, and will be acoustically attenuated where required, subject to detailed design development post planning.

The office space will be served by a separate heat pump (VRF) system.

A PV array of 1.6 kWp is proposed at roof level as shown in Figure 4. PVs are not currently proposed on the south and west facing pitched roofs due to potential visual impact to the Fortis Green Conservation Area. Final design and configuration will be determined with PV specialist input post-planning.

Table 3. Outline LZC feasibility for 6a Denmark Terrace.

LZC Technology	Adopted	Feasibility
Photovoltaics	Y	The development has included an extent of roof for the installation of PV panels, considering maintenance access and solar exposure. The PV array can integrate well with the proposed heating and hot water strategy.
Solar thermal	N	A solar thermal hot water system is not compatible with the individual heat pump strategy without the provision of separate thermal stores. PV is deemed a more effective use of available roof space.
Wind turbines	N	The installation of wind turbines at the proposed building/site will have a notable visual impact on the site and surroundings, and not deemed suitable.
Ground source heat pump (GSHP)	N	The installation of a ground source borehole system requires notable space, time and cost, and is not deemed feasible for a scheme of this scale and nature.
Air Source Heat pumps (ASHP)	Y	Air Source Heat pumps are an effective way of providing low carbon heating and hot water. The office space will also be served by a heat pump /VRF system.
Biomass	N	Biomass systems emit high NOx levels and are not supported within urban areas. There is also no suitable space onsite for the storage of biomass.

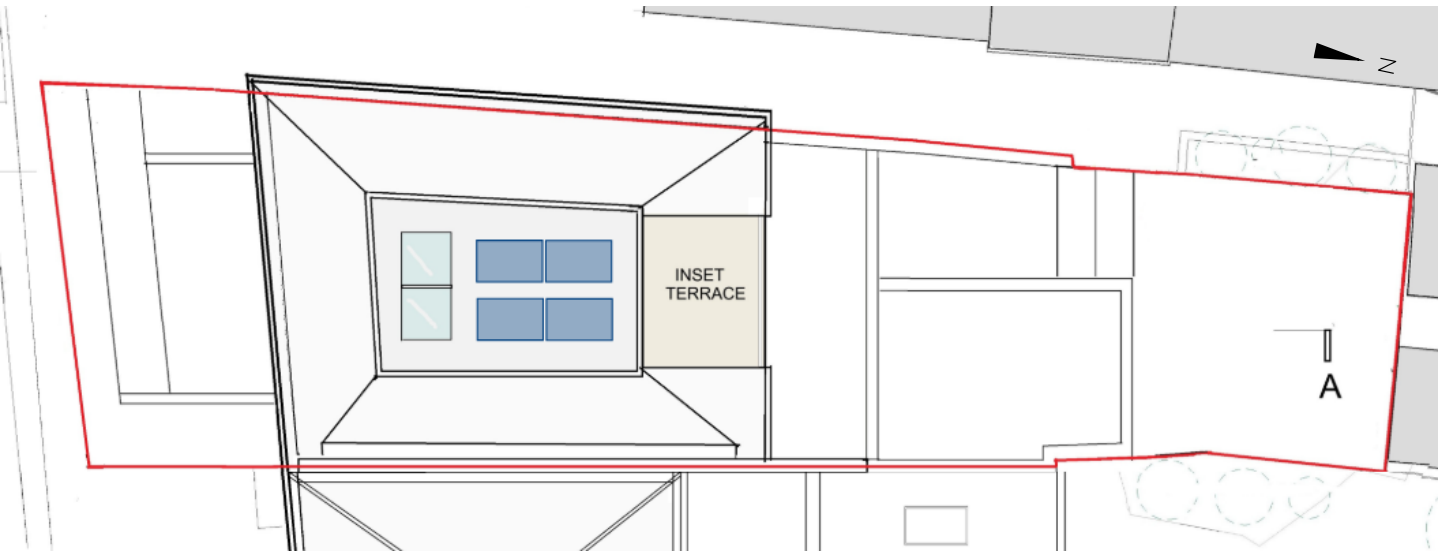


Figure 4. Roof plan showing proposed indicative locations of PV array (in blue) on 6a Denmark Terrace.

3.4 Results

3.4.1 Residential

Through the measures outlined for each stage of the Energy Hierarchy, it is anticipated the residential portion of the proposed development can achieve a 63% reduction in regulated CO₂ emissions over the Part L1 2021 notional baseline. This meets the minimum onsite reduction target of 35% set out by the GLA, as well as the benchmark reduction target of 50% for residential developments stipulated within GLA’s Energy Assessment Guidance (2022).

Table 4, Table 5 and Figure 5 present the anticipated CO₂ emissions and savings at each stage of the Energy Hierarchy for the residential portion of the scheme.

The dwellings are also anticipated to achieve a 10% reduction in regulated CO₂ at the Be Lean stage with building fabric and system efficiencies measures alone, which meets the 10% Be Lean reduction target set out by the GLA for major residential developments.

3.4.2 Non-residential

The very minor scale office element of the development is expected to achieve a 27% reduction in regulated CO₂ at the Be Lean Stage and an overall reduction of 36% over the Part L2 2021 baseline, meeting the respective reduction targets of 15% and 35% set out by the GLA for major non-domestic developments (see Table 6, Table 7 and Figure 6).

3.4.3 Site-wide

Overall, the proposed development at 6a Denmark Terrace is anticipated to achieve a reduction in regulated CO₂ emissions of 62% over the Part L 2021 baseline (see Table 8 and Figure 7).

A 51% reduction is estimated to be achievable from the application of ASHPs and PVs, significantly exceeding the 20% target reduction from low/zero carbon technologies stipulated in Policy SP4.

To achieve ‘zero carbon’ for the scheme, 2.8 tonnes per annum of regulated CO₂, equivalent to 52.9 tonnes over 30 years, should be offset via a financial contribution. Any carbon offset contributions should be subject to viability discussions and detailed design stage calculations.

Table 4. Carbon emissions after each stage of the Energy Hierarchy for the dwellings of 6a Denmark Terrace.

	Carbon Dioxide Emissions (tCO ₂ /yr)	
	Regulated	Unregulated
Baseline: Part L 2021 Compliant Development	4.4	1.2
After energy demand reduction (be lean)	4.0	1.2
After heat network connection (be clean)	4.0	1.2
After renewable energy (be green)	1.7	1.2

Table 5. Regulated carbon savings from each stage of the Energy Hierarchy for the dwellings of 6a Denmark Terrace.

	Regulated carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: Savings from energy demand reduction	0.5	10%
Be clean: Savings from heat network	0.0	0%
Be green: Savings from renewable energy	2.3	52%
Cumulative on-site savings	2.8	63%
Annual savings from off-set payment	1.7	-
Cumulative savings for off-set payment	50 tonnes over 30 years	
Cash in-lieu contribution	£ 4,722	

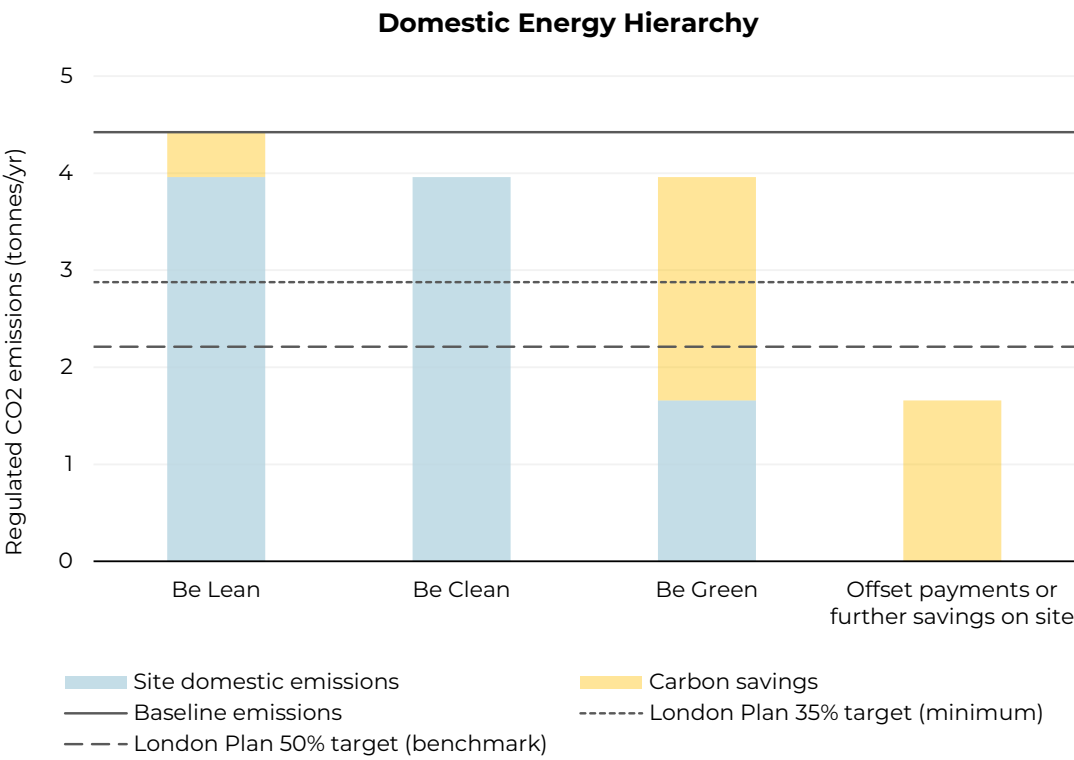


Figure 5. Regulated carbon emissions at each stage of the Energy Hierarchy for the domestic part of the development.

Table 6. Carbon emissions after each stage of the Energy Hierarchy for the office space of 6a Denmark Terrace.

	Carbon Dioxide Emissions for the office space (tCO ₂ /yr)	
	Regulated	Unregulated
Part L2 2021 notional baseline	0.2	0.2
After energy demand reduction (be lean)	0.1	0.2
After heat network connection (be clean)	0.1	0.2
After renewable energy (be green)	0.1	0.2

Table 7. Regulated carbon savings from each stage of the Energy Hierarchy for the office space of 6a Denmark Terrace.

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: Savings from energy demand reduction	0.04	27%
Be clean: Savings from heat network	0.00	0%
Be green: Savings from renewable energy	0.02	10%
Cumulative on-site savings	0.06	36%
Annual savings from off-set payment	0.11	-
Cumulative savings for off-set payment	3 tonnes over 30 years	
Cash in-lieu contribution (£)	£ 300	

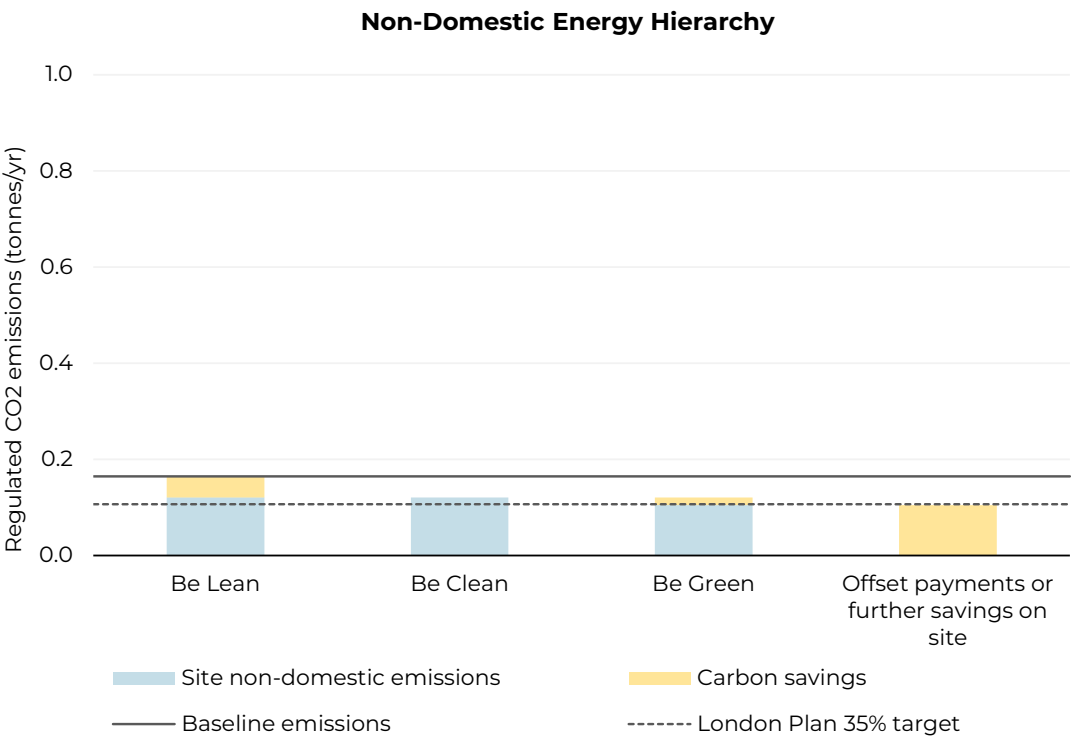


Figure 6. Regulated non-domestic carbon emissions at each stage of the Energy Hierarchy for the office space.

Table 8. Regulated carbon savings from each stage of the site wide Energy Hierarchy for 6a Denmark Terrace.

	Total regulated emissions (tCO ₂ /yr)	CO ₂ savings (tCO ₂ .yr)	Percentage savings (%)
Part L 2021 baseline	4.6	0.0	-
Be lean	4.1	0.5	11%
Be clean	4.1	0.0	0%
Be green	1.8	2.3	51%
Total savings	-	2.8	62%
Cumulative savings for off-set payment	52.9 tonnes over 30 years		
Cash in-lieu contribution (£)	£ 5,022		

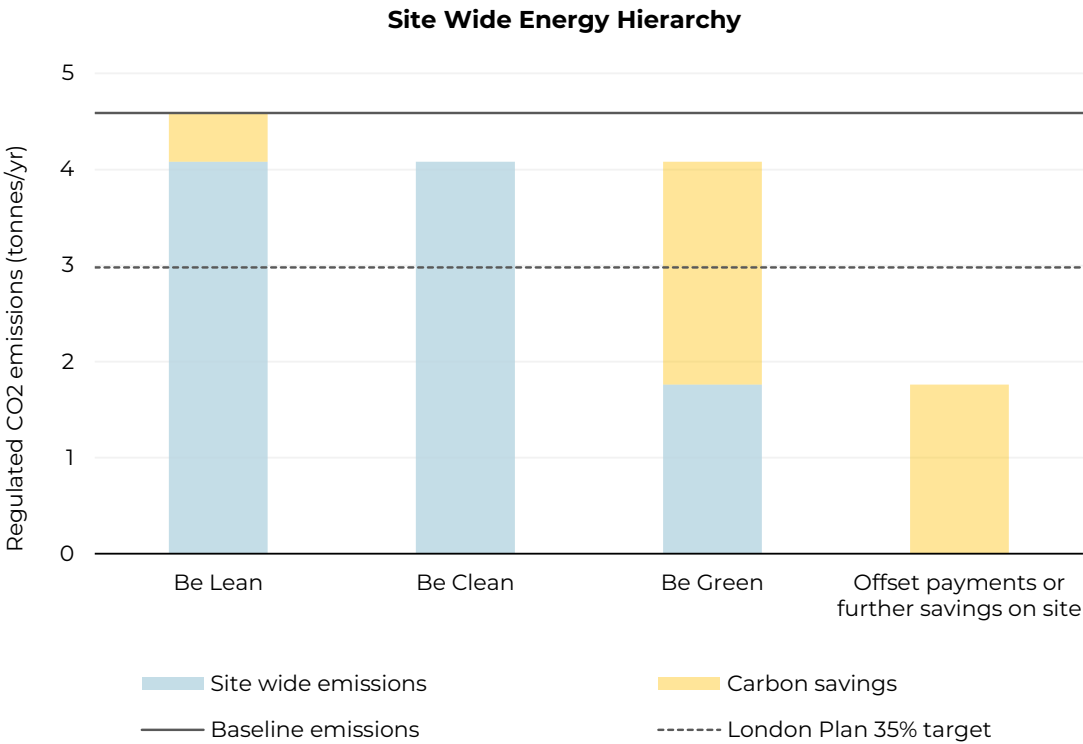


Figure 7. Regulated site-wide carbon emissions at each stage of the Energy Hierarchy for 6a Denmark Terrace.

4 Sustainability Strategy

This section of the report presents the key elements of the development which responds to the sustainable development policies and guidance set out within the London Plan, Haringey's Local Plan, Development Management DPD and Sustainable Design and Construction SPD.

4.1 Optimising Land Use

The site currently comprises a part-one/part-two storey building of non-domestic use, with ancillary spaces to the rear. The immediate vicinity comprises a mix of terraced houses (some with retail units at ground level) to the east and southwest, a restaurant with flats above to the west, and The Clissold Arms public house to the south, across Fortis Green.

The design and size of the proposed development have been carefully considered to harmonise with the site's surroundings whilst maximising density for the currently under-utilised site, to facilitate the delivery of much needed new homes and the reversion of commercial accommodation at ground floor level.

In addition to the provision of new homes, the development will bring about other benefits such as revitalising the outlook and character of the site through introduction of landscaped areas, and retention of employment opportunities onsite.

4.2 Health and Wellbeing

4.2.1 Air Quality

In line with GLA's SPG on The Control of Dust and Emissions during Construction and Demolition, any potential dust and stationary plant emissions during the construction period, and any potential impact from traffic flows on the local road network, during and after construction will be mitigated.

Electrically driven air source heat pumps will supply space heating and hot water at the proposed development. There will be no PM and NOx emissions associated with fossil fuel combustion from the operation of the building services systems at the scheme.

4.2.2 Noise

The development will incorporate building fabric measures to ensure the impact of any external sources on internal ambient noise levels are within acceptable limits, in line with BS8233:2014 or latest standards. Any potential noise impact during demolition and construction will be mitigated accordingly. Acoustic attenuation will be provided for the heat pump external units where required.

4.2.3 Daylight and Sunlight

The Daylight and Sunlight Assessment undertaken indicates that daylight and sunlight access to neighbouring properties with the proposed development in place, as well as the proposed habitable spaces within the development, are considered fully acceptable in the urban context of the site, BRE guidance and relevant planning policy.

Please refer to the accompanying daylight/sunlight reports prepared by Daylight and Lighting Consultancy for further details.

4.2.4 External Lighting

The external lighting design and specification will be in accordance with the ILP's Guidance Note for The Reduction of Obtrusive Light (2021).

The scheme will limit the amount of up-lighting and all external lighting (aside from security lighting) will be connected to daylight sensors and be time controlled.

4.2.5 External amenity

All homes will have access to private gardens or terraces. The application site is also a short walk from the public green spaces of Coldfall Wood to the north, Cherry Tree Wood to the southwest and Highgate Wood to the south.



Figure 8. Existing site and surrounding context (source: Google Maps, accessed: April 2026).

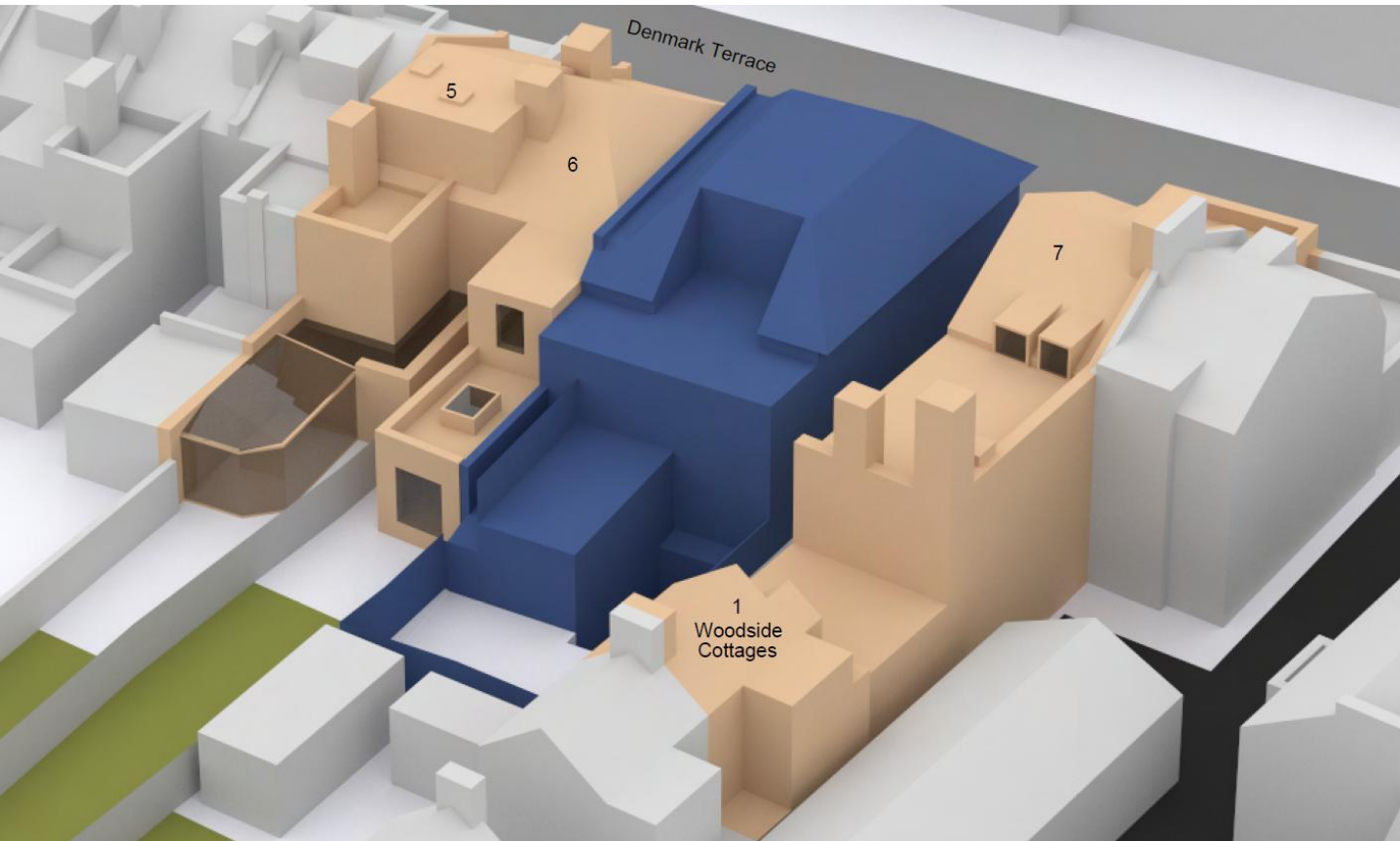


Figure 9. Technical model used for the daylight and sunlight assessment, prepared by Daylight and Lighting Consultancy.

4.3 Nature, Landscape and Biodiversity

The site currently has no ecological value as the front of the property is a concrete drive/ parking area, categorised as developed land/ sealed surface; and the whole of the existing yard to the rear of the property is hard surfaced with metal and concrete sheds used for storage.

The proposed development will include soft landscaping and planting which will enhance ecological value of the site.

The lower ground floor flat incorporates a sunken garden at the front and a rear terrace which will be landscaped. The amenity area at the front of the property is 16.6 sqm; and the amenity space at the rear is 15.9 sqm. These spaces will comprise vegetated garden with a native hedgerow along the boundary.

At ground floor, a rear landscaped garden will be created for the ground floor flat, comprising 45.7 sqm of vegetated garden with a native species hedge along the boundary. At the front of the property there will be a shared amenity space of 27.7 sqm. There will be hedge planting along the front of the site.

The BNG Assessment carried out for the scheme indicates that the current landscape design would result in a biodiversity net gain of 0.9113 habitat areas and 0.1659 hedgerow units. As the baseline for area habitat units, hedgerow units and watercourse units are zero, the metric shows that there has been an increase in the biodiversity on site and the BNG targets are met, and the Trading Rules are satisfied.

Further details are presented in the BNG Assessment prepared by SY2 Planning and the Landscape Section within the DAS prepared by Archplan.



Figure 10. Proposed Landscape and urban greening elements shown in the basement plan (above) and ground floor plan (below) for 6a Denmark Terrace, prepared by Archplan.

4.4 Climate Resilience

4.4.1 Managing risk of overheating

The scheme has been designed with consideration for the 6 steps of the Cooling Hierarchy in Policy SI4 of the London plan.

1. Reduce the amount of heat entering the building

- Reasonably sized glazed areas are proposed to enable good daylight ingress without excessive solar gains.
- Solar control glazing and blinds will be specified to windows where required.

2. Minimise internal heat generation through energy efficient design

- All heat sources (e.g. cylinders) will be factory insulated to reduce heat loss. Lateral heat distribution pipework will be minimised as far as feasible.
- All light fixtures will be low energy and will not result in notable internal lighting heat gains.

3. Manage the heat within the building through exposed internal thermal mass and high ceilings

- Exposed internal thermal mass is more effective for non-domestic spaces when it is possible to significantly pre-cool spaces during night-time when they are unoccupied – this will be considered for the ground floor office space subject to the application of secure night-time ventilation.
- The inclusion of exposed internal thermal mass will result in notably higher space heating demand for domestic spaces.
- Exposed internal thermal mass (at ceiling level) also requires exposed building services and is not deemed suitable for the homes.

4. Provide passive ventilation

- Natural ventilation through openable windows will be the main strategy for fresh air provision and passive cooling.
- Majority of the dwellings are dual aspect with good potential for cross ventilation.

5. Provide mechanical ventilation

- MVHR with summer bypass will be provided as part of the overall energy strategy.

6. Provide active cooling systems

- Cooling is not currently proposed for the homes. Where required due to the existing noise context, air tempering coils could be installed to the MVHR units of the homes.

A Part O assessment will be carried out at detailed design stage post planning to ensure full compliance with Building Regulations.

4.4.2 Managing flood risk

The site is located in an area with a low probability of flooding from rivers and seas (see Figure 11).

There will be no increase in impermeable areas at the site as part of the proposal. The proposed development is therefore not anticipated to result in an increase in flood risk elsewhere.

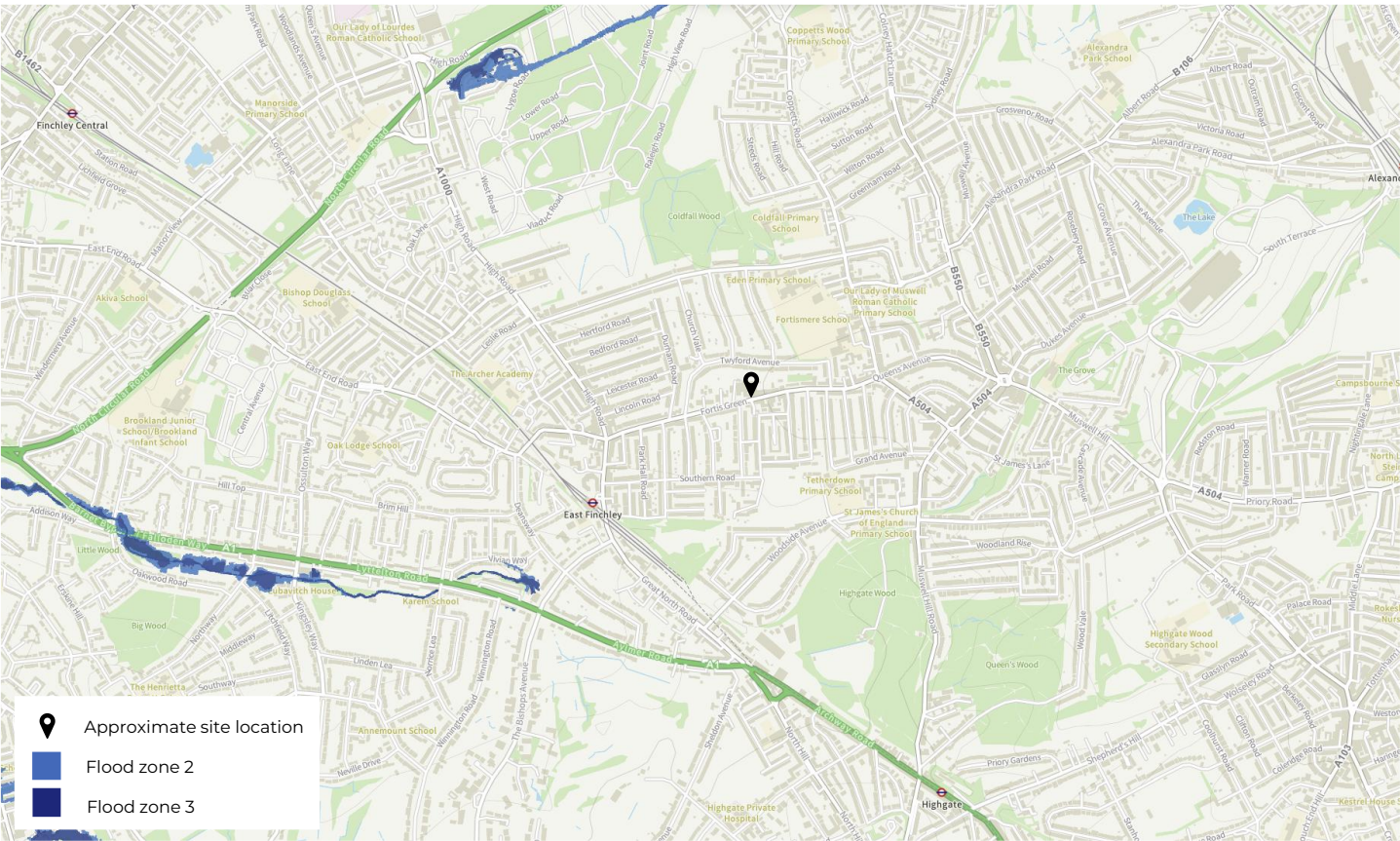


Figure 11. Flood risk map – rivers and sea flooding. (Accessed: April 2025).

4.5 Water and Surface Water Runoff

4.5.1 Water Efficiency

The proposed development will target a mains water consumption of less than 105 litres/person/day. This is consistent with Building Regulations Part G(2) requirement, London Plan policy SI5 and Haringey's Policy DM29.

The following suggested flow rates shall be considered during detailed design of the development to achieve the water consumption target:

- WCs: 6 litre / 3 litre dual flush.
- Wash basin taps: 4 litres/min.
- Kitchen sink taps: 6 litres/min.
- Showers: 8 litres/min.
- Baths: 180 litres to overflow;
- Dishwasher: 1.25 litres/place setting (where provided).
- Washing Machine: 8.17 litres/kg dry load (where provided).

Low flow sanitary fittings and water efficient appliances (where relevant) will be installed at the office space to align with BREEAM Excellent standard for the 'Wat 01' water category or equivalent. The suggested specification for the office space is as follows:

- WC: 4 litres effective flush.
- Wash basin tap: 6 litres/min.
- Kitchenette tap: 7 litres/min.
- Dishwasher (domestic scale): 13 litres/cycle.

4.5.2 Surface water runoff

The existing site comprises buildings and hard standing only. The proposed development will increase permeable areas at the site through the introduction of soft landscape areas to the front of the site and in the rear garden. Surface water runoff is anticipated to reduce as a result of the proposal.

4.6 Materials and Waste

4.6.1 Material Selection and Procurement

The structure grid of the proposed building has been rationalised and stacked to minimise transfer structures and the associated concrete and steel volume as far as possible. Materials have been selected for longevity and durability as well as recoverability and recyclability at end of life. To minimise potential sources of indoor air pollution, low VOC materials, paints and finishes will be specified where possible.

To reduce embodied carbon of the proposed development, materials with recycled content will be prioritised during detailed design stage specification.

All timber used on the site will be FSC or PEFC certified. Where feasible, all other construction materials utilised at the development will be certified under BES6001 and EMS or other similar responsible sourcing certification schemes.

Where practicable, the contractor will source items locally, and where possible amalgamate deliveries to reduce the overall number of vehicle movements taking place.

4.6.2 Waste Management and Circular Economy

Waste streams will be efficiently segregated (offsite) and processed during both construction and operation stages, with a target to maximise potential re-use of materials and diversion from landfill in line with GLA and Haringey policies.

All waste that cannot be reused or recycled will be disposed of in accordance with legislation and best practice.

An appropriately sized bin store is proposed to the front of the site.

4.7 Sustainable Transport

The application site has good transport connectivity for a sub-urban location. The nearest underground station is at East Finchley within 10-15 min walking distance. There are also multiple bus stops within 1-5 min walking distance, with connections with Muswell Hill, Highgate, Finchley Central and Central London.

4.7.1 Cycle Parking

Secure cycle storage will be provided at front of the scheme in accordance with London Plan and Haringey requirements to promote active travel by future residents and building users.

4.7.2 Car Parking

The development is car free.

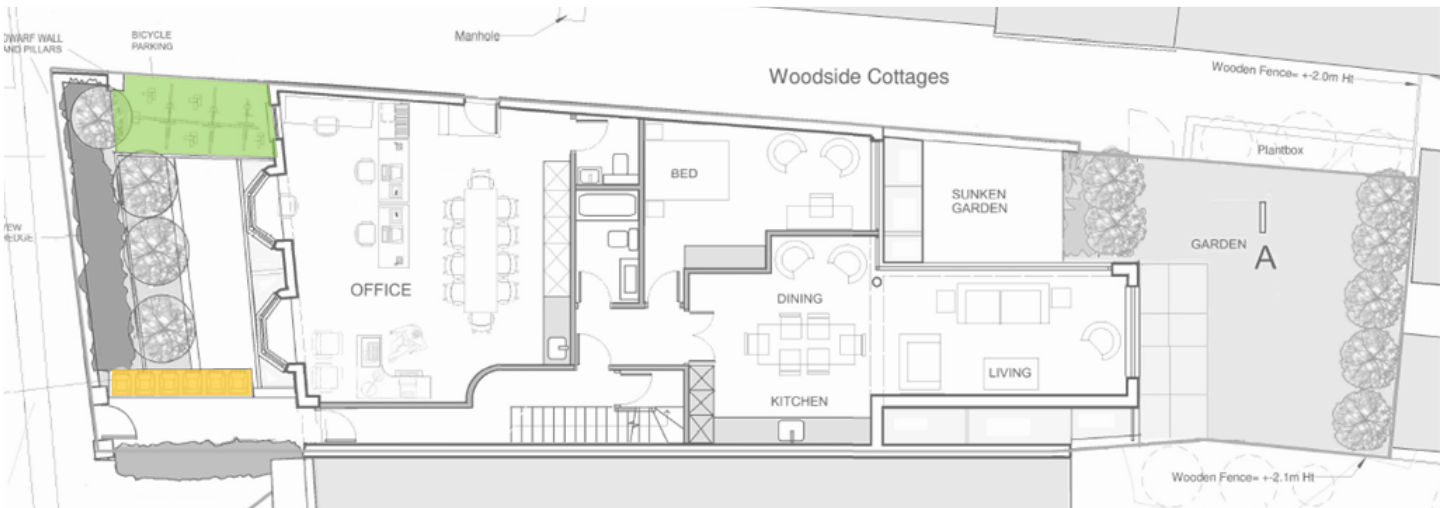


Figure 12. Cycle storage provision (in green) and bin store (in amber) at 6a Denmark Terrace.

4.8 BREEAM

BREEAM is a performance-based assessment method and certification scheme for new and refurbished buildings with a primary aim of mitigating the life cycle impacts of buildings on the environment.

BREEAM becomes prohibitively expensive on small projects such as the proposed very minor office space at 6a Denmark Terrace.

From recent project experience, feasibility of achieving BREEAM ratings on small projects and the additional capital cost can be as much as an additional 10%. Investigations into the additional cost a BREEAM Very Good or above rating would add to small projects, indicating that these projects would become unviable if the BREEAM rating were to be conditioned.

On the other hand, the cost of achieving BREEAM ratings on large projects is easier to absorb into the greater overall project cost. For example, BRE's Briefing Paper 'Delivering Sustainable Buildings: Savings and Payback Office Case Study for BREEAM UK New Construction 2018' looks at the additional costs of achieving BREEAM Very Good on a 13,800m² new office building. The paper concludes that for their case study building the capital cost uplifts over the baseline building's overall construction costs are less than 0.25%.

A number of London's Local Plans recognise the difficulty small developments face and only require BREEAM on non-domestic developments larger than 500m² GIA, including Tower Hamlets Local Plan 2031 Policy D.ES7; Southwark Council Plan 2019-2036 Policy P69; Westminster City Plan Policy 42. The office space at 6a Denmark Terrace has an area of only circa 51 m². It forms a small portion of the proposed development and is significantly below the 500m² threshold.

For the proposed office space at 6a Denmark Terrace, energy and sustainability measures will be well integrated into the design and construction of the building - these include:

- highly efficient building fabric,
- low carbon space heating/cooling via ASHP/VRF system,
- areas of soft landscaping,
- use of sustainable materials,
- installation of water efficient sanitary fittings and appliances.

Environmental impact including air and noise pollution will be minimised through design. The scheme is also car free and will be designed to be functionally adaptable (with minimal partitions).

The minor scale office space strives to incorporate notable energy efficiency and sustainable features as far as possible given the site constraints; the application of BREEAM would not bring about any additional tangible and significant environmental benefits.

Further to the above, BREEAM has also been criticised for being a tick box exercise with a lack of flexibility, particularly for very small-scale schemes with site constraints. For example, site constraints such as the development's location, size and surrounding context may mean that some credits are inherently not achievable.

For these reasons, it is believed the BREEAM Very Good requirement set out in Policy SP4 should not apply to the office space at 6a Denmark Terrace in this instance.

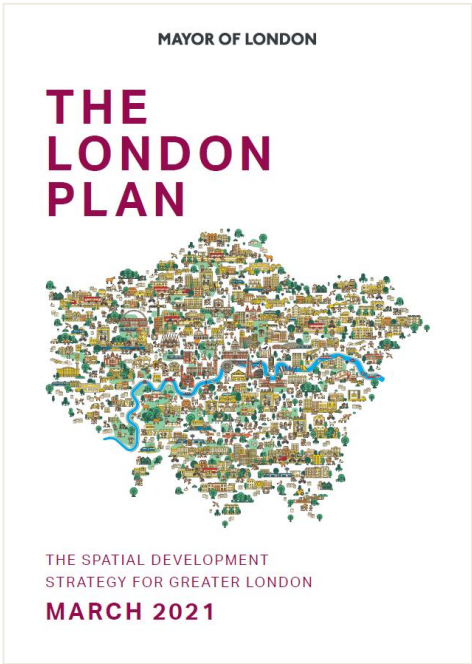
5 Conclusions

Through the adoption of the energy and sustainability strategies presented in this report, the client and design team demonstrated that the proposed development fulfils the relevant policy requirements stipulated by the London Plan and Haringey’s Local Plan.

The proposal will positively contribute to sustainable development at the site and its surroundings.

Appendix A – GLA policies

London Plan (March 2021)



The London Plan is part of the statutory development plan for London and sets out a framework for how for how the city will develop sustainably over the next 20-25 years. The energy and sustainability policies within the London Plan relevant to the proposed development at 6a Denmark Terrace are summarised below.

Policy GG2 Making the best use of land

- enable the development of brownfield land, particularly in Opportunity Areas, on surplus public sector land, and sites within and on the edge of town centres, as well as utilising small sites.
- proactively explore the potential to intensify the use of land, promoting higher density development.
- protect and enhance London’s open spaces, and promote the creation of new green infrastructure and urban greening, including aiming to secure net biodiversity gains where possible.

- plan for good local walking, cycling and public transport connections.

Policy GG3 Creating a healthy city

- promote more active and healthy lives for all Londoners and enable them to make healthy choices, utilise the Healthy Streets Approach
- seek to improve London’s air quality and green spaces.
- ensure that new buildings are well-insulated and sufficiently ventilated to avoid the health problems associated with damp, heat and cold.
- seek to create a healthy food environment.

Policy GG4 Delivering the homes Londoners need

- ensure that more homes are delivered.
- create mixed and inclusive communities, with good quality homes that meet high standards of design.

Policy GG5 Growing a good economy

- promote the strength and potential of the wider city region to ensure that London’s economy diversifies and that the benefits of economic success are shared more equitably across London.
- ensure that sufficient high-quality and affordable housing, as well as physical and social infrastructure is provided to support London’s growth.

Policy GG6 Increasing efficiency and resilience

- seek to improve energy efficiency and support the move towards a low carbon circular economy, contributing towards London becoming a zero carbon city by 2050.
- ensure buildings and infrastructure are designed to adapt to a changing climate.

Policy D2 Infrastructure requirements for sustainable densities

- density of development proposals should consider, and be linked to, the provision of future planned levels of infrastructure rather than existing levels.
- density of development should be proportionate to the site’s connectivity and accessibility by walking, cycling, and public transport to jobs and services.

Policy D7 Accessible Housing

- at least 10 per cent of dwellings (which are created via works to which Part M volume 1 of the Building Regulations applies) meet Building Regulation requirement M4(3) ‘wheelchair user dwellings’
- all other dwellings (which are created via works to which Part M volume 1 of the Building Regulations applies) meet Building Regulation requirement M4(2) ‘accessible and adaptable dwellings’.

Policy D11 Safety, security, and resilience to emergency

- maximise building resilience and minimise potential physical risks, including those arising as a result of extreme weather, fire, flood and related hazards.
- Include measures to design out crime.

Policy D14 Noise

- avoiding significant adverse noise impacts on health and quality of life.
- mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses.
- improving and enhancing the acoustic environment and promoting appropriate soundscapes.

Policy G1 Green infrastructure

- incorporate appropriate elements of green infrastructure that are integrated into London’s wider green infrastructure network.

Policy G5 Urban greening

- contribute to the greening of London by including urban greening as a fundamental element of site and building design, and by incorporating measures such as high-quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage.

Policy G6 Biodiversity and access to nature

- manage impacts on biodiversity and aim to secure net biodiversity gain.

Policy SI1 Improving air quality

- demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.
- ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development.

Policy SI2 Minimising greenhouse gas emissions

- Major development should be net zero-carbon. 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.
- Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.
 - 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:
 - through a cash in lieu contribution to the borough's carbon offset fund, or
 - off-site provided that an alternative proposal is identified and delivery is certain.
 - 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.

Policy SI3 Energy infrastructure

- Major development proposals within Heat Network Priority Areas should have a

communal low-temperature heating system.

- identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure. Identify existing heating and cooling networks, identify proposed locations for future heating and cooling networks and identify opportunities for expanding and inter-connecting existing networks as well as establishing new networks.
- Heat networks should achieve good practice design and specification standards for primary, secondary and tertiary systems comparable to those set out in the CIBSE/ADE Code of Practice CPI or equivalent.

Policy SI4 Managing heat risk

- 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 cooling hierarchy.

Policy SI5 Water infrastructure

- to minimise the use of mains water, water supplies and resources should be protected and conserved in a sustainable manner.
- minimise the use of mains water in line with the Optional Requirement of the Building Regulations (residential development), achieving mains water consumption of 105 litres or less per head per day (excluding allowance of up to five litres for external water consumption).
- seek to improve the water environment and ensure that adequate wastewater infrastructure capacity is provided.

Policy SI7 Reducing waste and supporting the circular economy

- promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible.
- encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products.
- design developments with adequate, flexible, and easily accessible storage space and collection systems that support, as a minimum, the separate collection of dry recyclables (at least card, paper, mixed plastics, metals, glass) and food.

Policy SI12 Flood risk management

- ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.

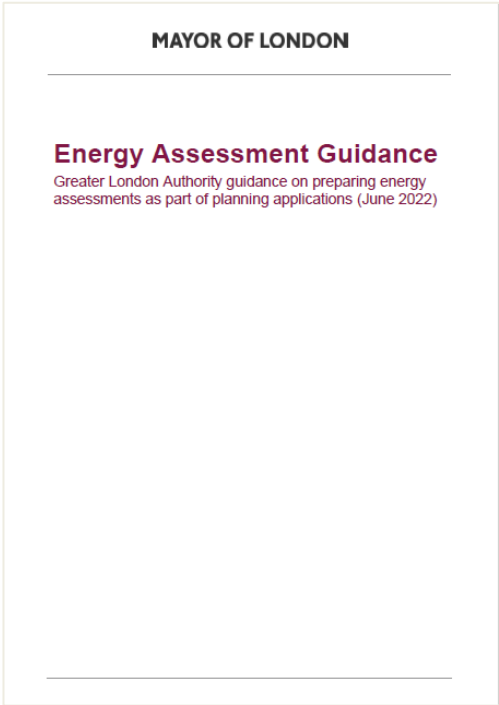
Policy SI13 Sustainable Drainage

- aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the drainage hierarchy.

Policy T5 Cycling

- securing the provision of appropriate levels of cycle parking which should be fit for purpose, secure and well-located. Developments should provide cycle parking at least in accordance with the minimum standards set out in Table 10.2 and Figure 10.3 the London Plan.
- Cycle parking should be designed and laid out in accordance with the guidance contained in the London Cycling Design Standards.

Energy Assessment Guidance (June 2022)



This document provides guidance on how to prepare energy statements that meets London Plan Policy SI2 for GLA referable projects. It is also useful reference for Major Developments (>10 dwellings or >1,000m² non-domestic space) proposed for within Greater London.

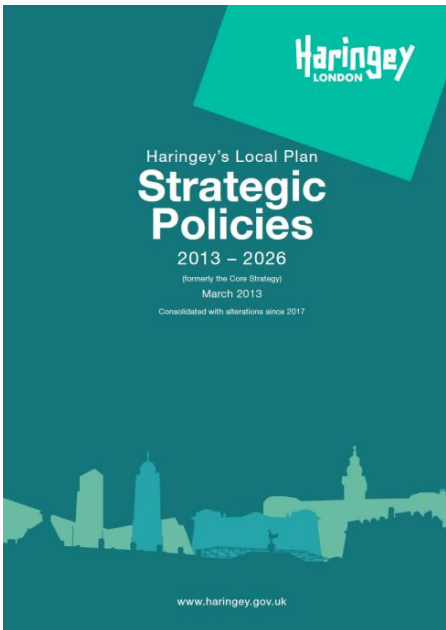
The main requirements relevant to the proposed scheme at 6a Denmark Terrace are summarised below:

- Energy strategy for minor developments to be developed in line with the Energy Hierarchy.
- Major developments are required to achieve a minimum 35 per cent on-site carbon reduction over Part L 2021. Residential developments are expected to be able to exceed this, and so an additional benchmark (50 per cent reduction) has been set that residential developments should be aiming to achieve.
- Energy demand should be reduced as far as possible before the heating strategy and installation of low carbon and renewable

technologies is considered. This is important in protecting consumers from high prices. Developments are expected to achieve carbon reductions beyond Part L 2021 of 10 per cent for residential developments and 15 per cent for non-residential developments through energy efficiency measures alone, before other measures are applied.

Appendix B – Haringey’s policies

Haringey’s Local Plan Strategic Policies
2013-2026 (2013)



The Haringey Local Plan (2013) outlines how the Council will address local and strategic development needs including housing, employment, leisure, and retail provision.

The energy and sustainability policies within the Haringey Local Plan relevant to the proposed development at 6a Denmark Terrace are summarised below.

SP4 Working towards a Low Carbon Haringey

- All new developments to take measures to reduce energy use and carbon emissions during design, construction and occupation.
- From 2011 onwards, all new residential development will achieve a minimum 25% reduction in total (regulated) CO₂ emissions in line with Code for Sustainable Homes Level 4 energy standards, and should aim to achieve

Level 6. All new residential development shall be zero carbon from 2016 onwards.

- From 2011 onwards all new non-residential development shall be built to at least BREEAM “very good” standard and should aim to achieve BREEAM “excellent” or the current nationally agreed standard. All new non-residential development shall be zero carbon from 2019.
- All developments to assess, identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network.
- All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

SP5 Water Management and Flooding

- All development to be water efficient during construction and operation and to reduce all forms of food risk.

SP6 Waste and Recycling

- Seek to minimise waste creation, increase recycling rates in relation to commercial, industrial and municipal waste in order to achieve the Mayor’s recycling targets.
- Integrated, well-designed recycling facilities to be incorporated into all new developments.

SP7 Transport

- Promoting public transport, walking and cycling.
- Adopting maximum car parking standards and car free housing wherever feasible.

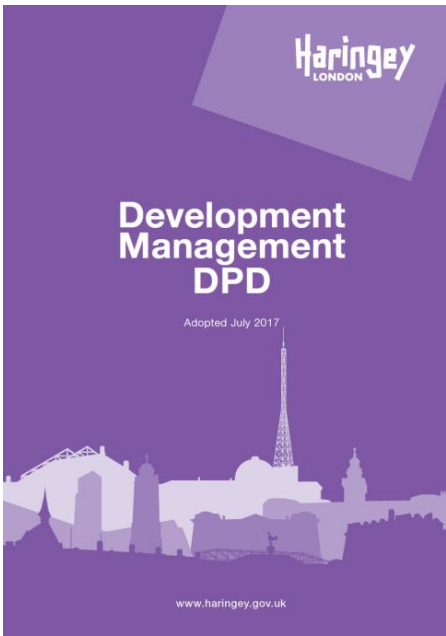
SP11 Design

- All developments to ensure impacts on health, climate change, natural resources and biodiversity are minimised by adopting and improving sustainable design and construction techniques

SP13 Open Space and Biodiversity

- New development shall protect and improve Haringey’s parks and open spaces.
- All development shall protect and improve sites of biodiversity and nature conservation.

Development Management DPD (2017)



The Development Management Development Plan Document (DPD) gives effect to Haringey’s spatial strategy and the key objectives of the Strategic Policies Local Plan by supporting proposals that contribute to the delivery of sustainable development in accordance with the strategy. The Development Management DPD sets out criteria-based policies against which planning applications will be assessed.

Energy and sustainability guidance relevant to the proposed development are summarised below.

DM20 Open Space and Green Grid

- Development that protects and enhances Haringey’s open spaces will be supported.

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.
- Seek opportunities for locally sourced labour.
- 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.

DM22 Decentralised Energy

- Subject to other policy requirements, proposals that contribute to the provision and use of Decentralised Energy network infrastructure will be supported.
- All development proposals should prioritise connection to existing or planned future DE networks.
- Minor new-build development located within 25 metres will be expected to secure connection to that network subject to demonstration of technical feasibility and financial viability.
- All minor new-build development located within 25 metres of a DE network ‘connection zone’ should be designed for connection to a DE network.

DM23 Environmental Protection

- 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.

- 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.
- Development proposals that include external lighting must mitigate potential adverse impacts from such lighting.

DM24 Managing and Reducing Flood Risk

- The Council will ensure that all proposals for new development avoid and reduce the risk of flooding to future occupants and do not increase the risk of flooding.
- All proposals for new development will be required to manage and reduce surface water run-off and manage water and waste water discharges.

DM25 Sustainable Drainage Systems

- All proposals for new development must seek to manage surface water as close to its source as possible in line with the London Plan drainage hierarchy.

DM29 On-Site Management of Waste Water and Water Supply

- All proposals for new residential development should be designed to meet the London Plan target for mains water consumption.

DM32 Parking

Development proposals will be assessed against the car parking and cycle parking standards set out in the London Plan.

Appendix C – Energy calculation assumptions for 6a Denmark Terrace

The items listed below are assumptions only, based on a combination of best judgement at planning stage and information from the design team where appropriate. Throughout the design and construction stages the fabric and system requirements (including provisions of renewable technologies) may change whilst the building designs are being progressed. All information detailed in this summary sheet is preliminary recommendation at the Planning Stage. It should be noted that this document is not exhaustive and the design and construction teams should allow for flexibility on site where necessary.

Residential elements

Residential Building fabric parameter	Part L 2021/Part L 2026 notional	Proposed specification	Unit	Note
Walls				
External walls	0.18	0.15	W/m²K	1
Walls to corridors and stairwells	0.18	0.25	W/m²K	1
Party walls between flats (fully filled cavity with effective sealing on all edges)	0	0	W/m²K	1
Floors				
Floor unheated corridors and stairwell	0.13	0.25	W/m²K	1
Roofs/ceilings				
All roofs	0.11	0.10	W/m²K	1
Openings				
Flat entrance doors	1.0	1.0	W/m²K	1
New windows - pane and frame	1.2	1.2	W/m²K	1
Windows solar transmittance factor (g-value)	0.63/0.4	0.4	W/m²K	1, 2
Windows frame factor	0.7	0.8	W/m²K	1
Air permeability				
Maximum average air permeability	5/4	<3.5	m³/m².h	1
Air permeability test required for all homes prior to handover.				

Residential Building fabric parameter	Part L 2021/Part L 2026 notional	Proposed specification	Unit	Note
Thermal Bridging				
The following psi values are recommended. All junctions should either be thermally modelled or meet valid reference construction details with psi values below those outlined below. Detailed photographic evidence will be required for all build-ups and junctions for all homes on site during construction.				
E1 lintels	0.05	0.05	W/mK	1
E3 Sill	0.05	0.05	W/mK	1
E4 Jambs	0.05	0.05	W/mK	1
E5 Ground Floor	0.16	0.08	W/mK	1
E5 Ground Floor (to corridor)	0.16	0.08	W/mK	1
E6 Inter floor within dwelling	0	0	W/mK	1
E6 Inter floor within dwelling (to corridor)	0	0	W/mK	1
E7 Inter floor between dwelling	0.07	0.07	W/mK	1
E7 Inter floor between dwelling (to corridor)	0.07	0.07	W/mK	1
E11 Eaves (ins. at rafter level)	0.04	0.04	W/mK	1
E14 Flat roof to terrace	0.08	0.08	W/mK	1
E24 Eaves (ins. at ceiling level - inverted)	0.24	0.24	W/mK	1
E16 Corner (normal)	0.09	0.09	W/mK	1
E17 Corner (inverted)	-0.09	-0.09	W/mK	1
E18 Party wall between dwellings	0.06	0.06	W/mK	1
E21 Exposed floor (inverted)	0.32	0.32	W/mK	1
P3 Inter floor between dwellings	0	0	W/mK	1
R6 Flat ceiling	0.06	0.06	W/mK	1
R8 Roof wall (rafter)	0.06	0.06	W/mK	1

Residential Building Services Systems	Proposed specification	Unit	Note
Ventilation			
Type	MVHR to all flats		1, 4
Installed Specific Fan Power	<0.75	W/l/s	1, 3, 4
Heat recovery efficiency	>85	%	1, 3, 4
MVHR duct type	Rigid		1, 4
MVHR duct installation specification	Level 1		1, 4
Installer commissioning certificate	Assumed		1, 4
MVHR unit modelled	Nuaire MRXBOXAB-ECO2		1, 4
Heating			
Type	Individual air source heat pump		1, 3, 4
Heat source 1 - heat efficiency in winter	>300	%	1, 3, 4
Heat source 1 - heat efficiency in summer	>200	%	1, 3, 4
Flow temperature	<55	°C	1, 3, 4
Heating controls	Time and temperature zone control by arrangement		1, 3, 4
Electricity tariff	Standard		1, 3, 4
Pump in heated space	Yes		1, 3, 4
Product and installation to Microgeneration Certification Scheme standard	Yes		1, 3, 4
Hot Water			
From main heating system	Yes		1
Cylinder volume (per dwelling)	150	Litres	1, 4
Insulation	Factory - 100mm		1, 4
Cylinder in heated space	Yes		1, 4
Cylinderstat	Yes		1, 4
Independent time control	Yes		1, 4
Water consumption			
Part G Water consumption	<105	l/p/d	1
Showers flow rate	<8	l/min	1

Residential Building Services Systems	Proposed specification	Unit	Note
Lighting			
Light fittings with efficacy >120 lm/W	All		1
Photovoltaics			
Capacity of PV system	1.6	kWp	1, 4
No. of panels	4		1, 4
Panel capacity	400 W/panel		1, 4
Orientation	South		1, 4
Tilt from horizontal	10°		1, 4
Export capable meter	Yes		1, 4
PV connection	Connected to landlord supply		1, 4
Battery	Not currently assumed		1, 4

Notes	
1	Planning stage assumption to achieve planning policy or Building Regulations targets
2	Subject to detailed overheating assessment to be carried out where required
3	Building regulations requirement
4	Subject to MEP design by others
NB. Please refer to Approved Document L1 2021 and L1 2026 for all requirements to comply with Building Regulations Part L.	

Office space

Office space fabric parameter	Part L 2021 notional	Proposed specification	Unit	Note
Floor				
Ground floors	0.15	0.10	W/m²K	1
Walls				
External walls	0.18	0.15	W/m²K	1
Ceilings				
Ceilings to flats	0.18	0.10	W/m²K	1
Air permeability				
Maximum air permeability (test required on site)	5	4	m³/m².h	1
Openings				
New windows - pane and frame	1.4	1.2	W/m²K	1
Windows transmittance factor (g-value)	0.29	0.4		1
Windows frame factor	0.1	0.1		1
Internal blinds	No	Yes		1
Thermal bridging				
Wall-wall (corner), Wall-floor (not ground)	-	0.10	W/mK	1
Lintel, sill, jamb	-	0.05	W/mK	1

Notes	
1	Planning stage assumption to achieve planning policy or Building Regulations targets
2	Subject to MEP Design at fit-out stage
NB. Please refer to Approved Document L2 2021 / 2026 for all requirements to comply with Part L.	

Office Services Systems	Proposed specification	Unit	Note
Ventilation			
Type	Mechanical extract ventilation		1, 2
Specific fan power	<0.25	W/l.s	1, 2
Heating and cooling			
HVAC system type	Split/ Multi-split		1, 2
Seasonal COP in heating mode	400	%	1, 2
Seasonal EER in cooling model	600	%	1, 2
Fuel type	Electricity		1, 2
Hot Water			
Hot water generation type	Instantaneous electric water heater		1, 2
System efficiency	100	%	1, 2
Ductwork			
Ductwork to be leakage tested	Yes		1, 2
Ductwork CEN classification	Class D		1, 2
AHU to meet CEN leakage standards	Yes		1, 2
AHU CEN classification	Class L1		1, 2
Metering			
The system has provision for metering	Yes		1, 2
The metering warns 'out of range' values.	Yes		1, 2
Lighting			
Lamp efficacy	120	lm/cW	1, 2
Light output ratio LED	1		1, 2
Photoelectric lighting control	Yes, where applicable		1, 2
Occupancy sensing	Yes, where applicable		1, 2

Appendix D – SAP output

The table below shows the SAP results for the sample dwellings modelled. The Lean Stage DER has been adjusted to include the PV allowance included in the Notional Building and to enable calculation of Be Lean stage savings as per GLA’s methodology. Planning stage SAP output worksheet for the unit highlighted in blue is appended. Planning stage SAP outputs for all units are available on request.

Table 9. Planning stage SAP results.

Unit Reference	TER (kgCO ₂ /m ²)	Lean DER (kgCO ₂ /m ²)	Green DER (kgCO ₂ /m ²)	TFEE (kWh/m ²)	DFEE (kWh/m ²)
1	11.9	10.3	4.6	43.6	41.2
2	13.7	12.1	4.79	35.7	35.1
3	14.4	13.2	5.09	35.1	36.0
4	10.7	9.9	4.18	32.3	32.8

Full SAP Calculation Printout



Plot Reference	Lean_MVHR			Issued on Date	01/05/2026			
Assessment Reference	Flat 1		Plot Type Ref					
Plot Address				SAP Version	10.2			
SAP Rating	85 B		DER	11.93		TER	11.86	
Environmental	88 B		% DER < TER				-0.59	
CO ₂ Emissions (t/year)	1.41		DFEE	41.17		TFEE	43.61	
Compliance Check	See BREL		% DFEE < TFEE				5.59	
% DPER < TPER	-9.49		DPER	68.37		TPER	62.45	
Assessor Details	Ms. Sherleen Pang				Assessor ID	BA17-0001		
Client								

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	136.5100 (1b)	2.5400 (2b)	346.7354 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	136.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	346.7354 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(18)
Number of sides sheltered	4	(19)

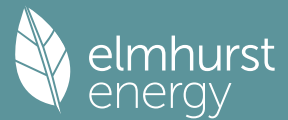
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1225 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1562	0.1531	0.1501	0.1347	0.1317	0.1164	0.1164	0.1133	0.1225	0.1317	0.1378	0.1439 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												68.8000 (23c)
Effective ac	0.3122	0.3091	0.3061	0.2908	0.2877	0.2724	0.2724	0.2693	0.2785	0.2877	0.2938	0.2999 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.0000	1.0000	2.0000		(26)
Windows			32.9800	1.1450	37.7634		(27)
Rooflight			10.3800	1.1450	11.8855		(27a)
Ground floor			136.5100	0.1000	13.6510	110.0000	15016.1000 (28a)
External Wall 1	136.0900	32.9800	103.1100	0.1500	15.4665	140.0000	14435.3995 (29a)
Wall to corr	20.8000	2.0000	18.8000	0.2500	4.7000	140.0000	2631.9999 (29a)
Ceiling to corridor	0.9400		0.9400	0.2500	0.2350	9.0000	8.4600 (30)
External Roof 2	13.7800	10.3800	3.4000	0.1000	0.3400	9.0000	30.6000 (30)
Total net area of external elements Aum(A, m ²)			308.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	86.0414		(33)
Main dwelling							
Ceiling to commercial			121.7900			30.0000	3653.7000 (32b)
Internal Wall 1			214.9300			9.0000	1934.3699 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	37710.6293 (34)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

276.2481 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.4600	0.0500	1.1230
E2 Other lintels (including other steel lintels)	24.4200	0.0500	1.2210
E4 Jamb	49.3000	0.0800	3.9440
E5 Ground floor (normal)	8.1900	0.0800	0.6552
E5 Ground floor (normal)	39.9200	0.0700	2.7944
E7 Party floor between dwellings (in blocks of flats)	7.9800	0.0700	0.5586
E7 Party floor between dwellings (in blocks of flats)	22.8600	0.0900	2.0574
E16 Corner (normal)	12.7000	-0.0900	-1.1430
E17 Corner (inverted - internal area greater than external area)	13.5500	0.3200	4.3360
E21 Exposed floor (inverted)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5466 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 101.5880 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	35.7213	35.3709	35.0205	33.2684	32.9180	31.1659	31.1659	30.8155	31.8667	32.9180	33.6188	34.3197
Heat transfer coeff	137.3093	136.9589	136.6084	134.8563	134.5059	132.7538	132.7538	132.4034	133.4547	134.5059	135.2068	135.9076
Average = Sum(39)m / 12 =												134.7687

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0059	1.0033	1.0007	0.9879	0.9853	0.9725	0.9725	0.9699	0.9776	0.9853	0.9905	0.9956
HLP (average)												0.9872
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy

2.9101 (42)

Hot water usage for mixer showers

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	73.0131	71.9158	70.3169	67.2577	65.0001	62.4824	61.0514	62.6382	64.3776	67.0808	70.2057	72.7333
Hot water usage for baths	31.5212	31.0531	30.3939	29.1784	28.2682	27.2590	26.7139	27.3685	28.0812	29.1611	30.4017	31.4147
Hot water usage for other uses	44.4326	42.8169	41.2011	39.5854	37.9697	36.3539	36.3539	37.9697	39.5854	41.2011	42.8169	44.4326
Average daily hot water use (litres/day)												136.9340

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	148.9669	145.7858	141.9119	136.0215	131.2380	126.0954	124.1192	127.9763	132.0443	137.4431	143.4243	148.5806
Energy conte	235.9272	207.5970	218.1134	186.2066	176.6716	155.0490	150.1114	158.4614	162.8238	186.5090	204.3342	232.6413
Energy content (annual)										Total =	Sum(45)m =	2274.4459

Distribution loss (46)m = 0.15 x (45)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Distribution loss	35.3891	31.1396	32.7170	27.9310	26.5007	23.2573	22.5167	23.7692	24.4236	27.9764	30.6501	34.8962
Water storage loss (or HIU loss):												

Store volume

150.0000 (47)

b) If manufacturer declared loss factor is not known :

Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0115
Volume factor from Table 2a												0.9283
Temperature factor from Table 2b												0.5400
Enter (49) or (54) in (55)												0.8683

Total storage loss

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total storage loss	26.9176	24.3126	26.9176	26.0493	26.9176	26.0493	26.9176	26.9176	26.0493	26.9176	26.0493	26.9176
If cylinder contains dedicated solar storage	26.9176	24.3126	26.9176	26.0493	26.9176	26.0493	26.9176	26.9176	26.0493	26.9176	26.0493	26.9176
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total heat required for water heating calculated for each month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total heat required	286.1071	252.9209	268.2933	234.7679	226.8515	203.6102	200.2914	208.6414	211.3850	236.6890	252.8955	282.8213
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Output from w/h

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Output from w/h	286.1071	252.9209	268.2933	234.7679	226.8515	203.6102	200.2914	208.6414	211.3850	236.6890	252.8955	282.8213
Total per year (kWh/year)												2865.2745

12Total per year (kWh/year)

Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000

Heat gains from water heating, kWh/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat gains from water heating	118.5898	105.2851	112.6667	100.7627	98.8873	90.4028	90.0560	92.8324	92.9879	102.1582	106.7901	117.4972

5. Internal gains (see Table 5 and 5a)

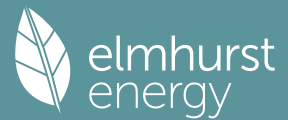
Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	154.0431	170.5477	154.0431	159.1779	154.0431	159.1779	154.0431	154.0431	159.1779	154.0431	159.1779	154.0431
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	305.4077	308.5769	300.5907	283.5889	262.1273	241.9564	228.4810	225.3119	233.2981	250.2998	271.7614	291.9323
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000
Losses e.g. evaporation (negative values) (Table 5)	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050
Water heating gains (Table 5)	159.3948	156.6742	151.4337	139.9482	132.9130	125.5594	121.0430	124.7747	129.1499	137.3094	148.3196	157.9264
Total internal gains	688.4976	705.4508	675.7194	652.3669	618.7353	593.3456	570.2191	570.7816	588.2777	611.3042	648.9108	673.5537

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	7.7800	10.6334	0.4000	0.8000	0.7700	18.3457

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South	13.3700	46.7521	0.4000	0.8000	0.7700	138.6167 (78)
West	11.8300	19.6403	0.4000	0.8000	0.7700	51.5247 (80)
West	10.3800	26.0000	0.4000	0.7000	1.0000	68.0098 (82)

Solar gains	276.4968	504.1222	765.8610	1056.9834	1268.4070	1292.6316	1232.6143	1072.2713	867.5801	578.8343	337.5051	232.3738 (83)
Total gains	964.9944	1209.5730	1441.5803	1709.3503	1887.1423	1885.9772	1802.8334	1643.0528	1455.8578	1190.1385	986.4159	905.9275 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	76.2889	76.4841	76.6803	77.6765	77.8789	78.9068	78.9068	79.1156	78.4924	77.8789	77.4752	77.0757
alpha	6.0859	6.0989	6.1120	6.1784	6.1919	6.2605	6.2605	6.2744	6.2328	6.1919	6.1650	6.1384
util living area	0.9970	0.9882	0.9564	0.8399	0.6444	0.4488	0.3238	0.3702	0.6186	0.9202	0.9910	0.9979 (86)
MIT	20.2072	20.3861	20.6134	20.8401	20.9303	20.9486	20.9502	20.9501	20.9389	20.7800	20.4457	20.1794 (87)
Th 2	20.0785	20.0806	20.0827	20.0934	20.0956	20.1063	20.1063	20.1085	20.1020	20.0956	20.0913	20.0870 (88)
util rest of house	0.9959	0.9843	0.9428	0.8020	0.5881	0.3870	0.2582	0.2987	0.5441	0.8894	0.9873	0.9972 (89)
MIT 2	19.1509	19.3795	19.6622	19.9295	20.0173	20.0418	20.0426	20.0448	20.0318	19.8743	19.4655	19.1224 (90)
Living area fraction												0.3431 (91)
MIT	19.5134	19.7249	19.9886	20.2419	20.3306	20.3530	20.3540	20.3554	20.3430	20.1851	19.8018	19.4851 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5134	19.7249	19.9886	20.2419	20.3306	20.3530	20.3540	20.3554	20.3430	20.1851	19.8018	19.4851 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9824	0.9412	0.8086	0.6031	0.4041	0.2764	0.3186	0.5646	0.8929	0.9858	0.9965 (94)
Useful gains	960.2525	1188.2684	1356.7922	1382.2446	1138.1264	762.1412	498.2468	523.4407	821.9677	1062.6863	972.3949	902.7864 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2088.9348	2030.4049	1842.6557	1529.5335	1160.8690	763.7271	498.3619	523.7141	833.1579	1289.2461	1717.3696	2077.3611 (97)
Space heating kWh	839.7397	565.9157	361.4824	106.0480	16.9205	0.0000	0.0000	0.0000	0.0000	168.5605	536.3818	873.8836 (98a)
Space heating requirement - total per year (kWh/year)												3468.9322
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	839.7397	565.9157	361.4824	106.0480	16.9205	0.0000	0.0000	0.0000	0.0000	168.5605	536.3818	873.8836 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3468.9322
Space heating per m2										(98c) / (4) =		25.4116 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												87.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	839.7397	565.9157	361.4824	106.0480	16.9205	0.0000	0.0000	0.0000	0.0000	168.5605	536.3818	873.8836 (98)
Space heating efficiency (main heating system 1)	87.3000	87.3000	87.3000	87.3000	87.3000	0.0000	0.0000	0.0000	0.0000	87.3000	87.3000	87.3000 (210)
Space heating fuel (main heating system)	961.9011	648.2425	414.0692	121.4754	19.3820	0.0000	0.0000	0.0000	0.0000	193.0819	614.4121	1001.0121 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	286.1071	252.9209	268.2933	234.7679	226.8515	203.6102	200.2914	208.6414	211.3850	236.6890	252.8955	282.8213 (64)
Efficiency of water heater (217)m	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000	87.3000 (216)
Fuel for water heating, kWh/month	327.7287	289.7146	307.3234	268.9208	259.8528	233.2305	229.4288	238.9936	242.1364	271.1214	289.6855	323.9648 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	43.0024	38.8409	43.0024	41.6153	43.0024	41.6153	43.0024	43.0024	41.6153	43.0024	41.6153	43.0024 (231)
Lighting	29.7977	23.9048	21.5237	15.7692	12.1806	9.9516	11.1115	14.4432	18.7602	24.6144	27.8020	30.6259 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3973.5764 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												92.3000
Water heating fuel used												3282.1014 (219)

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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 1.1000)	
mechanical ventilation fans (SFP = 1.1000)	465.3189 (230a)
central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	506.3189 (231)
Electricity for lighting (calculated in Appendix L)	240.4848 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	8002.4815 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3973.5764	0.2100	834.4510 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	3282.1014	0.2100	689.2413 (264)	
Space and water heating			1523.6923 (265)	
Pumps, fans and electric keep-hot	506.3189	0.1387	70.2327 (267)	
Energy for lighting	240.4848	0.1443	34.7094 (268)	
Total CO2, kg/year			1628.6344 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.9300 (273)	

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3973.5764	1.1300	4490.1413 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	3282.1014	1.1300	3708.7746 (278)	
Space and water heating			8198.9159 (279)	
Pumps, fans and electric keep-hot	506.3189	1.5128	765.9592 (281)	
Energy for lighting	240.4848	1.5338	368.8636 (282)	
Total Primary energy kWh/year			9333.7387 (286)	
Dwelling Primary energy Rate (DPER)			68.3700 (287)	

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	136.5100 (1b)	x 2.5400 (2b)	= 346.7354 (1b) - (3b)	
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	136.5100		4 (4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	346.7354 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1154 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3654	(18)
Number of sides sheltered	4	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2558 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3261	0.3197	0.3133	0.2813	0.2749	0.2430	0.2430	0.2366	0.2558	0.2749	0.2877	0.3005 (22b)
Effective ac	0.5532	0.5511	0.5491	0.5396	0.5378	0.5295	0.5295	0.5280	0.5327	0.5378	0.5414	0.5452 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0000	1.0000	2.0000			(26)
TER Opening Type			24.4400	1.1450	27.9847			(27)
TER Roof Light			7.6900	1.5918	15.5496			(27a)
Ground floor			136.5100	0.1300	17.7463			(28a)
External Wall 1	136.0900	24.4400	111.6500	0.1800	20.0970			(29a)
Wall to corr	20.8000	2.0000	18.8000	0.1800	3.3840			(29a)
Ceiling to corridor	0.9400		0.9400	0.1100	0.1034			(30)
External Roof 2	13.7800	7.6900	6.0900	0.1100	0.6699			(30)
Total net area of external elements Aum(A, m2)			308.1200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	87.5350		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 276.2481 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	22.4600	0.0500	1.1230
E4 Jamb	24.4200	0.0500	1.2210
E5 Ground floor (normal)	49.3000	0.1600	7.8880
E5 Ground floor (normal)	8.1900	0.1600	1.3104
E7 Party floor between dwellings (in blocks of flats)	39.9200	0.0700	2.7944
E7 Party floor between dwellings (in blocks of flats)	7.9800	0.0700	0.5586
E16 Corner (normal)	22.8600	0.0900	2.0574
E17 Corner (inverted - internal area greater than external area)	12.7000	-0.0900	-1.1430
E21 Exposed floor (inverted)	13.5500	0.3200	4.3360

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 20.1458 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 107.6808 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	63.2947	63.0585	62.8269	61.7394	61.5359	60.5887	60.5887	60.4132	60.9535	61.5359	61.9475	62.3779	(38)
Heat transfer coeff	170.9755	170.7393	170.5077	169.4201	169.2167	168.2694	168.2694	168.0940	168.6343	169.2167	169.6283	170.0586	(39)
Average = Sum(39)m / 12 =												169.4192	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2525	1.2507	1.2490	1.2411	1.2396	1.2327	1.2327	1.2314	1.2353	1.2396	1.2426	1.2458	(40)
HLP (average)												1.2411	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

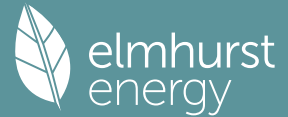
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9101 (42)
Hot water usage for mixer showers	73.0131	71.9158	70.3169	67.2577	65.0001	62.4824	61.0514	62.6382	64.3776	67.0808	70.2057	72.7333	(42a)
Hot water usage for baths	31.5212	31.0531	30.3939	29.1784	28.2682	27.2590	26.7139	27.3685	28.0812	29.1611	30.4017	31.4147	(42b)
Hot water usage for other uses	44.4326	42.8169	41.2011	39.5854	37.9697	36.3539	36.3539	37.9697	39.5854	41.2011	42.8169	44.4326	(42c)
Average daily hot water use (litres/day)												136.9340	(43)
Daily hot water use	148.9669	145.7858	141.9119	136.0215	131.2380	126.0954	124.1192	127.9763	132.0443	137.4431	143.4243	148.5806	(44)
Energy conte	235.9272	207.5970	218.1134	186.2066	176.6716	155.0490	150.1114	158.4614	162.8238	186.5090	204.3342	232.6413	(45)
Energy content (annual)										Total = Sum(45)m =		2274.4459	
Distribution loss (46)m = 0.15 x (45)m	35.3891	31.1396	32.7170	27.9310	26.5007	23.2573	22.5167	23.7692	24.4236	27.9764	30.6501	34.8962	(46)
Water storage loss (or HIU loss):													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	282.5221	249.6828	264.7083	231.2985	223.2665	200.1408	196.7063	205.0563	207.9156	233.1039	249.4260	279.2362	(62)
WWHRS	-33.3785	-29.5202	-30.9119	-25.5963	-23.8548	-20.4127	-19.1337	-20.3467	-21.1198	-24.8979	-28.2063	-32.7604	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	249.1435	220.1625	233.7964	205.7022	199.4117	179.7281	177.5726	184.7096	186.7958	208.2060	221.2197	246.4758	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2512.9239	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	115.7217	102.6946	109.7986	97.9872	96.0192	87.6273	87.1880	89.9644	90.2124	99.2902	104.0146	114.6292	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	154.0431	170.5477	154.0431	159.1779	154.0431	159.1779	154.0431	154.0431	159.1779	154.0431	159.1779	154.0431	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	305.4077	308.5769	300.5907	283.5889	262.1273	241.9564	228.4810	225.3119	233.2981	250.2998	271.7614	291.9323	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	(71)

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Water heating gains (Table 5)	155.5399	152.8193	147.5788	136.0933	129.0581	121.7045	117.1881	120.9198	125.2950	133.4545	144.4647	154.0715 (72)
Total internal gains	684.6426	701.5958	671.8645	648.5120	614.8804	589.4907	566.3642	566.9267	584.4228	607.4493	645.0559	669.6988 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
North					5.7600	10.6334	0.6300	0.7000			0.7700	18.7183 (74)
South					9.9100	46.7521	0.6300	0.7000			0.7700	141.5945 (78)
West					8.7700	19.6403	0.6300	0.7000			0.7700	52.6403 (80)
West					7.6900	26.0000	0.6300	0.7000			1.0000	79.3562 (82)

Solar gains	292.3093	535.4592	818.7719	1136.6501	1368.5547	1396.3318	1330.8513	1154.9213	929.8906	616.3342	357.2868	245.3394 (83)
Total gains	976.9519	1237.0551	1490.6363	1785.1622	1983.4351	1985.8226	1897.2155	1721.8480	1514.3134	1223.7835	1002.3427	915.0382 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	61.2671	61.3519	61.4352	61.8296	61.9039	62.2524	62.2524	62.3174	62.1177	61.9039	61.7537	61.5974
alpha	5.0845	5.0901	5.0957	5.1220	5.1269	5.1502	5.1502	5.1545	5.1412	5.1269	5.1169	5.1065
util living area	0.9972	0.9905	0.9684	0.8886	0.7274	0.5314	0.3884	0.4450	0.7111	0.9470	0.9927	0.9980 (86)
MIT	19.6592	19.9136	20.2662	20.6689	20.9064	20.9846	20.9975	20.9950	20.9380	20.5707	20.0270	19.6129 (87)
Th 2	19.8782	19.8796	19.8810	19.8873	19.8885	19.8940	19.8940	19.8950	19.8918	19.8885	19.8861	19.8836 (88)
util rest of house	0.9961	0.9870	0.9572	0.8536	0.6609	0.4446	0.2918	0.3403	0.6192	0.9217	0.9895	0.9972 (89)
MIT 2	18.3322	18.6568	19.0987	19.5779	19.8200	19.8867	19.8933	19.8936	19.8561	19.4817	18.8077	18.2769 (90)
Living area fraction	18.7875	19.0880	19.4993	19.9523	20.1928	20.2634	20.2722	20.2715	20.2273	fIA = Living area / (4) =	19.2261	0.3431 (91)
MIT	18.7875	19.0880	19.4993	19.9523	20.1928	20.2634	20.2722	20.2715	20.2273	19.8554	19.2261	18.7353 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7875	19.0880	19.4993	19.9523	20.1928	20.2634	20.2722	20.2715	20.2273	19.8554	19.2261	18.7353 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9946	0.9837	0.9524	0.8560	0.6801	0.4741	0.3250	0.3764	0.6487	0.9208	0.9869	0.9961 (94)
Useful gains	971.7139	1216.9330	1419.6590	1528.0222	1348.9986	941.5497	616.6244	648.0879	982.4098	1126.8765	989.1983	911.4259 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2477.0066	2422.4530	2216.4855	1872.4783	1437.1189	952.9725	617.9160	650.7810	1033.2712	1566.1637	2056.9314	2471.8554 (97)
Space heating kWh	1119.9377	810.1094	592.8389	248.0084	65.5615	0.0000	0.0000	0.0000	0.0000	326.8296	768.7678	1160.9595 (98a)
Space heating requirement - total per year (kWh/year)												5093.0129
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1119.9377	810.1094	592.8389	248.0084	65.5615	0.0000	0.0000	0.0000	0.0000	326.8296	768.7678	1160.9595 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5093.0129
Space heating per m ²										(98c) / (4) =		37.3087 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1119.9377	810.1094	592.8389	248.0084	65.5615	0.0000	0.0000	0.0000	0.0000	326.8296	768.7678	1160.9595 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	1213.3670	877.6916	642.2957	268.6982	71.0309	0.0000	0.0000	0.0000	0.0000	354.0949	832.9012	1257.8110 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	249.1435	220.1625	233.7964	205.7022	199.4117	179.7281	177.5726	184.7096	186.7958	208.2060	221.2197	246.4758 (64)
Efficiency of water heater	87.0141	86.7102	86.0550	84.4803	81.8526	79.8000	79.8000	79.8000	79.8000	85.0666	86.6171	79.8000 (216)
(217)m	87.0141	86.7102	86.0550	84.4803	81.8526	79.8000	79.8000	79.8000	79.8000	85.0666	86.6171	87.0801 (217)
Fuel for water heating, kWh/month	286.3254	253.9061	271.6824	243.4914	243.6228	225.2232	222.5221	231.4657	234.0800	244.7566	255.3997	283.0450 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	32.0071	25.6773	23.1196	16.9384	13.0837	10.6895	11.9354	15.5141	20.1512	26.4395	29.8634	32.8967 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-34.9964	-51.0216	-75.7940	-88.1324	-97.5015	-91.8358	-90.6416	-84.3172	-73.6340	-59.5686	-39.0440	-30.0580 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)

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Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-14.9730	-31.9439	-64.3468	-97.9317	-130.7891	-131.9496	-130.4666	-109.9290	-79.8232	-46.1815	-20.1453	-11.8124	-11.8124	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													5517.8905	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													2995.5201	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													258.3158	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1686.8371	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													7170.8893	(238)

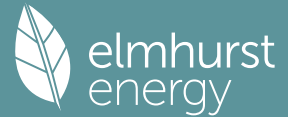
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5517.8905	0.2100	1158.7570 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2995.5201	0.2100	629.0592 (264)
Space and water heating			1787.8162 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	258.3158	0.1443	37.2829 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-816.5451	0.1339	-109.3423
PV Unit electricity exported	-870.2920	0.1255	-109.2182
Total			-218.5605 (269)
Total CO2, kg/year			1618.4679 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5517.8905	1.1300	6235.2163 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2995.5201	1.1300	3384.9377 (278)
Space and water heating			9620.1540 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	258.3158	1.5338	396.2134 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-816.5451	1.4949	-1220.6246
PV Unit electricity exported	-870.2920	0.4606	-400.8885
Total			-1621.5132 (283)
Total Primary energy kWh/year			8524.9550 (286)
Target Primary Energy Rate (TPER)			62.4500 (287)

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Plot Reference	Green_MVHR_PV				Issued on Date	04/05/2026	
Assessment Reference	Flat 1			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	77 C		DER	4.60		TER	11.86
Environmental	96 A		% DER < TER				61.21
CO ₂ Emissions (t/year)	0.54		DFEE	41.17		TFEE	43.61
Compliance Check	See BREL		% DFEE < TFEE				5.59
% DPER < TPER	23.55		DPER	47.74		TPER	62.45
Assessor Details	Ms. Sherleen Pang				Assessor ID	BA17-0001	
Client							

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	136.5100 (1b)	2.5400 (2b)	346.7354 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	136.5100		346.7354 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	346.7354 (5)

2. Ventilation rate

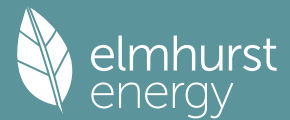
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1225 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1562	0.1531	0.1501	0.1347	0.1317	0.1164	0.1164	0.1133	0.1225	0.1317	0.1378	0.1439 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												68.8000 (23c)
Effective ac	0.3122	0.3091	0.3061	0.2908	0.2877	0.2724	0.2724	0.2693	0.2785	0.2877	0.2938	0.2999 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.0000	1.0000	2.0000		(26)
Windows			32.9800	1.1450	37.7634		(27)
Rooflight			10.3800	1.1450	11.8855		(27a)
Ground floor			136.5100	0.1000	13.6510	110.0000	15016.1000 (28a)
External Wall 1	136.0900	32.9800	103.1100	0.1500	15.4665	140.0000	14435.3995 (29a)
Wall to corr	20.8000	2.0000	18.8000	0.2500	4.7000	140.0000	2631.9999 (29a)
Ceiling to corridor	0.9400		0.9400	0.2500	0.2350	9.0000	8.4600 (30)
External Roof 2	13.7800	10.3800	3.4000	0.1000	0.3400	9.0000	30.6000 (30)
Total net area of external elements Aum(A, m ²)			308.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	86.0414		(33)
Main dwelling							
Ceiling to commercial			121.7900			30.0000	3653.7000 (32b)
Internal Wall 1			214.9300			9.0000	1934.3699 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	37710.6293 (34)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

276.2481 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	22.4600	0.0500	1.1230
E2 Other lintels (including other steel lintels)	24.4200	0.0500	1.2210
E4 Jamb	49.3000	0.0800	3.9440
E5 Ground floor (normal)	8.1900	0.0800	0.6552
E5 Ground floor (normal)	39.9200	0.0700	2.7944
E7 Party floor between dwellings (in blocks of flats)	7.9800	0.0700	0.5586
E7 Party floor between dwellings (in blocks of flats)	22.8600	0.0900	2.0574
E16 Corner (normal)	12.7000	-0.0900	-1.1430
E17 Corner (inverted - internal area greater than external area)	13.5500	0.3200	4.3360
E21 Exposed floor (inverted)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

15.5466 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 101.5880 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	35.7213	35.3709	35.0205	33.2684	32.9180	31.1659	31.1659	30.8155	31.8667	32.9180	33.6188	34.3197
Heat transfer coeff	137.3093	136.9589	136.6084	134.8563	134.5059	132.7538	132.7538	132.4034	133.4547	134.5059	135.2068	135.9076
Average = Sum(39)m / 12 =												134.7687

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0059	1.0033	1.0007	0.9879	0.9853	0.9725	0.9725	0.9699	0.9776	0.9853	0.9905	0.9956
HLP (average)												0.9872
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy

2.9101 (42)

Hot water usage for mixer showers

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	73.0131	71.9158	70.3169	67.2577	65.0001	62.4824	61.0514	62.6382	64.3776	67.0808	70.2057	72.7333
Hot water usage for baths	31.5212	31.0531	30.3939	29.1784	28.2682	27.2590	26.7139	27.3685	28.0812	29.1611	30.4017	31.4147
Hot water usage for other uses	44.4326	42.8169	41.2011	39.5854	37.9697	36.3539	36.3539	37.9697	39.5854	41.2011	42.8169	44.4326
Average daily hot water use (litres/day)												136.9340

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	148.9669	145.7858	141.9119	136.0215	131.2380	126.0954	124.1192	127.9763	132.0443	137.4431	143.4243	148.5806
Energy conte	235.9272	207.5970	218.1134	186.2066	176.6716	155.0490	150.1114	158.4614	162.8238	186.5090	204.3342	232.6413
Energy content (annual)										Total = Sum(45)m =		2274.4459

Distribution loss (46)m = 0.15 x (45)m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Distribution loss	35.3891	31.1396	32.7170	27.9310	26.5007	23.2573	22.5167	23.7692	24.4236	27.9764	30.6501	34.8962
Water storage loss (or HIU loss):												

Store volume

150.0000 (47)

b) If manufacturer declared loss factor is not known :

Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0115
Volume factor from Table 2a												0.9283
Temperature factor from Table 2b												0.5400
Enter (49) or (54) in (55)												0.8683

Total storage loss

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total storage loss	26.9176	24.3126	26.9176	26.0493	26.9176	26.0493	26.9176	26.9176	26.0493	26.9176	26.0493	26.9176
If cylinder contains dedicated solar storage	26.9176	24.3126	26.9176	26.0493	26.9176	26.0493	26.9176	26.9176	26.0493	26.9176	26.0493	26.9176

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	286.1071	252.9209	268.2933	234.7679	226.8515	203.6102	200.2914	208.6414	211.3850	236.6890	252.8955	282.8213
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Output from w/h

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Output from w/h	286.1071	252.9209	268.2933	234.7679	226.8515	203.6102	200.2914	208.6414	211.3850	236.6890	252.8955	282.8213
Total per year (kWh/year)												2865.2745

Electric shower(s)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000

Heat gains from water heating, kWh/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat gains from water heating, kWh/month	118.5898	105.2851	112.6667	100.7627	98.8873	90.4028	90.0560	92.8324	92.9879	102.1582	106.7901	117.4972

5. Internal gains (see Table 5 and 5a)

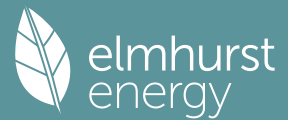
Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	154.0431	170.5477	154.0431	159.1779	154.0431	159.1779	154.0431	154.0431	159.1779	154.0431	159.1779	154.0431
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	305.4077	308.5769	300.5907	283.5889	262.1273	241.9564	228.4810	225.3119	233.2981	250.2998	271.7614	291.9323
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506	37.5506
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000
Losses e.g. evaporation (negative values) (Table 5)	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050	-116.4050
Water heating gains (Table 5)	159.3948	156.6742	151.4337	139.9482	132.9130	125.5594	121.0430	124.7747	129.1499	137.3094	148.3196	157.9264
Total internal gains	688.4976	705.4508	675.7194	652.3669	618.7353	593.3456	570.2191	570.7816	588.2777	611.3042	648.9108	673.5537

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	7.7800	10.6334	0.4000	0.8000	0.7700	18.3457

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South	13.3700	46.7521	0.4000	0.8000	0.7700	138.6167 (78)
West	11.8300	19.6403	0.4000	0.8000	0.7700	51.5247 (80)
West	10.3800	26.0000	0.4000	0.7000	1.0000	68.0098 (82)

Solar gains	276.4968	504.1222	765.8610	1056.9834	1268.4070	1292.6316	1232.6143	1072.2713	867.5801	578.8343	337.5051	232.3738 (83)
Total gains	964.9944	1209.5730	1441.5803	1709.3503	1887.1423	1885.9772	1802.8334	1643.0528	1455.8578	1190.1385	986.4159	905.9275 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	76.2889	76.4841	76.6803	77.6765	77.8789	78.9068	78.9068	79.1156	78.4924	77.8789	77.4752	77.0757
alpha	6.0859	6.0989	6.1120	6.1784	6.1919	6.2605	6.2605	6.2744	6.2328	6.1919	6.1650	6.1384
util living area	0.9970	0.9882	0.9564	0.8399	0.6444	0.4488	0.3238	0.3702	0.6186	0.9202	0.9910	0.9979 (86)
MIT	20.2072	20.3861	20.6134	20.8401	20.9303	20.9486	20.9502	20.9501	20.9389	20.7800	20.4457	20.1794 (87)
Th 2	20.0785	20.0806	20.0827	20.0934	20.0956	20.1063	20.1063	20.1085	20.1020	20.0956	20.0913	20.0870 (88)
util rest of house	0.9959	0.9843	0.9428	0.8020	0.5881	0.3870	0.2582	0.2987	0.5441	0.8894	0.9873	0.9972 (89)
MIT 2	19.1509	19.3795	19.6622	19.9295	20.0173	20.0418	20.0426	20.0448	20.0318	19.8743	19.4655	19.1224 (90)
Living area fraction												0.3431 (91)
MIT	19.5134	19.7249	19.9886	20.2419	20.3306	20.3530	20.3540	20.3554	20.3430	20.1851	19.8018	19.4851 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5134	19.7249	19.9886	20.2419	20.3306	20.3530	20.3540	20.3554	20.3430	20.1851	19.8018	19.4851 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9824	0.9412	0.8086	0.6031	0.4041	0.2764	0.3186	0.5646	0.8929	0.9858	0.9965 (94)
Useful gains	960.2525	1188.2684	1356.7922	1382.2446	1138.1264	762.1412	498.2468	523.4407	821.9677	1062.6863	972.3949	902.7864 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2088.9348	2030.4049	1842.6557	1529.5335	1160.8690	763.7271	498.3619	523.7141	833.1579	1289.2461	1717.3696	2077.3611 (97)
Space heating kWh	839.7397	565.9157	361.4824	106.0480	16.9205	0.0000	0.0000	0.0000	0.0000	168.5605	536.3818	873.8836 (98a)
Space heating requirement - total per year (kWh/year)												3468.9322
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	839.7397	565.9157	361.4824	106.0480	16.9205	0.0000	0.0000	0.0000	0.0000	168.5605	536.3818	873.8836 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3468.9322
Space heating per m2										(98c) / (4) =		25.4116 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												170.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	839.7397	565.9157	361.4824	106.0480	16.9205	0.0000	0.0000	0.0000	0.0000	168.5605	536.3818	873.8836 (98)
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000 (210)
Space heating fuel (main heating system)	493.9645	332.8916	212.6367	62.3812	9.9532	0.0000	0.0000	0.0000	0.0000	99.1532	315.5187	514.0492 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	286.1071	252.9209	268.2933	234.7679	226.8515	203.6102	200.2914	208.6414	211.3850	236.6890	252.8955	282.8213 (64)
Efficiency of water heater (217)m	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000 (216)
Fuel for water heating, kWh/month	168.2983	148.7770	157.8196	138.0988	133.4421	119.7707	117.8185	122.7302	124.3441	139.2288	148.7620	166.3655 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	39.5202	35.6957	39.5202	38.2454	39.5202	38.2454	39.5202	39.5202	38.2454	39.5202	38.2454	39.5202 (231)
Lighting	29.7977	23.9048	21.5237	15.7692	12.1806	9.9516	11.1115	14.4432	18.7602	24.6144	27.8020	30.6259 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-5.7534	-10.3680	-19.3076	-27.0865	-33.8287	-33.3934	-32.6731	-27.9824	-20.8097	-13.3924	-6.9296	-4.6829 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2040.5483 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												170.0000
Water heating fuel used												1685.4556 (219)

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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 1.1000)	
mechanical ventilation fans (SFP = 1.1000)	465.3189 (230a)
Total electricity for the above, kWh/year	465.3189 (231)
Electricity for lighting (calculated in Appendix L)	240.4848 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-236.2075 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	4195.6001 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2040.5483	0.1575	321.4648 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1685.4556	0.1410	237.6277 (264)
Space and water heating			559.0925 (265)
Pumps, fans and electric keep-hot	465.3189	0.1387	64.5455 (267)
Energy for lighting	240.4848	0.1443	34.7094 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-236.2075	0.1305	-30.8273
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-30.8273 (269)
Total CO2, kg/year			627.5201 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6000 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2040.5483	1.5832	3230.5250 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1685.4556	1.5213	2564.1240 (278)
Space and water heating			5794.6489 (279)
Pumps, fans and electric keep-hot	465.3189	1.5128	703.9344 (281)
Energy for lighting	240.4848	1.5338	368.8636 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-236.2075	1.4821	-350.0841
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-350.0841 (283)
Total Primary energy kWh/year			6517.3628 (286)
Dwelling Primary energy Rate (DPER)			47.7400 (287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

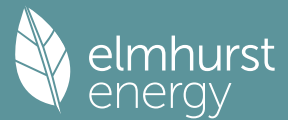
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	136.5100 (1b)	2.5400 (2b)	346.7354 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	136.5100		346.7354 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	346.7354 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	40.0000 / (5) = 0.1154 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3654 (18)
Number of sides sheltered	4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2558 (21)

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Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
	0.3261	0.3197	0.3133	0.2813	0.2749	0.2430	0.2430	0.2366	0.2558	0.2749	0.2877	0.3005	(22b)
Effective ac	0.5532	0.5511	0.5491	0.5396	0.5378	0.5295	0.5295	0.5280	0.5327	0.5378	0.5414	0.5452	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0000	1.0000	2.0000			(26)
TER Opening Type			24.4400	1.1450	27.9847			(27)
TER Roof Light			7.6900	1.5918	15.5496			(27a)
Ground floor			136.5100	0.1300	17.7463			(28a)
External Wall 1	136.0900	24.4400	111.6500	0.1800	20.0970			(29a)
Wall to corr	20.8000	2.0000	18.8000	0.1800	3.3840			(29a)
Ceiling to corridor	0.9400		0.9400	0.1100	0.1034			(30)
External Roof 2	13.7800	7.6900	6.0900	0.1100	0.6699			(30)
Total net area of external elements Aum(A, m2)			308.1200					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	87.5350		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							276.2481	(35)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	22.4600	0.0500	1.1230	
E4 Jamb	24.4200	0.0500	1.2210	
E5 Ground floor (normal)	49.3000	0.1600	7.8880	
E5 Ground floor (normal)	8.1900	0.1600	1.3104	
E7 Party floor between dwellings (in blocks of flats)	39.9200	0.0700	2.7944	
E7 Party floor between dwellings (in blocks of flats)	7.9800	0.0700	0.5586	
E16 Corner (normal)	22.8600	0.0900	2.0574	
E17 Corner (inverted - internal area greater than external area)	12.7000	-0.0900	-1.1430	
E21 Exposed floor (inverted)	13.5500	0.3200	4.3360	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			20.1458	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	107.6808 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	63.2947	63.0585	62.8269	61.7394	61.5359	60.5887	60.5887	60.4132	60.9535	61.5359	61.9475	62.3779	(38)
Heat transfer coeff	170.9755	170.7393	170.5077	169.4201	169.2167	168.2694	168.2694	168.0940	168.6343	169.2167	169.6283	170.0586	(39)
Average = Sum(39)m / 12 =												169.4192	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2525	1.2507	1.2490	1.2411	1.2396	1.2327	1.2327	1.2314	1.2353	1.2396	1.2426	1.2458	(40)
HLP (average)												1.2411	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9101	(42)
Hot water usage for mixer showers														
73.0131	71.9158	70.3169	67.2577	65.0001	62.4824	61.0514	62.6382	64.3776	67.0808	70.2057	72.7333	72.7333	(42a)	
Hot water usage for baths														
31.5212	31.0531	30.3939	29.1784	28.2682	27.2590	26.7139	27.3685	28.0812	29.1611	30.4017	31.4147	31.4147	(42b)	
Hot water usage for other uses														
44.4326	42.8169	41.2011	39.5854	37.9697	36.3539	36.3539	37.9697	39.5854	41.2011	42.8169	44.4326	44.4326	(42c)	
Average daily hot water use (litres/day)													136.9340	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
148.9669	145.7858	141.9119	136.0215	131.2380	126.0954	124.1192	127.9763	132.0443	137.4431	143.4243	148.5806	148.5806	(44)	
Energy content (annual)	235.9272	207.5970	218.1134	186.2066	176.6716	155.0490	150.1114	158.4614	162.8238	186.5090	204.3342	232.6413	(45)	
Distribution loss (46)m = 0.15 x (45)m														
35.3891	31.1396	32.7170	27.9310	26.5007	23.2573	22.5167	23.7692	24.4236	27.9764	30.6501	34.8962	34.8962	(46)	
Water storage loss (or HIU loss):														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(56)	
If cylinder contains dedicated solar storage														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
282.5221	249.6828	264.7083	231.2985	223.2665	200.1408	196.7063	205.0563	207.9156	233.1039	249.4260	279.2362	279.2362	(62)	
WWHRS	-33.3785	-29.5202	-30.9119	-25.5963	-23.8548	-20.4127	-19.1337	-20.3467	-21.1198	-24.8979	-28.2063	-32.7604	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h														
249.1435	220.1625	233.7964	205.7022	199.4117	179.7281	177.5726	184.7096	186.7958	208.2060	221.2197	246.4758	246.4758	(64)	
12Total per year (kWh/year)													2512.9239	(64)
Electric shower(s)													2513	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
115.7217	102.6946	109.7986	97.9872	96.0192	87.6273	87.1880	89.9644	90.2124	99.2902	104.0146	114.6292	114.6292	(65)	

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	145.5063	(66)	

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(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	32.0071	25.6773	23.1196	16.9384	13.0837	10.6895	11.9354	15.5141	20.1512	26.4395	29.8634	32.8967	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-34.9964	-51.0216	-75.7940	-88.1324	-97.5015	-91.8358	-90.6416	-84.3172	-73.6340	-59.5686	-39.0440	-30.0580	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-14.9730	-31.9439	-64.3468	-97.9317	-130.7891	-131.9496	-130.4666	-109.9290	-79.8232	-46.1815	-20.1453	-11.8124	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												5517.8905	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2995.5201	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												258.3158	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1686.8371	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												7170.8893	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5517.8905	0.2100	1158.7570 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2995.5201	0.2100	629.0592 (264)
Space and water heating			1787.8162 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	258.3158	0.1443	37.2829 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-816.5451	0.1339	-109.3423
PV Unit electricity exported	-870.2920	0.1255	-109.2182
Total			-218.5605 (269)
Total CO2, kg/year			1618.4679 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5517.8905	1.1300	6235.2163 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2995.5201	1.1300	3384.9377 (278)
Space and water heating			9620.1540 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	258.3158	1.5338	396.2134 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-816.5451	1.4949	-1220.6246
PV Unit electricity exported	-870.2920	0.4606	-400.8885
Total			-1621.5132 (283)
Total Primary energy kWh/year			8524.9550 (286)
Target Primary Energy Rate (TPER)			62.4500 (287)

Appendix E – BRUKL output

Project name

Be Lean Assessment**As designed****Date:** Fri May 01 11:38:31 2026**Administrative information****Building Details****Address:** 6A Denmark Terrace, Haringey, London, N2 9HG**Certifier details****Name:** Ecolytk Ltd**Telephone number:** 0203 835 4114**Address:** Paul Street, London, EC2A 4NE**Certification tool****Calculation engine:** SBEM**Calculation engine version:** v6.1.e.2**Interface to calculation engine:** Virtual Environment**Interface to calculation engine version:** v7.0.31**BRUKL compliance module version:** v6.1.e.1**Foundation area [m²]:** 44.72**The CO₂ emission and primary energy rates of the building must not exceed the targets**

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.68
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.7
Target primary energy rate (TPER), kWh _{PE} /m ² annum	39.61
Building primary energy rate (BPER), kWh _{PE} /m ² annum	28.85
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	0F000000_W1
Floors	0.18	0.1	0.1	0F000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	-	-	No heat loss flat roofs
Windows** and roof windows	1.6	1.2	1.2	0F000000_W3_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

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	4

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	2.7	5.89	-	-	-
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- SYST0000-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			
OF Toilet	0.3	-	-	-	-	-	-	-	-	-	-	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
OF Office	120	-	-
OF Toilet	120	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
OF Office	NO (-70.7%)	YES
OF Toilet	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?	YES
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]	44.7	44.7
External area [m ²]	46.9	46.9
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	4	3
Average conductance [W/K]	20.13	31.32
Average U-value [W/m ² K]	0.43	0.67
Alpha value* [%]	34.61	39.87

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	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	6.89	9.01
Cooling	4.12	6.92
Auxiliary	0.04	0.06
Lighting	5.56	7.97
Hot water	2.73	2.73
Equipment*	40.75	40.75
TOTAL **	19.34	26.69

* 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]	130.91	195.19
Primary energy [kWh _{PE} /m ²]	28.85	39.61
Total emissions [kg/m ²]	2.7	3.68

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	65.6	65.3	6.9	4.1	0	2.64	4.4	2.7	5.89
	Notional	85.6	109.6	9	6.9	0.1	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

Be Green Assessment**As designed****Date:** Fri May 01 11:36:35 2026**Administrative information****Building Details****Address:** 6A Denmark Terrace, Haringey, London, N2 9HG**Certifier details****Name:** Ecolytk Ltd**Telephone number:** 0203 835 4114**Address:** Paul Street, London, EC2A 4NE**Certification tool****Calculation engine:** SBEM**Calculation engine version:** v6.1.e.2**Interface to calculation engine:** Virtual Environment**Interface to calculation engine version:** v7.0.31**BRUKL compliance module version:** v6.1.e.1**Foundation area [m²]:** 44.72**The CO₂ emission and primary energy rates of the building must not exceed the targets**

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.68
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.35
Target primary energy rate (TPER), kWh _{PE} /m ² annum	39.61
Building primary energy rate (BPER), kWh _{PE} /m ² annum	25.29
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	0F000000_W1
Floors	0.18	0.1	0.1	0F000000_F
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	-	-	No heat loss flat roofs
Windows** and roof windows	1.6	1.2	1.2	0F000000_W3_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

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	4

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	4	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- SYST0000-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
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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			
OF Toilet	0.3	-	-	-	-	-	-	-	-	-	-	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
OF Office	120	-	-
OF Toilet	120	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
OF Office	NO (-70.7%)	YES
OF Toilet	N/A	N/A

Regulation 25A: Consideration of high efficiency alternative energy systems

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

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	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
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	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.64	9.01
Cooling	4.05	6.92
Auxiliary	0.04	0.06
Lighting	5.56	7.97
Hot water	2.73	2.73
Equipment*	40.75	40.75
TOTAL **	17.02	26.69

* 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]	130.91	195.19
Primary energy [kWh _{PE} /m ²]	25.29	39.61
Total emissions [kg/m ²]	2.35	3.68

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	65.6	65.3	4.6	4	0	3.92	4.48	4	6
	Notional	85.6	109.6	9	6.9	0.1	2.64	4.4	----	----

Key to terms

- Heat dem [MJ/m2] = Heating energy demand
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- Heat con [kWh/m2] = Heating energy consumption
- Cool con [kWh/m2] = Cooling energy consumption
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- Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
- ST = System type
- HS = Heat source
- HFT = Heating fuel type
- CFT = Cooling fuel type

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